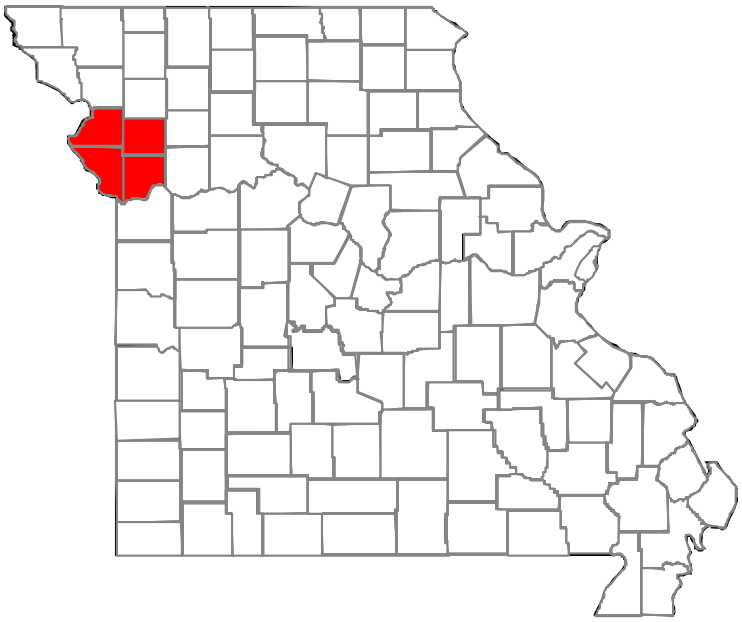
PRE-CERCLIS SITE SCREENING REPORT

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and DeKalb Counties, Missouri

September 30, 2010



Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

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EXECUTIVE SUMMARY

HISTORY

Beginning in the early 1980s and continuing until 2009, wastewater treatment sludge from a leather tannery in St. Joseph, Mo. was land applied as an agricultural fertilizer on farm fields in Andrew, Buchanan, Clinton and DeKalb counties in northwest Missouri. The fertilizer was applied to more than 100 farm fields covering an area of approximately 56,000 acres. In 2009, the Missouri Department of Natural Resources (department) initiated an investigation in response to public concerns about whether the sludge material contained hexavalent chromium that might pose health risks to the public. Chromium can exist in different forms, each with differing levels of toxicity. The hexavalent form of chromium is of concern because it is known to cause cancer in the human respiratory and digestive systems. Land application of the sludge ceased in early 2009, and the sludge is currently being disposed of in landfills in the St. Joseph area.

SAMPLING

The department's investigation included sampling of nine private groundwater wells, 19 farm fields, and 10 residential yards at selected locations in each of the four counties. Sampling was also conducted in areas that did not receive any sludge applications to provide background levels of chromium in the area. Nearly 600 soil samples were collected during several sampling events conducted in 2009 and 2010. Documents related to the investigation, including results of the soil and water sampling are available online at dnr.mo.gov/env/hwp/sw-sampling.htm.

FINDINGS

The sampling shows that past sludge applications have resulted in concentrations of chromium (including the hexavalent form) present in farm fields, yards and private wells. However, the hexavalent chromium concentrations do not exceed the health-based screening levels established for this site by the Environmental Protection Agency and the Missouri Department of Health and Senior Services. Based on the data collected, past land application of tannery wastewater treatment sludge does not appear to have resulted in a health threat to residents or farmers living in the sludge application areas. Therefore, no further investigation of the site is recommended or planned.

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PRE-CERCLIS SITE SCREENING FORMS

DATE	**September 30, 2010**
PREPARED BY	**Michael Stroh** **Missouri Department of Natural Resources**
SITE	**Tannery Sludge Farm Fields Site** **Andrew, Buchanan, Clinton, and Dekalb Counties**
C.A. NUMBER	**V997381-10**

1.0 INTRODUCTION

The Missouri Department of Natural Resources (Department), through a Cooperative Agreement with the U.S. Environmental Protection Agency (EPA), conducted a Pre-CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) Site Screening (SS) at the Tannery Sludge Farm Fields Site in Andrew, Buchanan, Clinton, and DeKalb Counties, Missouri. The purpose of this investigation was to determine whether there has been a release of a hazardous substance into the environment, or a substantial threat of such a release, which may present a danger to human health or the environment. If such a release has occurred, the site may be eligible for entry onto CERCLIS, EPA's inventory of potential hazardous substance sites that are evaluated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The site consists of over 100 agricultural fields where wastewater treatment sludge from a leather tannery facility was applied as a fertilizer. The investigation was initiated due to concerns about the presence of hexavalent chromium in the sludge.

This SS investigation was unique in that the site covered such a large area and required such an extensive sampling effort. Although the SS investigation was conceived and designed as one large study, decisions were made at the level of each assessed farm field and residential yard (decision units). As a result of the site size and investigation complexity, this report has been organized as a single main narrative section discussing aspects of the overall investigation that apply to all of the farm fields and residential yards investigated. Each of the individual farm field and yard decision units are then reported using separate SS forms included as appendices. The scope of the investigation included review of historical documents and sampling of soil and groundwater. The SS

investigation was initiated on June 8, 2009 and included sampling events conducted in August 2009, October 2009, December 2009, January 2010, and April 2010.

2.0 SITE DESCRIPTION

2.1 Location

The Tannery Sludge Farm Field site is a group of agricultural fields and nearby residences in various locations across parts of Andrew, Buchanan, Clinton and DeKalb Counties in northwestern Missouri, where wastewater treatment system sludge from a leather tannery in St. Joseph, Missouri was marketed as Organic Plus fertilizer and land applied. Figure A1 shows the overall 4-county area and identifies farm fields within each county where sludge was applied, as well as the tannery facility in St. Joseph. Sludge was applied in over 100 farm field locations in these four counties.

Since sampling every farm field which received sludge was beyond the typical scope of a Pre-CERCLIS SS investigation, an initial set of farm fields was selected in which to conduct sampling. US EPA Region VII staff selected a subset of sludge-applied fields for assessment using the extensive records of application dates, volumes and locations provided by the tannery (USEPA, 2009b). The subset includes 15 parcels that represent relatively high, medium and low rates of sludge application and frequency, and includes fields that received both more recent and older historic applications. An effort was also made to include fields in all four counties. Residential yards and private drinking water wells adjacent to or nearby these 15 parcels were also included in the investigation. Note that since 4 of the selected farm fields were larger than the 80-acre exposure area referred to as a decision unit (DU) used to develop the risk-based screening level (described in the SAP, MDNR, 2010a), the fields were divided into 2 DUs each, which brought the total number of farm field DUs actually assessed to 19. A total of 10 residences and 9 wells adjacent to the fields were sampled. Background sampling included 5 farm fields, 4 residences, and 3 wells. Figure A2 shows the locations of the farm field decision units, residences, wells and background sample locations on a 4-county map background. The individual farm field DUs are also depicted at a larger scale in Figures A3 through A21.

2.2 Operational History

The National Beef Leathers (NBL) tannery is located at 205 Florence Road in St. Joseph, Missouri. The tannery was previously known as Blueside, which became Prime Tanning in 1996 and was then purchased by NBL in March 2009. Starting in 1983, wastewater treatment sludge from the tannery was land applied as an agricultural fertilizer. The sludge was marketed as Organic Plus fertilizer and provided free to farmers in Andrew, Buchanan, Clinton and DeKalb Counties. In addition to land application, sludge and other wastes from the tannery have been disposed of in the St. Joseph sanitary landfill and other area landfills. Following public concern over potential health threat posed by the applied sludge, land application ceased in early 2009. Since that time, the tannery sludge has been disposed of solely in area landfills. At the time of this report, the sludge is disposed of at the Courtney Ridge Landfill northwest of Independence, MO.

Records provided by NBL indicate that the sludge was delivered to approximately 110 locations in the four county area covering over 56,000 acres of agricultural fields. The sludge was applied over a period of 26 years, ending in the spring of 2009 when concerns were raised regarding the hexavalent chromium concentration ([Cr^{+6}]) of the sludge and potential risks posed to farmers working the land and to residents living adjacent to application areas. MDNR file information indicates the applications were initially conducted under a letter of approval from the Department's Solid Waste Management Program and later, under Department-issued permits until 2005, at which time, permits were no longer required (MDNR, 2009a).

2.3 Previous Investigations

A joint investigation was conducted by the Department and EPA in April/May 2009, which included sampling of sludge and other wastes and process materials at NBL, as well as sampling at three farm fields (MDNR, 2009b, USEPA, 2009a). In May 2009, Transcanada Keystone Pipeline LP conducted a soil sampling investigation of hexavalent chromium along areas traversed by their pipeline in NW Missouri (Hackman, 2009). Also in May 2009, the department's Solid Waste Management Program conducted a sampling event at portions of the St. Joseph Sanitary Landfill where tannery sludge had been disposed (MDNR, 2009c). In August 2009 and October 2009, the Department conducted pilot

studies at farm fields and nearby residential yards to aid in designing the full scale investigation discussed in this report (MDNR, 2009d).

Summaries of these investigations and their findings were presented in the department's Tannery Sludge Farm Fields Field and Residential Yards Sampling and Analysis Plan (SAP) (MDNR, 2010a) and the Site Investigation Findings Reports for the farm fields and yards (MDNR, 2009e, and MDNR 2009f, MDNR, 2009g).

3.0 WASTE CHARACTERISTICS

3.1 Waste Type

The sludge is generated from the wastewater treatment process at a leather tanning facility. The general information on the tanning process provided below was taken from an EPA Emissions Factor document on leather tanning (USEPA, 1997). Leather tanning is essentially the reaction of collagen fibers in the hide with either tannins (vegetable process) or chromium (mineral process) along with other chemical agents. The tanning process renders animal hides softer, more pliable, and more resistant to wear and damage from water. Mineral tanning involves a reaction between the hide and a trivalent chromium salt (e.g. chromium sulfate). During the process, hides are "pickled" by placing them in contact with a mixture of salt and acid. The chromium tanning solution is introduced and allowed to penetrate the hide for a period of time after which the pH is raised. Following tanning, the chrome-tanned leather is piled down, wrung, and graded for the thickness and quality, split into flesh and grain layers, and shaved to the desired thickness.

According to information obtained during the April/May 2009 facility inspection, the NBL tannery in St. Joseph uses a mineral tanning process (USEPA, 2009a). The process generates two solid waste streams; a wastewater treatment "tannery sludge" waste and a "shave pit" waste. The tannery sludge waste is generated from the treatment of wastewater (Photo 31, Appendix B) and the shave pit waste consists of a collection of solid wastes from various points in the tanning process which are combined together prior to disposal.

3.2 Chromium - Properties and Toxicity

Except as otherwise noted, information in Section 3.2 was taken from the Toxicological Profile for Chromium (ATSDR, 2008). Chromium is a naturally occurring element found in rocks, animals, plants and soil. The most common forms are trivalent chromium (Cr^{+3}), and hexavalent chromium (Cr^{+6}). Chromium compounds are stable in the Cr^{+3} state and occur in nature in this state as ores. Cr^{+3} is an essential nutrient that helps the body use sugar, protein and fat. Cr^{+6} is the second most stable state. It rarely occurs naturally, but is produced from anthropogenic sources. Both Cr^{+3} and Cr^{+6} have been used for chrome plating, making dyes and pigments, leather tanning and wood preservation. Older chromium tanning processes involved using both Cr^{+3} and Cr^{+6} forms of chromium. More modern processes typically only use Cr^{+3}; however some Cr^{+6} may be formed incidentally during the tanning process and end up in various tanning wastes.

The environmental fate of chromium in soil is greatly dependent upon the speciation of chromium, which is a function reduction/oxidation (redox) conditions of the soil. In most soils, chromium will be present predominantly in the Cr^{+3} state. This form has very low solubility and low reactivity resulting in low mobility in the environment and low toxicity in living organisms. Under oxidizing conditions, some Cr^{+3} may be converted to Cr^{+6} in soil. In the Cr^{+6} form, chromium is relatively soluble, mobile, and toxic to living organisms. In deeper soil where anaerobic conditions exist, Cr^{+6} will tend to be reduced to Cr^{+3} by sulfur and iron present in soil. The reduction of Cr^{+6} to Cr^{+3} is possible in aerobic soils that contain appropriate organic energy sources to carry out the redox reaction, with the reduction of Cr^{+6} to Cr^{+3} facilitated by low pH.

The oxidation of Cr^{+3} to Cr^{+6} in soil is facilitated by the presence of organic substances, oxygen, manganese dioxide, and moisture. However, oxidation of Cr^{+3} to Cr^{+6} has not been observed in soil under conditions of maximum aeration and a maximum pH of 7.3. It has been reported that soluble Cr^{+3} in soil can be partly oxidized to Cr^{+6} by manganese dioxide in soil, and the process is enhanced at pH values >6. Because most Cr^{+3} in soil is immobilized due to adsorption and complexation with soil materials, the barrier to this oxidation process is the lack of availability of mobile Cr^{+3} to immobile manganese dioxide in soil surfaces. Due to this lack of availability of mobile Cr^{+3} to

manganese dioxide surfaces, a large portion of chromium in soil will not be oxidized to Cr^{+6}, even in the presence of manganese dioxide and favorable pH conditions.

Bioaccumulation of chromium from soil to aboveground parts of plants is unlikely. There is no indication of biomagnification of chromium along the terrestrial food chain (soil-plant-animal).

Total chromium concentrations in U.S. soils range from 1 to 2,000 mg/kg, with a mean of 37.0 mg/kg. The average chromium concentration in agricultural soils of Andrew, Buchanan and Clinton counties in Missouri has been reported as 67 mg/kg (Tidball, 1984).

Exposure to Cr^{+6} can cause a variety of adverse health effects depending on the dose, length of exposure, and route of exposure. For this site, the oral ingestion route of exposure was identified as the driving pathway for the residential yard soils and drinking water wells, while the inhalation exposure route was used to develop screening levels for the farm field soils (USEPA, 2009c). It was assumed that exposure would occur to a relatively low concentration of Cr^{+6} over a long period of time (chronic). The primary health effects of concern identified for this site associated with chronic inhalation and ingestion of low levels of Cr^{+6} compounds are lung and digestive system cancers. The U.S. Department of Health and Human Services, the International Agency for Research on Cancer and the EPA have classified Cr^{+6} as a "Known Human Carcinogen" through the inhalation route of exposure. The National Toxicology Program has determined that Cr^{+6} caused oral and small intestine cancers in laboratory animals. Based on this data, the EPA Office of Pesticide Programs has classified Cr^{+6} as "Likely to be Carcinogenic in Humans" through the ingestion pathway (USEPA, 2009c).

3.3 Site-Specific Screening Levels

USEPA Region VII risk assessment staff, with approval of the Agency for Toxic Substances and Disease Registry and Missouri Department of Health and Senior Services (MDHSS), developed site-specific health based screening levels (SLs) for Cr^{+6} in drinking water and surface soil for both residential yards and farm fields (USEPA, 2009c, DHSS, 2009). The drinking water SL is 0.3 ug/l, the farm fields SL is 86 mg/kg, and the residential yard SL is 2 mg/kg. As described in the

supporting documentations, these values were based on a risk level of 1 x 10^{-5}. The exposure pathway that drove the drinking water and residential yard SLs was the ingestion pathway, while the inhalation pathway drove the farm fields SL. It is important to note, however that the drinking water and residential yard SLs were calculated in 2009 using an oral cancer slope factor developed by the EPA Office of Pesticide Programs. More recent EPA decisions regarding Cr^{+6} have instead used the New Jersey Department of Environmental Protection (NJDEP) slope factor. For example, the 2010 EPA Regional Screening Levels used the NJDEP value (USEPA, 2010). Use of the NJDEP oral slope factor for this site would result in slightly higher SLs. For example, the drinking water SL would be approximately 0.4 ug/l vs. 0.3 ug/l.

4.0 CONCEPTUAL SITE MODEL

4.1 Physical and Chemical Processes

Tannery sludge was land-applied with a mechanical spreader (Photo 30, Appendix B), and most applications were performed predominantly by one individual working for NBL. The fact that the applications were performed by one individual indicates that sludge application technique was probably similar from field to field and across time. Variability in deposition of sludge would likely be present at the edges of the fields where the spreader made turns.

A primary transport mechanism would be runoff of sludge and accumulation in low-lying areas following rain events. Chromium in the sludge would be transformed back and forth between Cr^{+3} and Cr^{+6} primarily dependent on soil reduction/oxidation potential (which itself is influenced by moisture content, pH, exposure to air, and biological activity) and total organic carbon (TOC) content. The sludge itself contains high levels of TOC. These transformation factors would also vary spatially across the farm fields.

These sludge application, transportation and transformation factors would be expected to result in short-scale and long-scale heterogeneities in chromium concentrations across the farm fields. Variations in concentration would be expected from point to point across a relatively small area of the fields due to the clumpy nature of the sludge and how it was tossed out of the spreader. Variation

in concentrations across larger areas would also be expected due to transport of the sludge in rainwater runoff and differences in spreading rates (for example in areas where the spreader turned around or where sludge was stockpiled near an entrance gate). On the other hand, over the course of time in actively plowed and worked fields, these processes could have averaged out resulting in a relatively homogenous distribution of Cr^{+6} and/or nearly complete transformation into Cr^{+3}.

4.2 Exposure Pathways

In addition to exposure to Cr^{+6} contaminated soil by farm workers in the fields themselves, contamination could be transported to nearby residential yards through wind deposition. This could provide a direct exposure pathway to residents through inhalation and ingestion of contaminated soil particles. Contaminants on the smaller soil particle sizes are of most interest since they are most likely to become transported through wind deposition and to adhere to skin and other surfaces which make them more likely to be ingested or inhaled. For this study, particles smaller than 250 micrometers (µm) were identified as the particle size of interest.

Cr^{+6} could also leach vertically through the soil column into groundwater and be ingested by nearby residents using private drinking water wells. Migration of Cr^{+6} contaminated soil and sludge with rainwater runoff could result in exposure to human and ecological receptors through the surface water pathway. As discussed in Section 7, the surface water exposure and ecological exposure pathways were not assessed as part of the SS investigation.

EPA and the MDHSS risk assessors developed site-specific screening levels for Cr^{+6} in drinking water and farm field and residential yard surface soils at this site based on these exposure pathways (EPA, 2009c, MDHSS, 2009).

5.0 WASTE SAMPLING

Samples of the waste sludge were collected at the NBL facility in April/May 2009 and tested for a variety of metals, cyanide, volatile organic compounds and semivolatile organic compounds (VOCs and SVOCs) (MDNR, 2009b). The NBL tannery sludge was sampled again by the Department on

August 4, 2010. The full laboratory reports for these samples are provided in Appendix D, and Tables C1 and C2 in Appendix C summarizes the results. During those events, samples were also collected of the "shavings pit" waste material and other materials used in the tanning process at the facility. However, since those materials were not land applied, results for those samples are not further discussed in this report.

Several hydrocarbon VOCs and phenolic SVOCs were detected in the sludge waste samples, but the concentrations were well below commonly used screening levels for surface soil. Aside from chromium, no metals were detected in significantly elevated concentrations near the screening levels. Total Cr was measured in the sludge from 329 mg/kg to 469 mg/kg. The EPA Preliminary Remediation Goal (PRG) for total Cr in residential soil is 120,000 mg/kg. Hexavalent Cr was measured in the sludge from 7.7mg/kg to 46 mg/kg in samples from the April/May 2009 event. The site specific screening level for Cr^{+6} developed for surface soil in farm fields is 86 mg/kg. However, these Cr^{+6} results were obtained using an analytical method which produce a positive biased due to matrix interferences. The sample collected in August 2010 was analyzed using an alternative method that utilized measures designed to remove positive bias due to matrix interferences. The concentration of Cr^{+6} in the August 2010 sample was 0.21 mg/kg.

6.0 GROUNDWATER PATHWAY

6.1 Hydrogeologic Setting

Information provided in Section 6.1 is taken from a hydrogeologic summary provided by the department's Division of Geology and Land Survey (DGLS, 2010e). The Tannery Sludge Farm Fields site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age cyclothems of shale, limestone, and sandstone.

6.1.1 Soil and Residuum

The glacial material is 15 to 35 feet thick and predominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. This unit seldom produces more than a few gallons of water

per minute and has a slow recovery rate. The primary recharge for this unit is from rain infiltration. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth.

6.1.2 Hydrogeology

Surface water impoundments and alluvial aquifers are the primary drinking water sources as the bedrock groundwater is mostly non-potable.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed downstream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

6.2 Groundwater Targets

There are few surface water intakes in the region and most residents in rural portions of the 4 county area receive drinking water from either private wells or from public water supply districts served by public wells (MDNR, 2008). A very conservative estimate of the number of groundwater targets can

be made by estimating the number of rural residents and assuming they are all served by groundwater resources. Subtracting the total four-county population of 136,000 by the combined populations of the main urban centers of 96,000 using the 2000 census data yields an estimate of approximately 39,100 rural residents served by groundwater in the study area. This is probably an overestimate since it includes rural residents served by surface water sources and those served by public water systems that tend to be supplied by deeper wells less likely to be affected by vertical migration of contaminants. However it is a substantial number of potentially affected individuals, and therefore warrants sampling of the groundwater pathway as part of the SS.

6.3 Sampling Locations

Residential properties with private drinking water wells were identified adjacent or near to the selected farm field DUs. Not all farm fields had nearby residences and not all nearby residents granted permission to the department for sampling. A total of nine residences with private wells located near sludge-applied field granted permission for sampling. Three background private wells were also identified in areas not near sludge application. These 12 well sampling locations are shown in Figure 1. Information was not available on the depth or age of the wells sampled.

As described in the SAP, groundwater was sampled at each well location on December 16 and 17, 2009 and submitted for analysis of Cr^{+6} and total and dissolved Cr. On January 26, 2010, staff returned to resample one of the private wells.

6.4 Sample Results

The full analytical results, chain of custodies and field notes were provided in the Site Investigation Findings Reports dated January 25, 2010 and March 25, 2010 (MDNR, 2010c, MDNR, 2010d). A summary of results is provided in Table C3 of Appendix C.

Hexavalent chromium concentrations in the three background well locations (0.039ug/l, 0.022ug/l, and <0.017ug/l) were averaged to estimate a mean background level of 0.026 ug/l. For the non-detect result, the reporting level was used as the Cr^{+6} value to provide a conservative estimate of the mean.

Eight of the nine target wells contained Cr^{+6} below the 0.3 ug/l screening level, with concentrations ranging from non-detect (<0.017 ug/l) to 0.23 ug/l. One well (Location ID 102) was found to contain a Cr^{+6} right at the 0.3 ug/l screening level. This well was resampled on January 26, 2010 and found to contain 0.26 ug/l Cr^{+6}. The average of the two sampling results is 0.285 ug/l.

Well Location ID 105 was sampled in triplicate during the December 17, 2009 sampling event to assess overall precision. The percent relative standard deviation (%RSD) of the measured Cr^{+6} between the three replicates was 12.3%. Well Location ID 102 was sampled in duplicate during the January 26, 2010 sampling event, and the relative percent difference (RPD) of Cr^{+6} between the two measurements was 13.5%. The Quality Assurance Project Plan specifies a criterion of 30% RPD for groundwater duplicates. These results indicate very good overall sampling precision.

The replicate sampling data from these two Location IDs was also used to perform an analysis of uncertainty. This analysis quantifies the uncertainty due to the various sources of sampling and analysis error, and applies the error to the measured result. The resulting adjusted value, typically expressed as a 95% upper confidence limit (UCL95), provides a conservative estimate of the contaminant concentration that accounts for sampling errors. For well Location ID 102, the error-adjusted concentration of Cr^{+6} expressed as the UCL95 is 0.327 ug/l, which is slightly above the site-specific screening level.

6.5 Discussion

When compared to the mean background Cr^{+6} level, four of the nine target wells were found to contain Cr^{+6} significantly above background (greater than 3X the background mean), documenting a release of Cr^{+6} to groundwater at these locations as defined by CERCLA (USEPA, 1995).

With the exception of well Location ID 102, none of the sampled wells contained Cr^{+6} at concentration above the screening level, even accounting for sampling and analytical error. The MDHSS reviewed the results for well Location ID 102, and determined that although the error-adjusted Cr^{+6} level in the well was slightly above the screening level, it did not pose a significant

health threat. This determination was based on two considerations. First, the concentration of Cr^{+6} in the well is approximately equal to a 1 x 10^{-5} risk level which is within the target risk range. Second, as discussed in Section 3.3, had an oral cancer slope factor more consistent with recent EPA decisions regarding Cr^{+6} been used, the calculated SL would have been approximately 0.4 ug/l, which is slightly above the well concentration. Based on these considerations, MDHSS concluded that the well water at Location ID 102 does not pose a health threat.

6.6 Conclusions

The groundwater pathway was identified as a potential concern due to leaching of Cr^{+6} from land-applied sludge vertically with infiltrating rainwater, resulting in impacts to useable aquifers. Private well sampling was conducted at residences adjacent to or near sludge-applied farm fields to investigate this pathway. Although some of the well samples did show levels of Cr^{+6} above background concentrations, except for one well, the levels did not exceed the site-specific screening level of 0.3 ug/l. The [Cr^{+6}] in the well that exceeded the site-specific SL was only slightly above, and was within the target risk range (10^{-5}cancer risk level) using the oral cancer slope factor for Cr^{+6} currently used by EPA for developing Regional Screening Levels. Based on these findings, past application of sludge does not appear to have resulted in a health threat through the groundwater pathway.

7.0 SURFACE WATER PATHWAY

The conceptual site model (CSM) provided in the SAP (MDNR, 2010a) identifies the surface water pathway as a potential pathway of concern. Applied tannery sludge would be expected to be transported in surface water runoff into low-lying areas, and potentially into nearby streams and ponds. If levels of hexavalent chromium were high enough, it could pose a risk to human receptors through direct contact or to those using affected surface water as a drinking water source and to ecological receptors in the surface water bodies.

However, in the rural portions of the four counties that received sludge applications, surface water is

not the predominant source of drinking water. Most rural resident in these areas obtain drinking water from private wells or from public water supply districts that obtain water from wells (MDNR, 2008).

Based on the lack of extensive use of surface water in the study area, rather than include surface water pathway sampling in the SS investigation, the decision was made to wait until results from the soil exposure and groundwater pathways were available. Should assessment of the these pathways find that further CERCLA investigation of the site is warranted, then that investigation would include sampling to assess the surface water pathway. Should the SS investigation find extremely low [Cr^{+6}] in the farm fields themselves, then it would be reasonable to conclude that significant impact to surface water is also unlikely.

8.0 SOIL EXPOSURE AND AIR PATHWAYS

8.1 Physical Conditions

The glacial material is 15 to 35 feet thick and predominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The primary recharge for this unit is from rain infiltration. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth.

8.2 Soil and Air Targets

Based on application records maintained by NBL, sludge was applied in approximately 110 farm fields across the four-county study area. Based on an assumption that there is one residence adjacent to or nearby each farm field (not an unreasonable assumption based on observations made for the farm fields selected for this investigation), and that each residence has 3 residents, there would be approximately 330 individuals potentially exposed to sludge-applied fields.

8.3 Sample Collection

The data quality objectives, sampling design and a detailed description of the sampling process is provided in the SAP and SAP Addendum (MDNR, 2010a, MDNR, 2010b).

8.3.1 Sampling Design

The sampling design used an incremental sampling methodology (ISM). ISM is a structured sampling and processing protocol designed to increase sample representativeness and reduce common sampling errors that lead to variability in measured contaminant concentrations. ISM involves combining many increments of soil together to form one sample that is representative of the overall volume of soil over which a decision is to be made.

Variability in measured contaminant concentrations between soil samples is due primarily to the particulate nature of soil and heterogeneity in the distribution of contaminants. The elements of ISM that control data variability are incorporated into 1) the field collection of soil samples, and 2) laboratory processing and sub-sampling procedures. This methodology provides reasonably unbiased, reproducible estimates of the mean concentration of analytes in the specified volume of soil. The volume of soil may either be a Sampling Unit (SU) or a Decision Unit (DU).

For this project, an adaptive sampling design approach was used employing real-time analytical techniques (X-ray fluorescence analysis - XRF) and statistical analyses to determine sampling density in the field. The number of samples required to confidently determine that the true mean concentration of Cr^{+6} in a farm field is below the screening level will depend on 1) the heterogeneity of the concentration of hexavalent chromium ([Cr^{+6}]) across the field and 2) the magnitude of the true mean [Cr^{+6}] relative to the screening level. For example, if the [Cr^{+6}] does not vary much from location to location in a field and is very low compared to the screening level, then very few samples would be required to demonstrate with statistical confidence that the mean [Cr^{+6}] is below the SL. However, if the [Cr^{+6}] varies greatly across the field and/or the measured concentrations are near the screening level, a much higher sampling density would be required to demonstrate that the mean [Cr^{+6}] is below the SL. Typically, information about contaminant heterogeneity and estimates of the mean concentration are not available prior to a Pre-CERCLIS SS Investigation. However, for this project XRF analysis of total Cr was used to obtain estimates of variability and mean concentrations. The farm field pilot study demonstrated the relationship between total Cr and Cr^{+6} variability. These data were then analyzed to determine how many samples were required for Cr^{+6} analyses in each

farm field. This approach minimized the need for remobilization and resampling, while providing defensible data that met the project data quality objectives.

8.3.2 Farm Fields

A farm field DU was defined as an 80 acre field in which sludge was applied. This field size was chosen based on the exposure area used in developing the site-specific SL. Farm field DUs were chosen for inclusion in the SS investigation as described in Section 2.1. The DUs were overlain with a numbered grid of 1-acre sampling units (SUs) using a geographic information system (GIS). Maps of each DU showing the grid-overlay are provided in Appendix A, and photographs of some of the farm fields sampled are provided in Appendix B. Staff navigated to each DU and selected three 1-acre SUs for sampling. This number of initial SUs was chosen based on the pilot study results (MDNR, 2009f). The location of each SU was chosen using a "worst case/best case" strategy. Since the magnitude of the variability within and between the SUs influences how many increments need to be collected and how many SUs are to be sampled, the goal in selecting SUs was to maximize these properties. This "worst case/best case" approach, which "errs on the side of caution" was designed to guard against too few increments collected per SU and too few SUs sampled per DU.

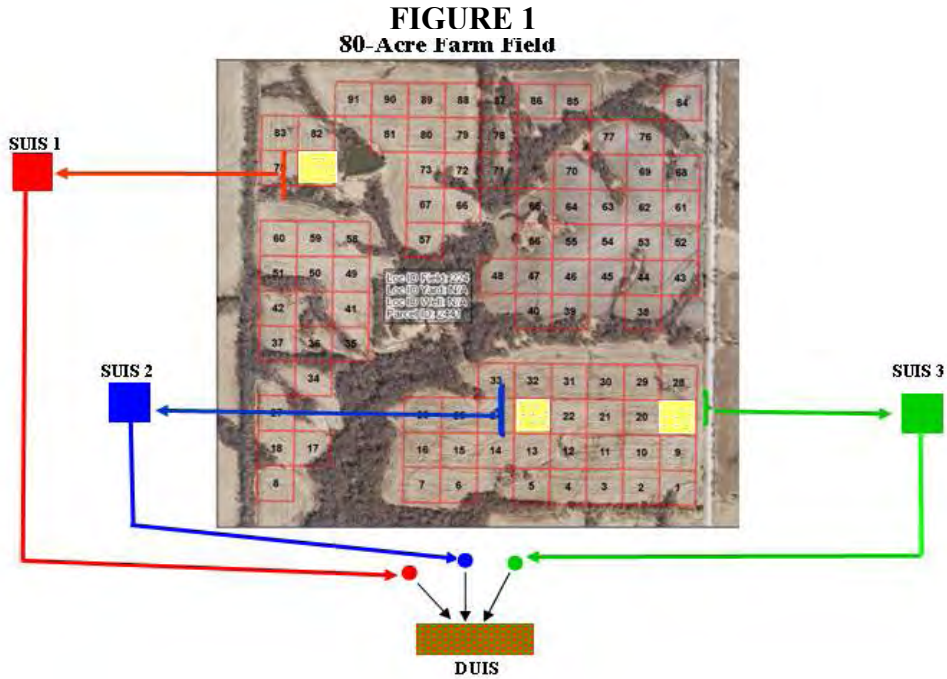
Within-SUs variability was maximized by judgmentally selecting SUs in the field based on assumptions made in developing the CSM as described in Section 4. For example, a "worst case" SU might be one near the corner of a field where the spreader had to turn around and may have deposited sludge more unevenly. Using within-SU variability from "worst case" SUs provides a conservative estimate of the number of increments to collect in each SU. Similarly, between-SU variability was maximized by selecting "worst case" and "best case" SUs for sampling. For example, an SU near the field's main gate where sludge may have been stockpiled prior to spreading would be expected to have higher concentrations than an SU in the center of the field. By combining data from SUs with low and high [Cr^{+6}] for statistical analysis, one creates "worst case" between-SU variability (high standard deviation), and this provides a conservative estimate of the number of SUs to sample within each DU.

Since the farm field DU and SU grids had already been mapped using GIS prior to mobilization, no

locational data was collected; GPS units were used only to navigate to the farm fields and SUs and flag off the boundaries of the SU for sampling. Note that this was a deviation from the SAP which stated that locational data would be collected during sample collection. Staff collected 10 discrete soil samples equally spaced from within each SU. A previously conducted pilot study established a relationship between total Cr variability and Cr^{+6}variability, allowing the use of an XRF analyzer, which only measures total Cr. The total Cr data from the discrete samples was used to 1) statistically determine the number of increments per SU and number of SUs per DU needed to control variability of [Cr^{+6}] in the fields, and 2) document the thoroughness of sample preparation techniques before samples were sent to the lab for [Cr^{+6}] analysis.

Samples were processed and analyzed for total Cr by XRF as described in the SAP (Photos 24-27, Appendix B). The results of the XRF analysis were statistically evaluated to determine whether the number of discrete samples initially collected within each SU (10 increments) and the initial number of SUs sampled per DU (3) was statistically sufficient to control variability in [Cr^{+6}] across the fields. The discrete samples from each SU were then combined together to form SU incremental samples (SUIS), and a portion of each SUIS was combined with other SUIS to form the DU incremental sample (DUIS). The sampling design is illustrated graphically in Figure1.

FIGURE 1



Following the decision logic described in the SAP and SAP Addendum, if it was determined the number of discrete samples initially collected per SU and number of SUs sampled per DU were sufficient to control variability of [Cr^{+6}] in the fields, then no additional sample collection would be required. However, if additional increments and/or more SUs were required based on statistical analysis, staff would collect them. Originally, the sample preparation and XRF analyses were planned to be conducted in the field using a mobile laboratory facility. However, due to adverse weather conditions (saturated and frozen soil), this was not practical. Instead, samples were returned to the Department's Environmental Services Program (ESP) for sample preparation and analysis. Statistical analysis of the XRF data was conducted using Visual Sampling Plan (VSP) (PNNL, 2010). Figure 2 shows the VSP module used (comparing true mean vs. action level), and some typical input parameters. The rejection and acceptance rates are set based on the data quality objective for decision error tolerance agreed to by the project planning team as described in the SAP. The site-specific screening level for Cr^{+6} of 86 mg/kg was adjusted to provide the "Action Level" input. A value of 1,720 mg/kg was calculated for total chromium using the site-specific Cr^{+6} screening level and adjusting it using a conservative value for the ratio of total to Cr^{+6} from the farm fields pilot study as shown in Table 1.

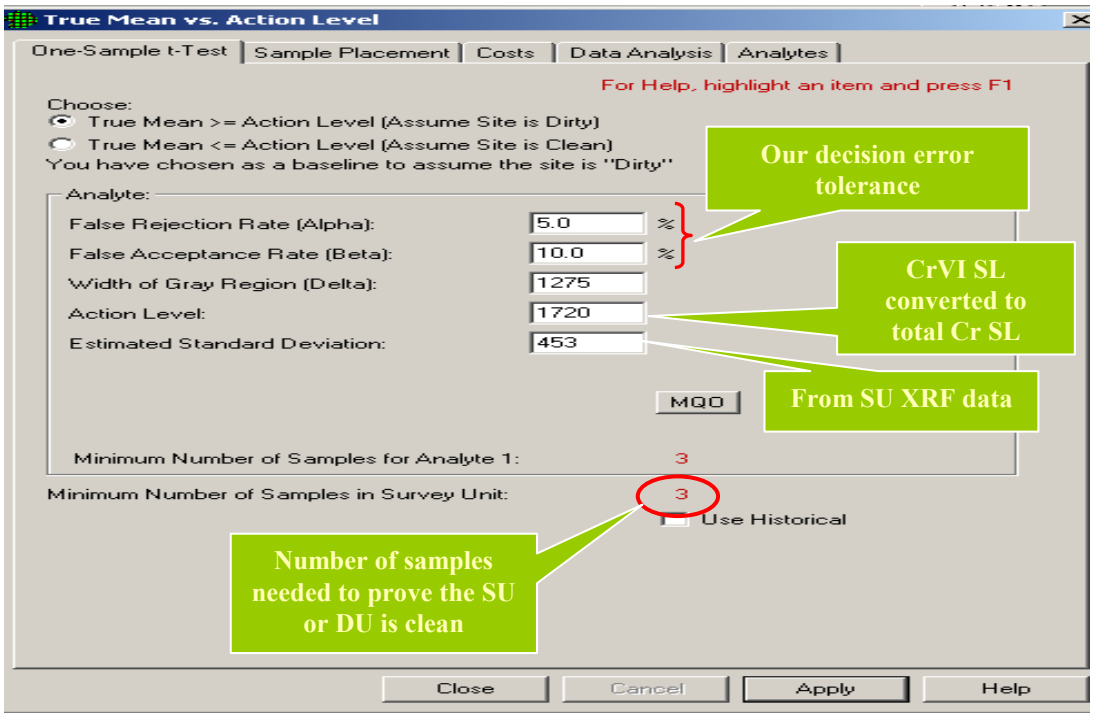
TABLE 1

SAMPLES USED FOR CONVERTING Cr^{+6} TO Cr SCREENING LEVEL			
LocationID.SU	**Total Cr**	**Cr^{+6}**	**% Cr^{+6}**
218.102	205	1.7	0.83
218.87	68	1	1.47
202.59	302	1.7	0.56
202.59	616	4.8	0.78
202.79	132	2.1	1.59
218.146	424	1.4	0.33
*Used 5% as conservative estimate (3 times highest observed ratio) which results in a total Cr adjusted screening level of 1,720 mg/kg (86*100/5)			

The width of the gray region is calculated as the difference between the adjusted action level and the mean Cr concentration from XRF analyses of discrete samples collected within a given SU. The output provided by VSP shows that a minimum of 3 samples would be required from this particular SU in order to reject the null hypothesis that the site is contaminated with Cr^{+6} above the SL ("site is

dirty”).

FIGURE 2



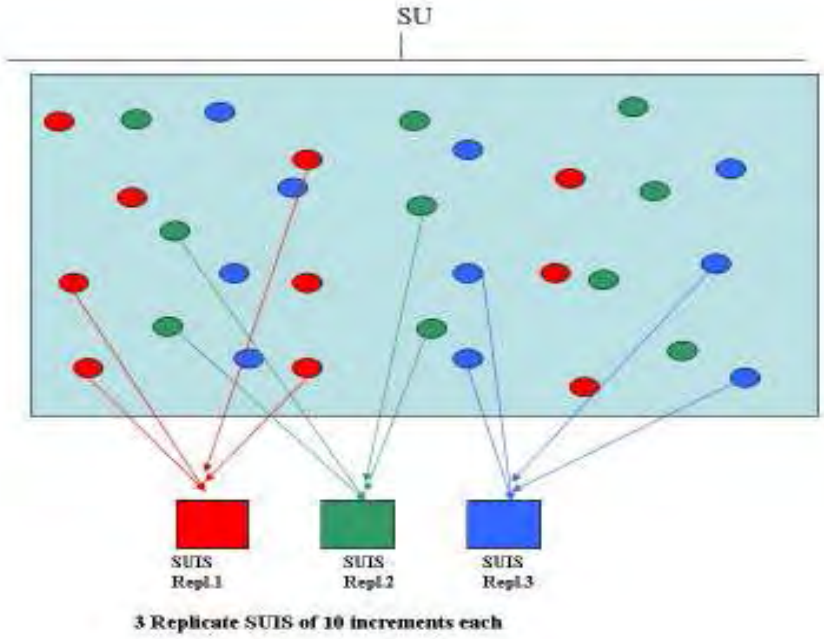
This type of analysis was conducted for all of the SUs sampled. The data showed that, due the combination of low observed [Cr] and low variability of [Cr] within the SU and between SUs for all of the DUs sampled, the initial 10 increments/SU and 3 SUs/DU collected were more than adequate to meet the data quality objectives for all of the farm fields sampled (Table C4, Appendix C). Therefore, the collected increments were combined together to form SU incremental samples (SUIS – see colored squares in Figure 1). The SUIS sample represents the [Cr^{+6}] in a one-acre SU. Splits of each SUIS (colored circles in Figure 1) were then combined to form a DUIS for each farm field DU. The DUIS sample represents the [Cr^{+6}] across the entire 80-acre farm field DU. A portion of each SUIS and DUIS sample was submitted to Applied Speciation Laboratories for Cr^{+6} analysis. Some of the samples were also analyzed for pH, ORP and TOC by Applied Speciation and Al, Fe, Mn, Mo, and V by the department's analytical laboratory. Applied Speciation was instructed to use an incremental subsampling technique to ensure that the aliquot of soil digested and analyzed represented the entire jar of soil submitted for analysis (Photo 29, Appendix B).

Background farm fields were identified in areas of the 4 counties where no tannery sludge was land applied. These fields were sampled and processed in the same manner described above, and submitted for analysis of the same parameters.

The mean background farm field [Cr^{+6}] was represented by the 95% upper confidence limit (UCL95) calculated using the student's-*t* method on pooled SUIS results from the background farm field locations. The mean concentration in each sludge-applied farm field DU was represented by the UCL95 calculated from the 3 SUIS samples within each DU. The mean DU [Cr^{+6}] was compared to the background [Cr^{+6}] to determine whether a release of Cr^{+6} to soil could be documented. The mean [Cr^{+6}] for each DU was also compared to the site-specific screening level of 86 mg/kg to determine whether further action was necessary.

In selected farm field DUs, one SU was chosen for replicate sampling. In these SUs, three separate 10-increment SUIS were collected. The location of each increment was offset as much as possible between the replicate samples as shown in Figure 3.

FIGURE 3



Good agreement between the [Cr^{+6}] measured in each of the 3 replicate SUIS would indicate that overall sampling process was capable of providing reproducible estimates of the mean [Cr^{+6}] in the farm fields. The estimate of variance obtained from the replicates was also used in an uncertainty analysis of the data. Note that since replicates were not collected in each DU, this approach required the assumption that fields in which the replicates were collected were similar enough in contaminant heterogeneity to justify extrapolating the results to fields in which no replicates were collected.

Similarly, for selected SUIS samples, laboratory replicate analyses was requested. The laboratory collected three separate subsamples from the jar of soil submitted and analyzed each for Cr^{+6}. Good agreement between the lab replicates would indicate that the subsampling procedure used by the lab was providing a reproducible analytical subsample. Additional routine laboratory QC was employed to assess the precision and accuracy of analytical method.

8.3.3 Residential Yards

An attempt was made by the Department to identify and gain permission to access residential properties adjacent to each farm field DU sampled. Some farm field DUs were remote and not located near residences, and some residents declined to grant access for sampling. A total of 10 residential yards were sampled. The locations of the yards are shown together in Figure 1, and individually on the maps of each farm field DU provided in Appendix A. Photographs of the yards are provided in Appendix B.

Staff established 3-4 SUs within each yard. Field sketches of each residential yard showing the SUs are provided in Appendix D. A pilot study was previously conducted to determine the number of increments needed per SU to control variability in [Cr^{+6}] at the scale of the residential yards. Based on the pilot study findings, an SUIS consisting of five increments was collected within each SU. The SUIS were processed and split. One of the splits was combined with splits from the other SUs to form a DUIS. A portion of each SUIS and DUIS were submitted for analysis as described previously.

Precision was assessed using replicate SUIS samples and laboratory subsampling replicates as described above. Background residential yards in areas of the four counties not near sludge applications were identified and sampled using the same approach as for target yards.

The mean background yard [Cr^{+6}] was represented by the UCL95 calculated using the pooled SUIS results from the background yard sampling locations. A UCL95 was calculated for each yard DU using the [Cr^{+6}] results from each SUIS sample. The mean [Cr^{+6}] in each yard DU was compared to both the background [Cr^{+6}] and the site specific screening level of 2 mg/kg to determine whether a release could be documented and whether further action was necessary.

8.4 Sample Results

Complete laboratory analytical results, chain of custodies, and field notes are provided in the Site Investigation Findings Reports for the January and April 2010 sampling events (MDNR, 2010d and MDNR, 2010f) which are included in Appendix D. A summary of the XRF results for total Cr in the farm field samples is provided in Table C4 of Appendix C. A summary of the farm field results is provided in Table C5 and a summary of the calculated UCL95 values for the farm fields is provided in Table C6. The residential yard results and UCL95 values are provided in Tables C7 and C8 of Appendix C.

The background mean [Cr^{+6}] in the soil of farm fields and residential yards unaffected by sludge application were 0.1 mg/kg and 0.071 mg/kg respectively. The concentration of Cr^{+6} in all farm field DUs and 90% of residential yard DUs were significantly above (>3x) the calculated background mean. These results document a release under CERCLA of Cr^{+6} to soil in farm fields and residential yards in the study area (USEPA, 1995). However, even accounting for the various sources of sampling and analytical error, no farm field or yard sample mean [Cr^{+6}] exceeded the respective risk-based screening levels established for the site. The highest single UCL95 value observed in the farm fields was more than an order of magnitude below the farm field screening level. Table 2 shows the range of 95 UCL [Cr^{+6}] values measured in the farm field and residential yard decision units relative to the screening levels.

TABLE 2

	Range of UCL95 [Cr^{+6}] measured, mg/kg	Cr^{+6} Screening Level, mg/kg
Farm Fields	0.54 – 5.05	86
Residential Yards	0.03 – 0.86	2

The specific sample results for individual yard and farm field DUs are further discussed in the SS forms included in Appendix F.

8.5 Data Quality Assessment

8.5.1 XRF Analyses

XRF analyzer accuracy was evaluated using control charts and standard reference materials (SRMs) containing known concentrations of chromium as described in the Standard Operating Procedure included in the SAP. Analyzer precision was evaluated from the percent relative standard deviation (%RSD) on replicate analyses of SRMs. These data were within the quality control limits described in the SAP indicating that the analyzers were operating properly.

Replicate analyses were conducted on each bag of processed soil sample, with manual mixing of the bag between analyses. Evaluation of the %RSD between the replicate analyses demonstrated that the sample processing measures (drying, disaggregation, sieving) generated soil samples with a relatively homogenous distribution of chromium.

SUIS samples were split and portions combined with other SUIS splits to build the DUIS samples. The average [Cr] calculated from the individual SUIS was compared to the [Cr] measured in the created DUIS sample to evaluate the representativeness of the splitting technique. Low observed relative percent differences between the calculated SUIS averages and the DUIS samples demonstrated that the splitting technique was representative.

8.5.2 Hexavalent Chromium Analyses

Replicate SUIS samples were intended to be collected in approximately 6 sampling units. However, due to field error, only 3 SUs were sampled in triplicate. The %RSD was calculated for both total Cr and Cr^{+6} in each set of three replicates, and is summarized in Table 3.

TABLE 3

Location ID - Sampling Unit	%RSD of Triplicate Samples	
	Total Cr	Hexavalent Cr
205-88	21	23
214-37	5	30
221-162	8.5	13.9

Calculated RSDs were at or below 30% for all three sets of replicate samples, demonstrating that sampling process was reasonably reproducible and that the number of increments collected per SU was sufficient to capture the heterogeneity of Cr^{+6} within the SU. The %RSD was consistently lower for total Cr than Cr^{+6} in all of the replicate sets. This indicates that there is a difference in the micro-heterogeneity between the two species of Cr in the soil. Additional particle size reduction and sieving to a finer mesh may improve the consistency of Cr^{+6} distribution within the samples. However, this was not necessary since, due to the low concentrations of Cr^{+6} observed, the level of data variability did not interfere with making decisions for each DU.

The relative percent difference (RPD) between laboratory replicate analyses for Cr^{+6} was calculated for each set of 15 laboratory duplicates as summarized in Table 4.

TABLE 4

Location ID - Sampling Unit	RPD of Lab Duplicate Cr^{+6} Analyses
201-DU	4.9
205-DU	10.8
205-88	16.8
212-53	21.4
213-44	5.6
214-44	0.62
215-55	14.8
217-10.3	2.3
302-Y3	21
303-DU	9.5
304-DU	1.1
313-Y2	19.8
320-DU	4.1
325-Y2	21
326-Y3	29

The calculated RPDs were all below 30%, which demonstrates that the laboratory subsampling process is capable of producing a subsample for analysis that is reasonably representative of the jar of soil submitted to the lab.

8.5.3 Matrix Spike Recovery Issue

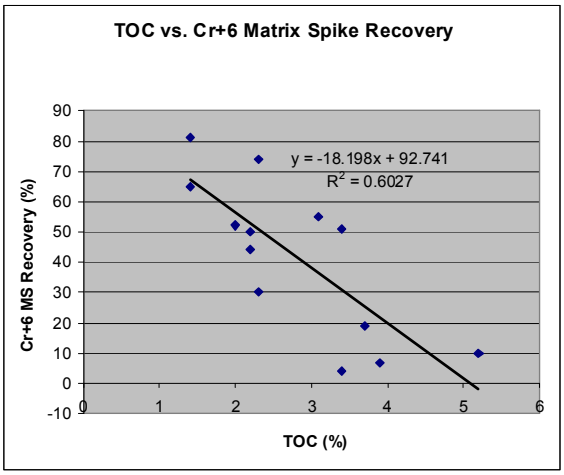
Review of the analytical data from the January 2010 sampling event revealed very low Cr^{+6} recoveries for matrix spikes in some of the samples. Review of all other associated quality control samples from the analytical batch a strongly reducing soil matrix which could explain the low matrix spike recoveries, since such conditions would favor the reduction of Cr^{+6} to Cr^{+3}. A review of the additional parameters (pH, ORP, TOC and total Al, FE, Mn, Mo, and V) that were analyzed on some of the farm field samples indicated a reducing nature of some of the soil matrices - particularly those collected from pastures. Table 5 provides averages for various parameters organized by field types. Values highlighted in red illustrate significant differences between field types. Of particular note is the difference in total organic carbon (TOC) between pasture and row crop field types.

TABLE 5

Averages											
Field Type	**Cr 6^{+}, mg/kg**	**Total Cr, mg/kg (XRF)**	**Ratio Cr^{+}6: Cr (%)**	**ORP (mV)**	**TOC, %**	**pH**	**Fe, mg/kg**	**Mn, mg/kg**	**Mo, mg/kg**	**V, mg/kg**	**Al, mg/kg**
Pasture (n=16)	**0.837**	**225**	**0.42**	448	**4.9**	6.78	32,408	445	**2.075**	38.6	14,738
Row Crop (n=10)	**2.292**	**91**	**2.40**	421	**1.6**	7.42	20,188	515	**0.533**	42.6	17,518

Data for these additional analytical parameters were not available for all of the DUs sampled. In order to improve confidence in the ability to determine whether mean [Cr^{+6}] in residential yard soil is below the screening level of 2.0 mg/kg, the sampling team resampled all of the residential yards and analyzed each sample for additional parameters in order to provide supporting multiple lines of evidence. As a further line of evidence, an aqueous Cr^{+6} matrix spike was conducted on *every* residential yard DUIS sample rather than the conventional one per analytical batch. Correlation of low Cr^{+6} DUIS sample results with poor matrix spike recovery and strong soil reducing conditions in both the residential yard and farm field samples would demonstrate that the soil matrix does not support formation of Cr^{+6}. Additionally, a soil reference material containing a certified concentration of Cr^{+6} was used to conduct a solid matrix spike on some of the samples. Failure to recover Cr^{+6} from the solid matrix spike would further support the supposition that the reducing nature of the soils rather than the sample preparation or analytical method are the source of the poor recoveries. The results of these additional quality control measures showed a fairly strong correlation between poor spike recoveries (both liquid and solid spikes) with the amount of TOC in the samples (Figure 4).

FIGURE 4



This indicates that the reducing nature of the soils, as indicated at least in part by the amount of organic carbon, strongly favor the trivalent form of chromium over the hexavalent form.

8.5.4 Conceptual Site Model Validation

The judgmental approach used to select farm fields and SUs for sampling was based on assumptions made using the CSM prepared for the site. The data obtained during the investigation was used to test these assumptions and validate the CSM, as summarized in Table 6.

TABLE 6

CSM Assumption	Validation
Target yards should have more Cr^{+6} than background yards because they are closer to applied fields and should receive windblown deposition.	90% of the target yards contained significantly higher [Cr^{+6}] (>3x) than the background mean [Cr^{+6}].
Target fields should have more Cr^{+6} than background fields since they got sludge application.	All of the target fields contained significantly higher [Cr^{+6}] than background fields.
Higher [Cr^{+6}] expected in fields with lower TOC, lower pH, and higher redox.	This was observed for TOC, but not for pH or redox. However, pH and redox analyses were done on dried samples which likely affected measurements since those parameters are moisture sensitive.

TABLE 6

CSM Assumption	Validation
Positive correlation expected between the farm field [Cr^{+6}] and nearby yard [Cr^{+6}] . In other words, yards near fields with higher levels should contain more Cr^{+6} than yards near fields with lower levels.	This was observed to be true for yards located near pasture type fields, but less so for those near row crops. This points towards the controlling effect of TOC and field type on [Cr^{+6}].
Positive correlation expected between total [Cr] and [Cr^{+6}] in the farm fields.	There was a slight correlation for pasture type fields, but little correlation within row crop fields. Since pastures have higher TOC than row crop fields, this again demonstrates the controlling effect of redox soil conditions on the levels of Cr^{+6}.
Positive correlation expected between farm field categories chosen as high, med, & low applications and their respective [Cr] and [Cr^{+6}].	This was true for [Cr], but less so for [Cr^{+6}]. The [Cr^{+6}] appear to be more controlled by TOC/field type independent of application rates. This is further supported by the observations discussed in Section 8.5.3 regarding matrix spike recoveries.

8.6 Conclusions

Surface soil sampling was conducted in a selected set of farm fields that historically received tannery sludge and in residential yards adjacent to those fields. Sampling was also conducted in background farm field and yards in areas unaffected by tannery sludge applications. Results indicate that a release of hexavalent chromium can be documented to soil in all of the farm fields and most of the nearby residential yards. However, even accounting for sampling and analytical error, the concentrations measured do not exceed the site-specific screening levels established for the site. The data further indicate that redox conditions of the soil do not support the formation or continued presence of Cr^{+6}, and that the more stable (and less toxic) form of chromium (Cr^{+3}) is favored. Assumptions made during development of the sampling design based on the conceptual site model were validated using the data obtained from the investigation. Based on these findings, past application of sludge does not appear to have resulted in a health threat through the soil exposure and air pathway.

9.0 SUMMARY AND CONCLUSIONS

The Tannery Sludge Farm Field site is a group of agricultural fields and nearby residences in various locations across parts of Andrew, Buchanan, Clinton and DeKalb Counties in northwestern Missouri, where sludge from a leather tannery in St. Joseph, Missouri was applied as a fertilizer. Concern arose about potential health threats to farmers and residents posed by chromium in the sludge. Land application of the tannery sludge was ceased in 2009, and the sludge is now disposed of in area landfills.

Analysis of sludge samples collected at the tannery facility document the presence of hexavalent chromium, a respiratory and gastrointestinal system carcinogen. A selected set of farm fields, residential yards, and private drinking water wells from across the 4 counties was identified for sampling, along with background locations. Results for samples collected from these locations document that sludge applications have resulted in elevated concentrations of both total and hexavalent chromium in farm fields, yards and wells relative to background levels. However, the concentrations measured do not exceed the site-specific health-based screening levels developed for the site. Based on the data collected, past land application of tannery sludge does not appear to have resulted in a health threat.

10.0 RECOMMENDATIONS

Based on the lack of identified health threats, the Tannery Sludge Farm Fields site is not recommended for entry on CERCLIS or for additional investigation under CERCLA.

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APPENDIX A
FIGURES

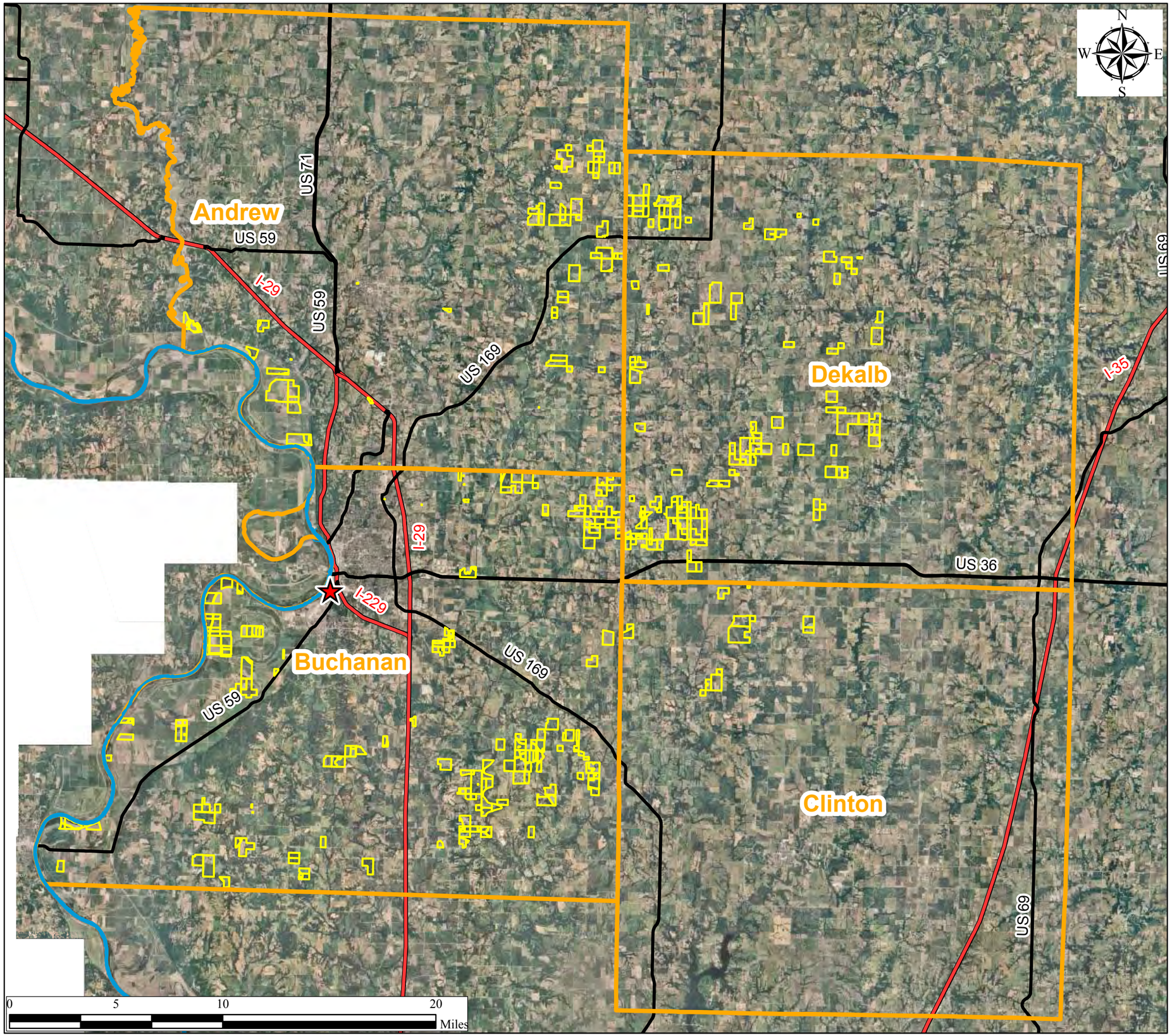
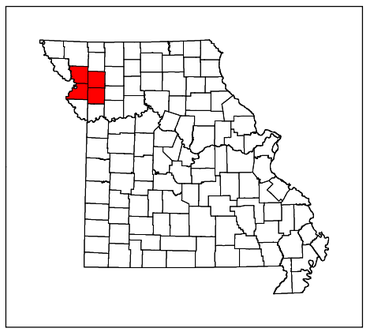


Figure A1: Map of 4-County Study Area Showing Sludge Application Fields Tannery Sludge Farm Fields Site Andrew, Buchanan, Clinton and Dekalb Counties Northwest Missouri

Legend

- ★ National Beef Leathers
- Sluge Applied Farm Field (1983-2008)
- County Boundary
- Interstate Highway
- US Highway
- Missouri River



Map Created on September 21, 2010 by Shelly Jackson.

This map can be found at M:\Superfund\Tannery Sludge Farm Fields\Maps\Report Maps\FigureA1_Sludge_Application_Fields.mxd

Base Map: National Agricultural Imagey Program. Flight Date: 2007.

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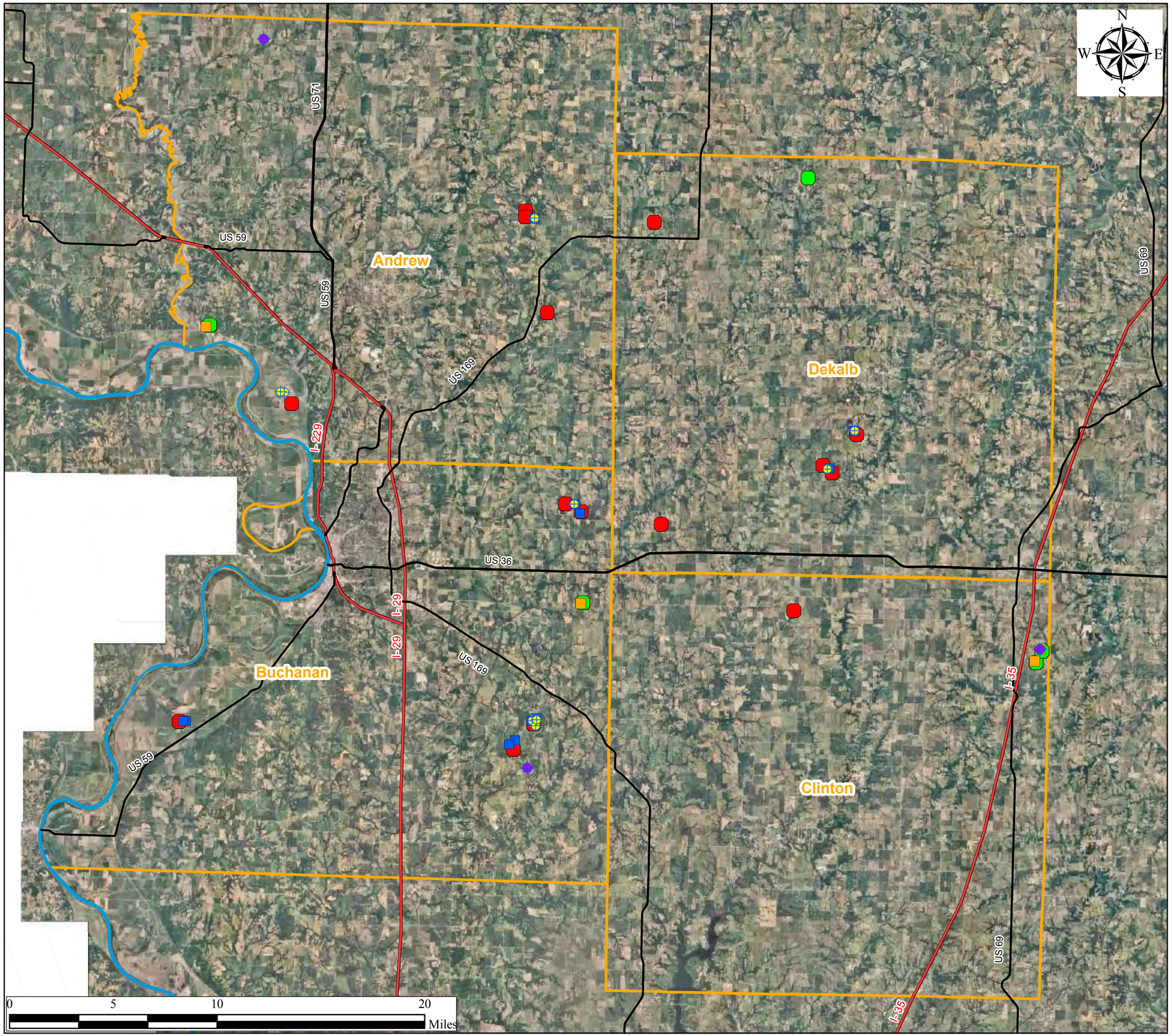
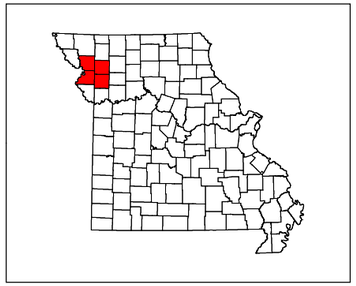


Figure A2: Map of 4-County Study Area
Showing Sample Locations
Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and
Dekalb Counties
Northwest Missouri

Legend

- Well - Background
- Well
- Residential Soil Sample - Background
- Residential Soil Sample
- Farm Field - Background
- Sludge Applied Farm Field
- Interstate Highway
- US Highway
- Missouri River
- County Boundary



Map Created on September 21, 2010 by Shelly Jackson.

This map can be found at M:\Superfund\Tannery Sludge Farm Fields\Maps\Report Maps\FigureA2_Sample_Location_Map.mxd

Base Map: National Agricultural Imagey Program. Flight Date: 2007.

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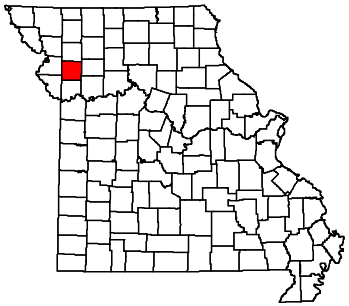
Figure A3

Tannery Sludge Farm Fields Site
Location ID Field: 201
Location ID Yard: 301
Location ID Well: 101
Clinton County
300 Acres

Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres



Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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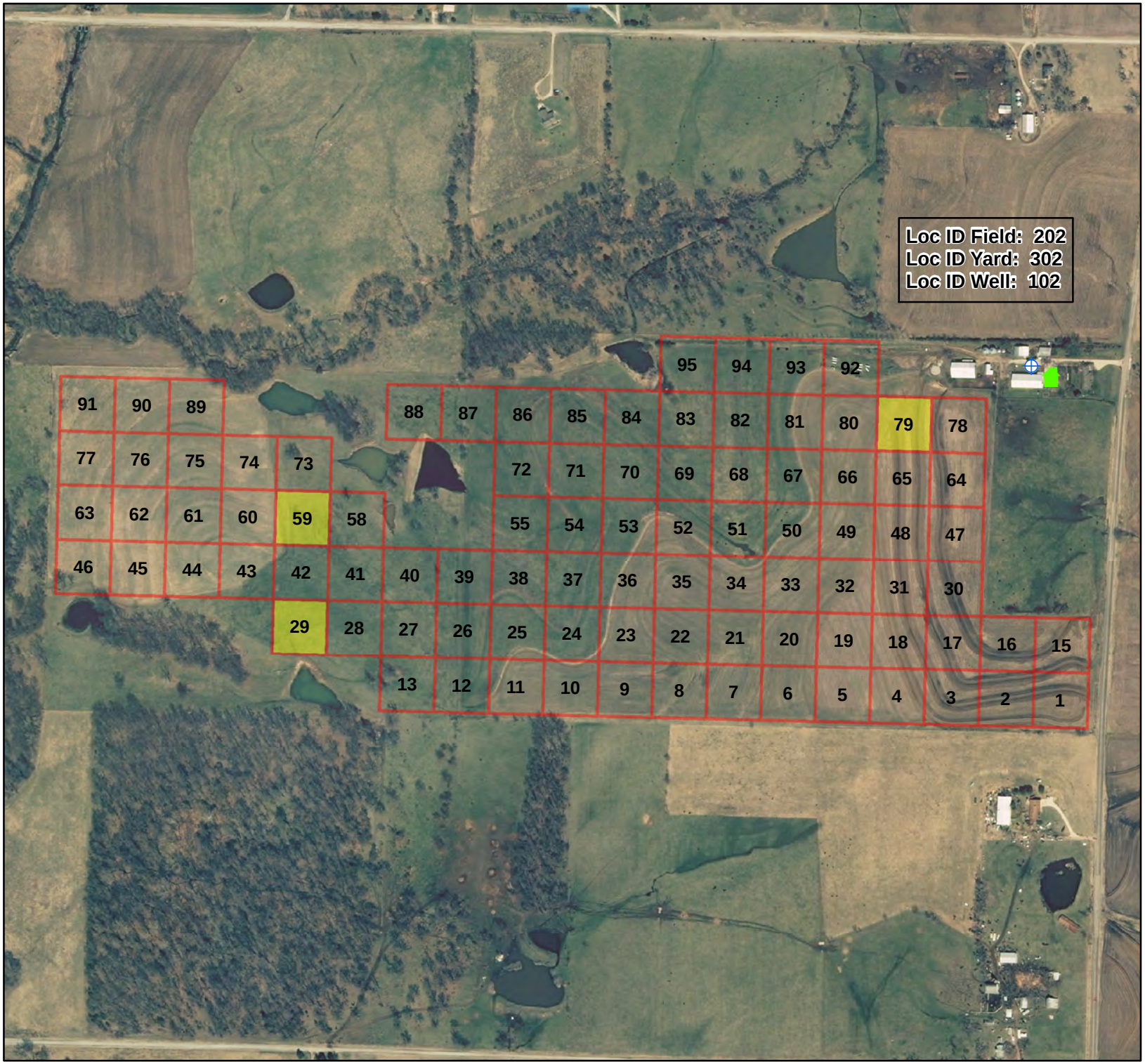
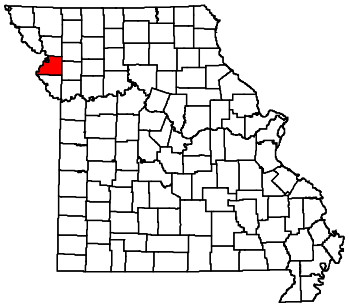
Figure A4

Tannery Sludge Farm Fields Site
Location ID Field: 202
Location ID Yard: 302
Location ID Wells: 102
Buchanan County
136 Acres



Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres



0 175 350 700 Yards

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Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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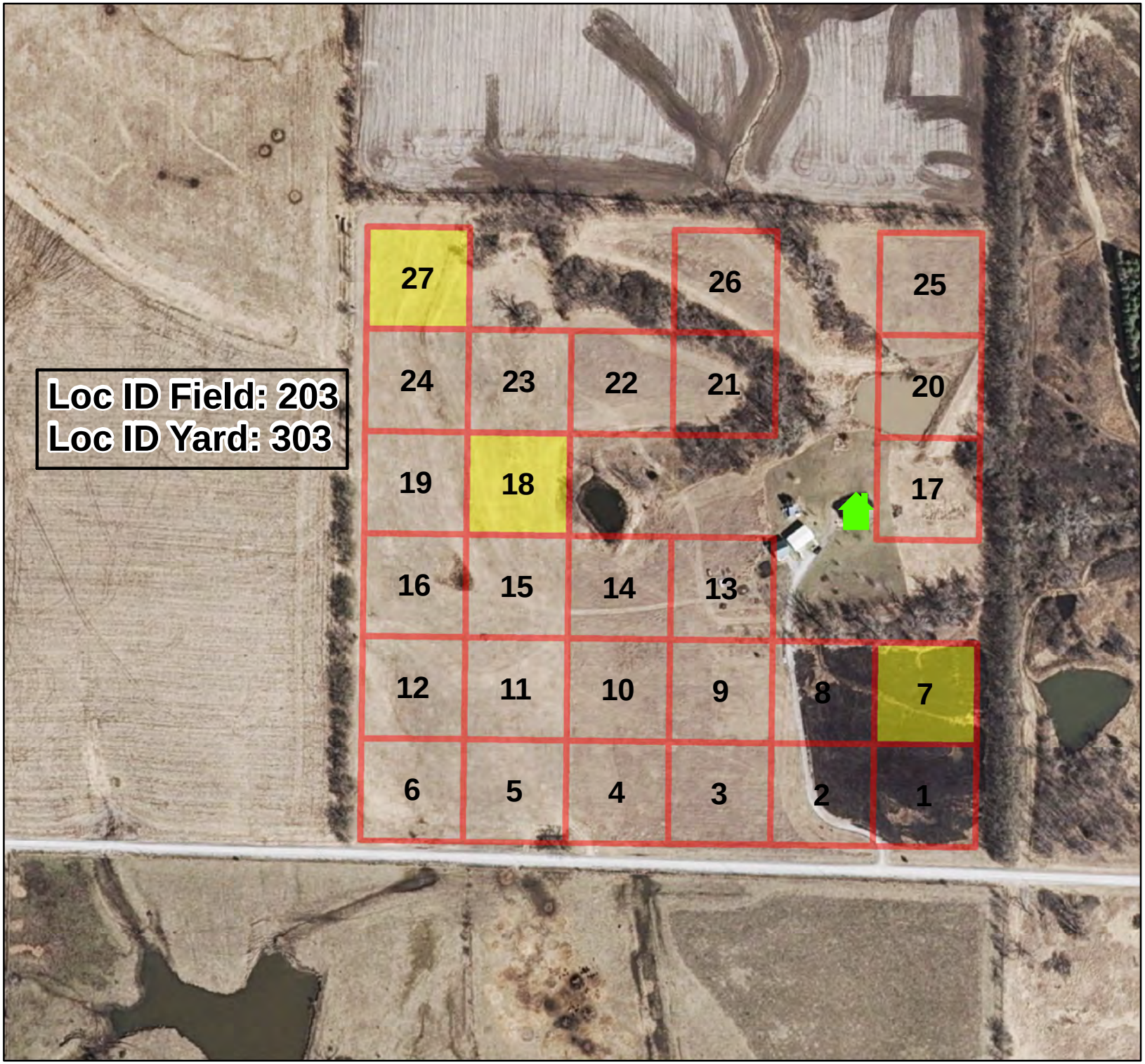
Figure A5

Tannery Sludge Farm Fields Site
Location ID Field: 203
Location ID Yard: 303
Dekalb County
40 Acres



Legend

- Residence
- Acres
- Sampled Acres

N
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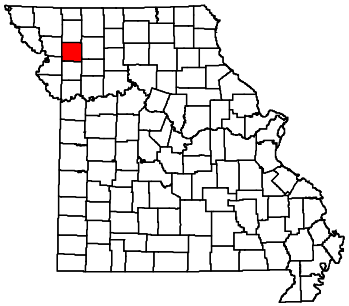
S



0 95 190 380 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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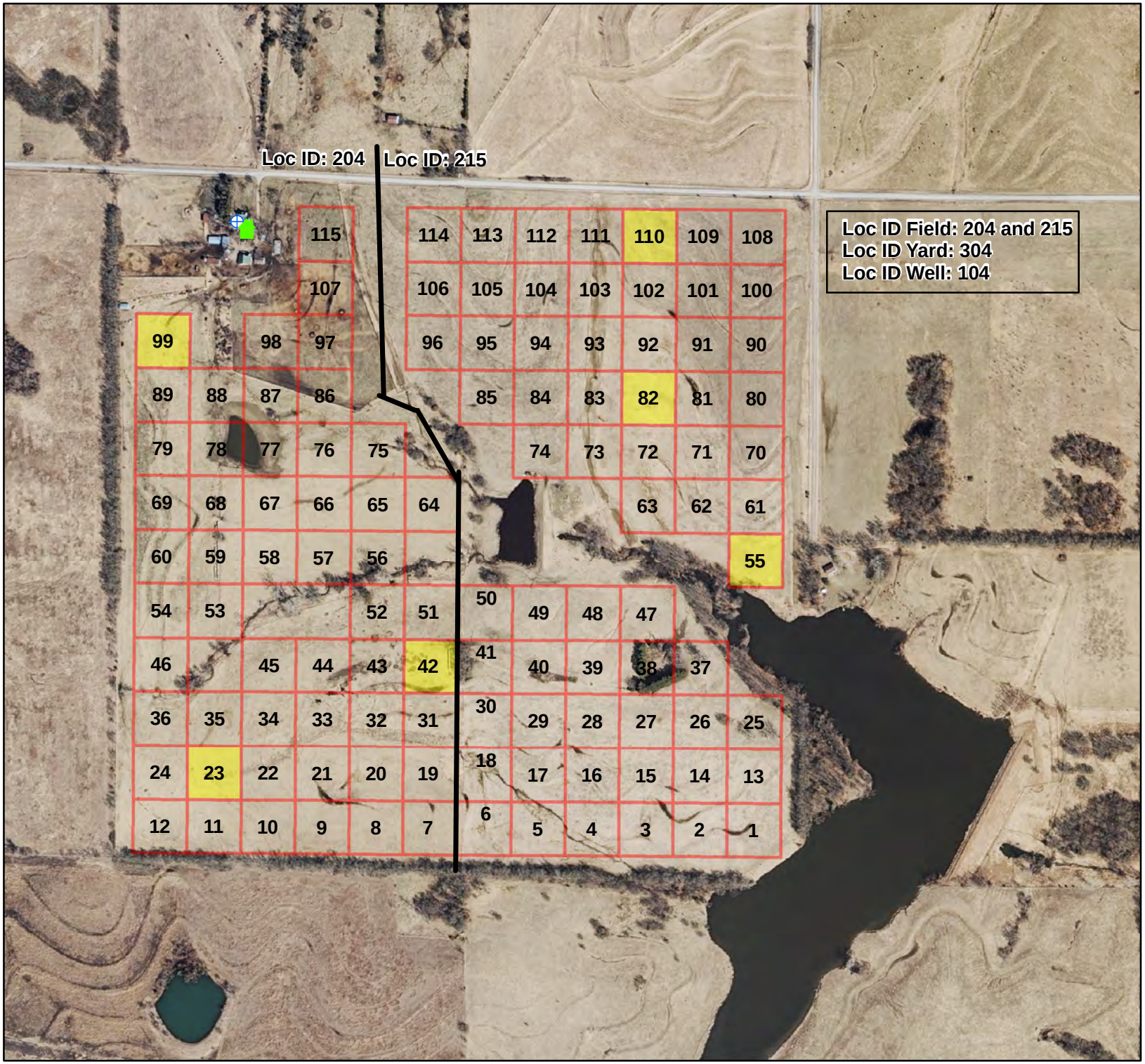
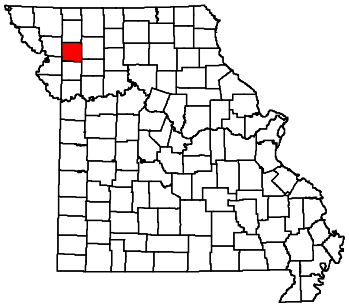
Figure A6

Tannery Sludge Farm Fields Site
Location ID Field: 204 and 215
Location ID Yard: 304
Location ID Well: 104
Dekalb County
161 Acres



Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres



Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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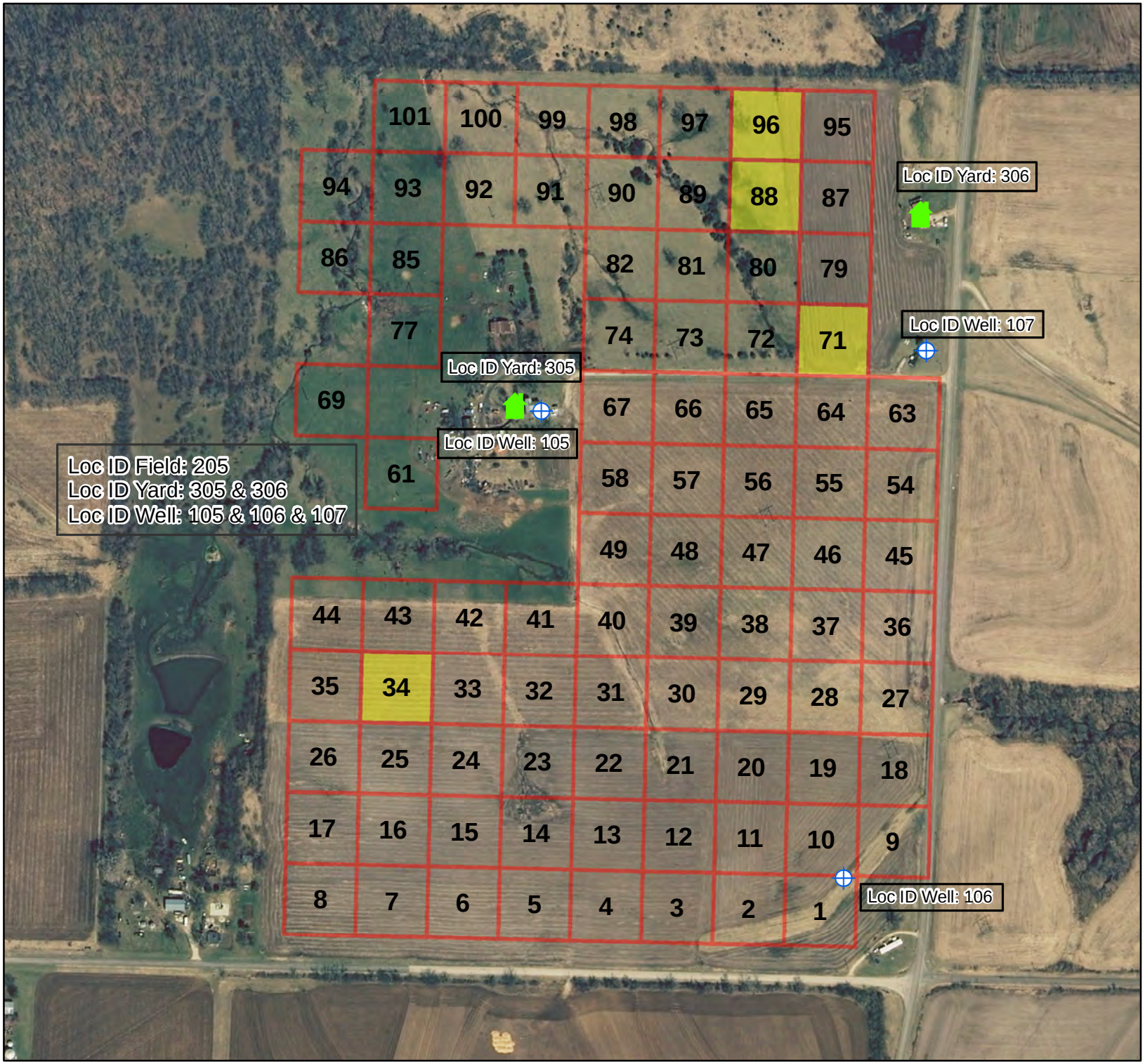
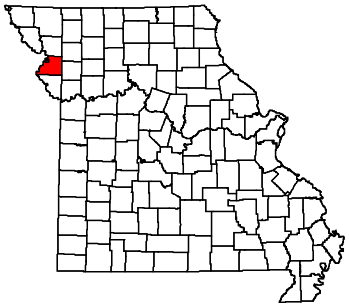
Figure A7

Tannery Sludge Farm Fields Site
Location ID Field: 205
Location ID Yard: 305 & 306
Location ID Well: 105 & 106 & 107
Buchanan County
110 Acres



Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres



0 125 250 500 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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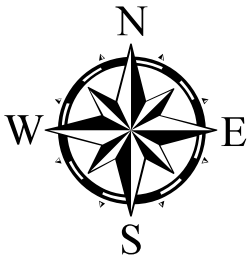
Figure A8

Tannery Sludge Farm Fields Site
Location ID Field: 209 & 210
Location ID Well: 109 & 110
Andrew County
N/A Acres

Legend

- Private Drinking Water Well
- Acres
- Sampled Acres



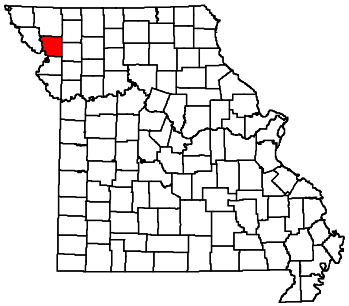


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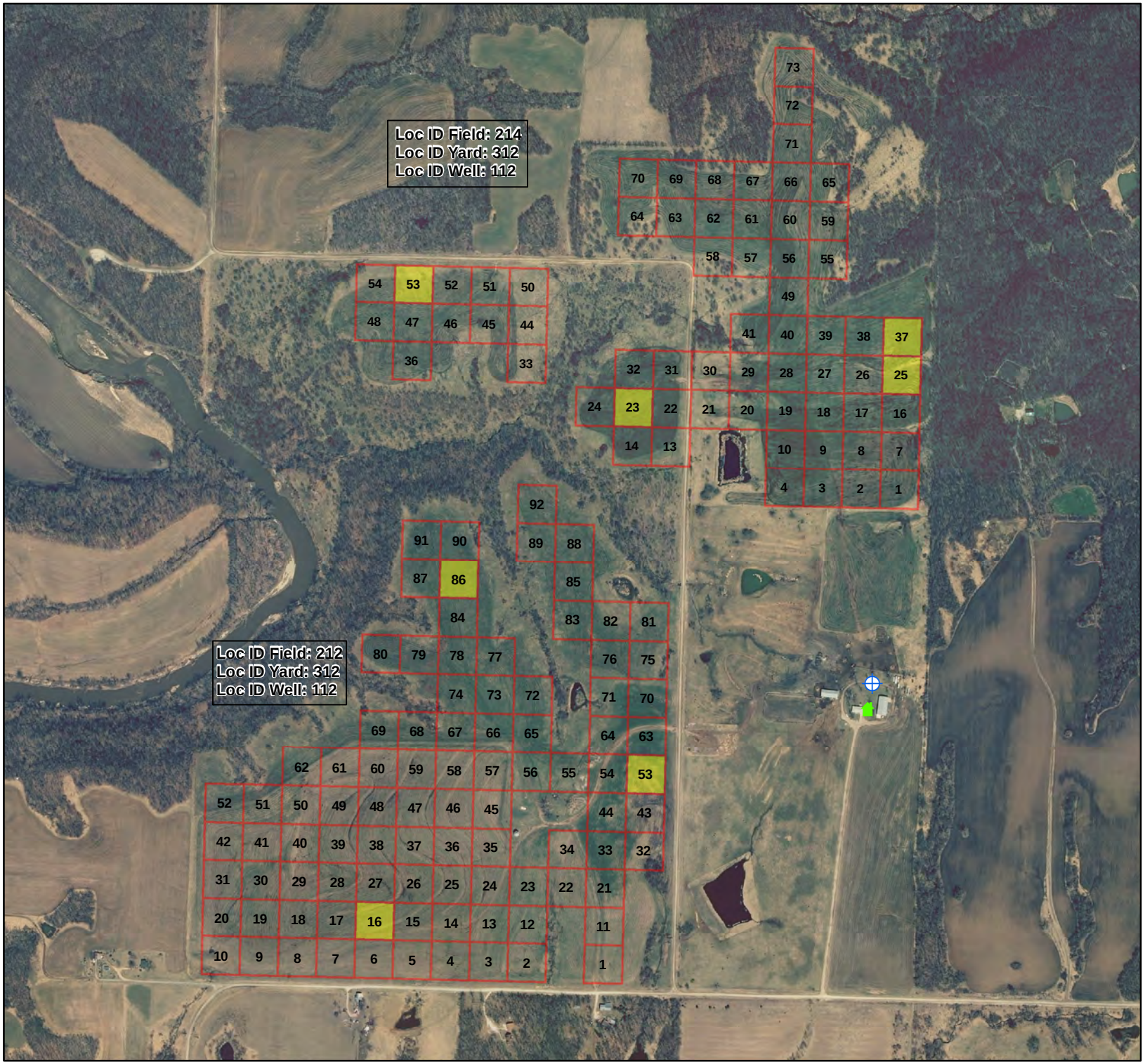
Figure A9

Tannery Sludge Farm Fields Site
Location ID Field: 212 and 214
Location ID Yard: 312
Location ID Wells: 112
Andrew County
Field 212: 226 Acres
Field 214: 166 Acres



Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres

N
W E
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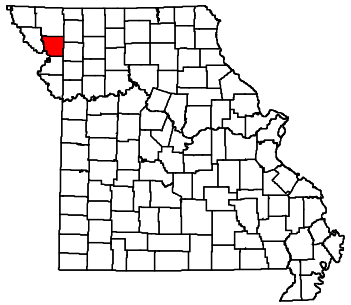

0 237.5 475 950
Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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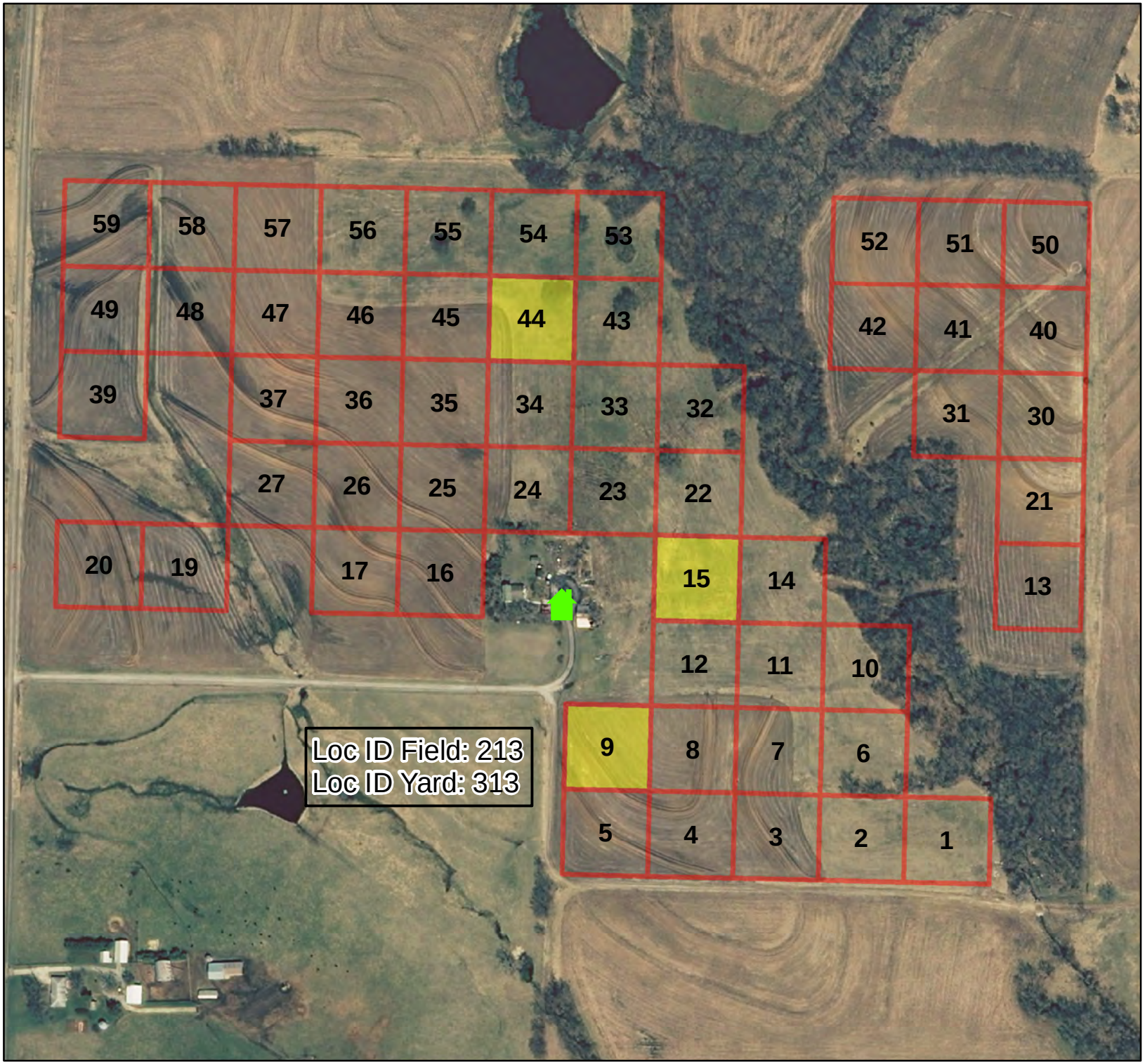
Figure A10

Tannery Sludge Farm Fields Site
Location ID Field: 213
Location ID Yard: 313
Buchanan County
89 Acres



Legend

- Residence
- Acres
- Sampled Acres

N
W E
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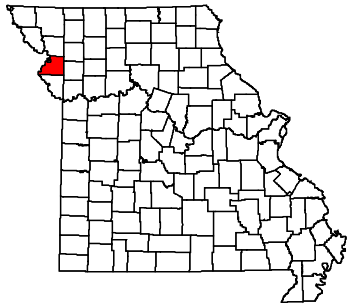

0 110 220 440 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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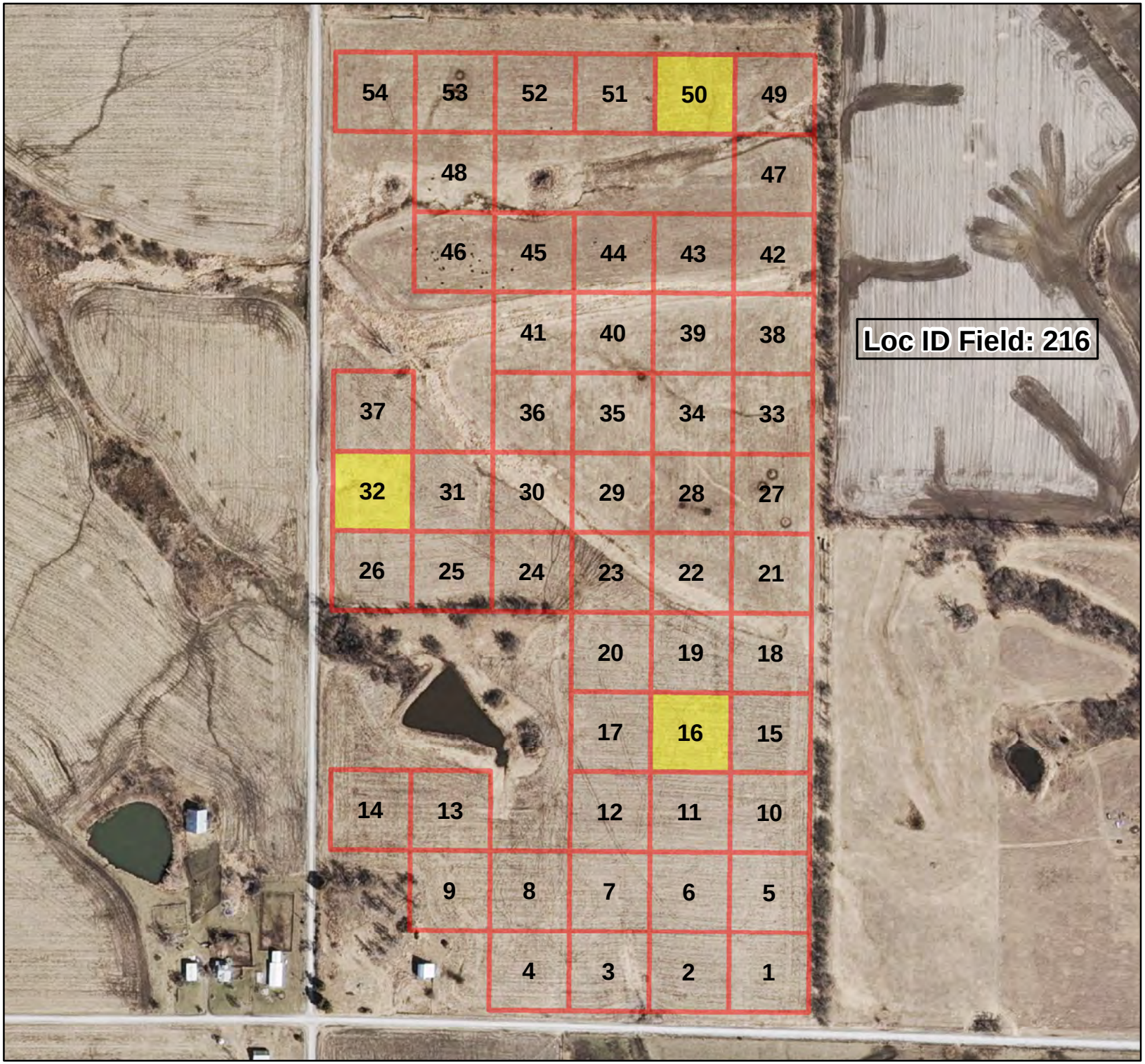
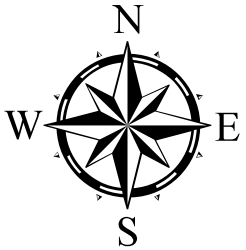
Figure A11

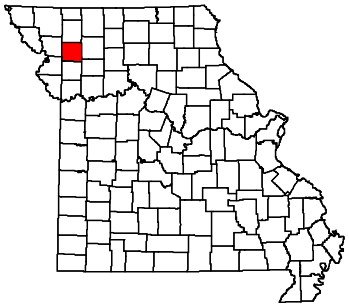
Tannery Sludge Farm Fields Site
Location ID Field: 216
Dekalb County
N/A Acres



Legend

- Acres
- Sampled Acres





0 115 230 460 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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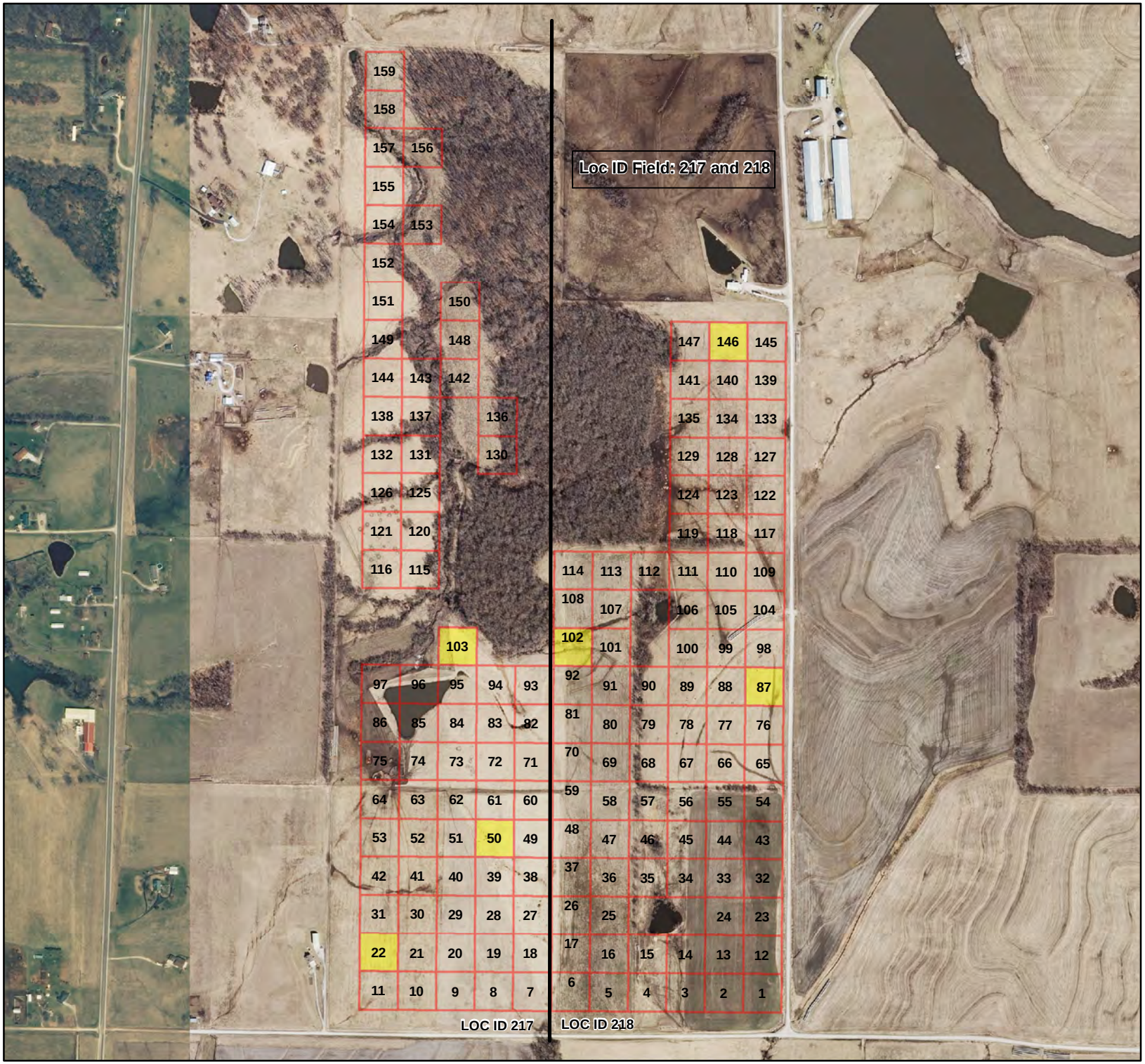
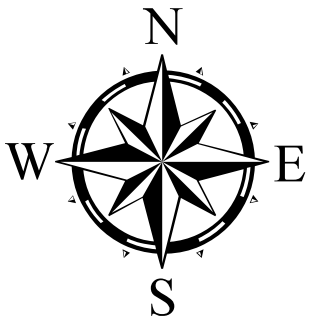
Figure A12

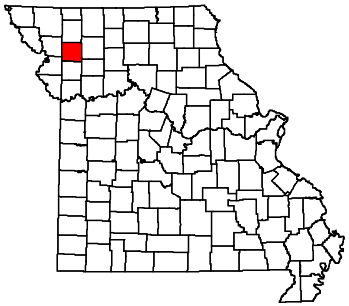
Tannery Sludge Farm Fields Site
Location ID Field: 217 and 218
Dekalb County
N/A Acres



Legend

- Acres
- Sampled Acres





0 262.5 525 1,050 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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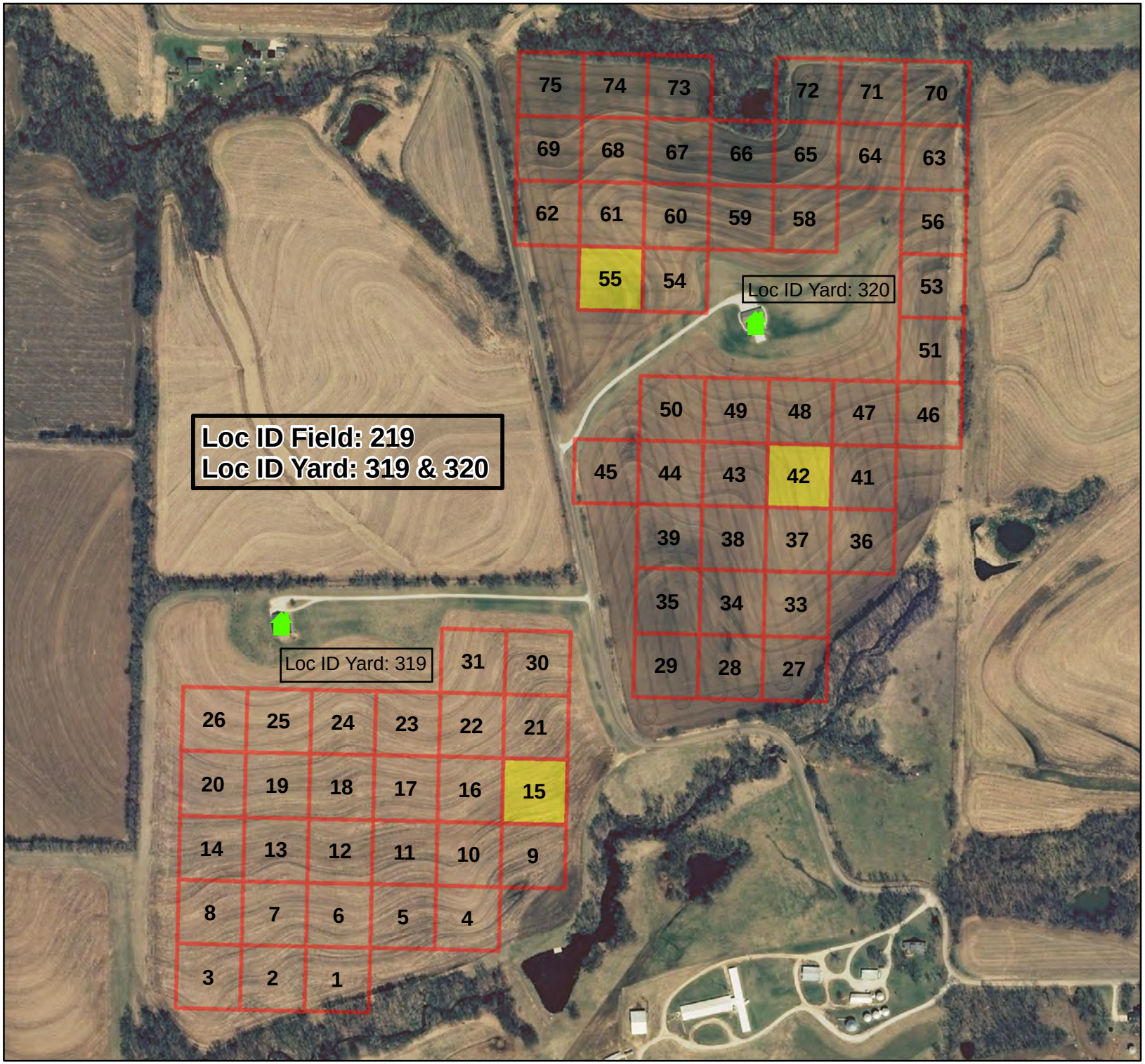
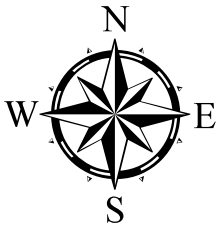
Figure A13

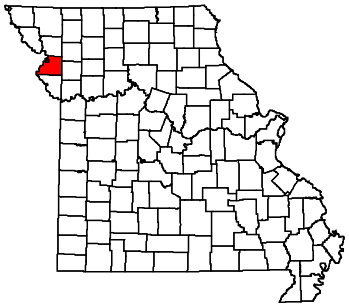
Tannery Sludge Farm Fields Site
Location ID Field: 219
Location ID Yard: 319 and 320
Buchanan County
145 Acres



Legend

- Residence
- Acres
- Sampled Acres





0 150 300 600 Yards

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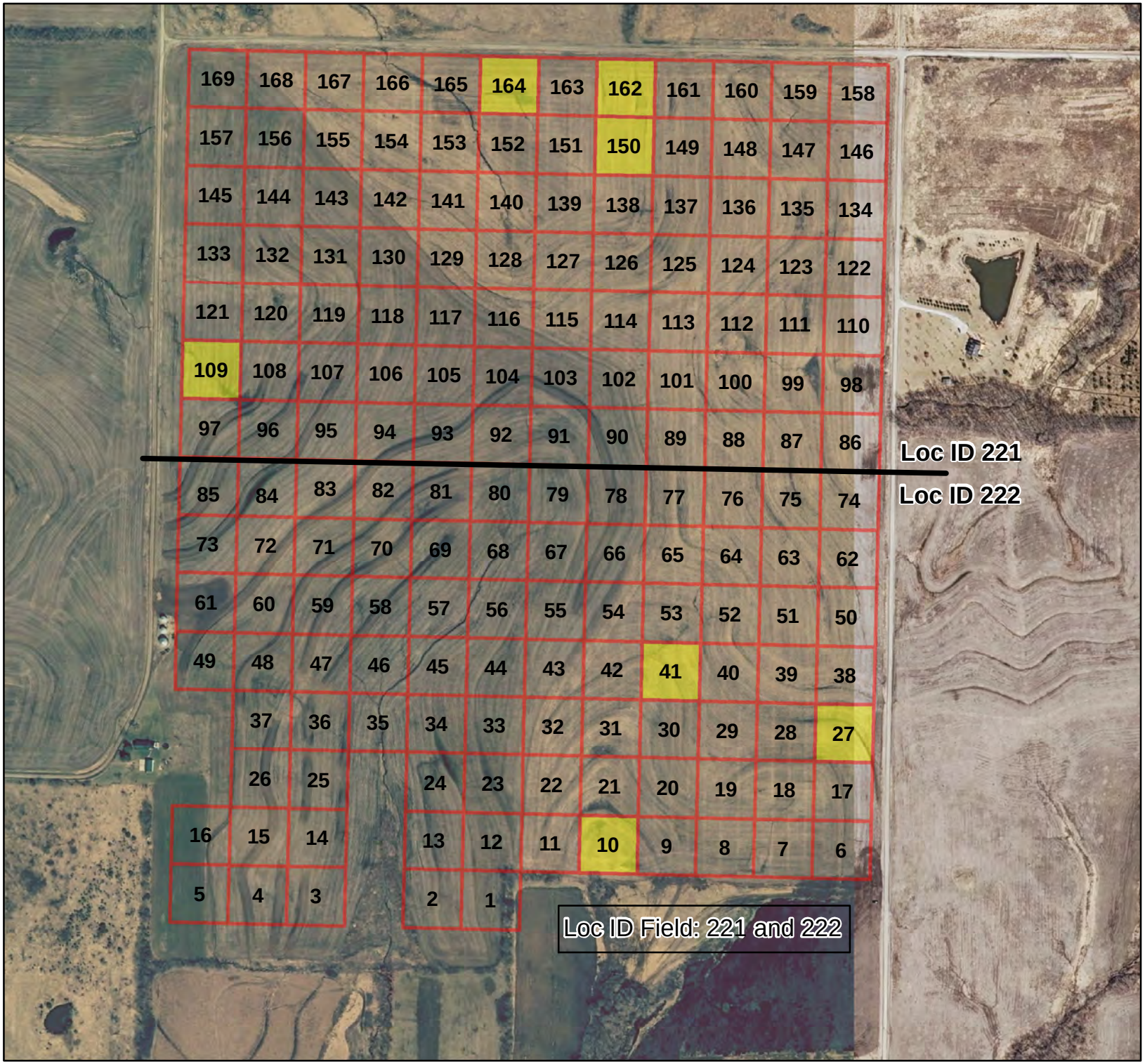
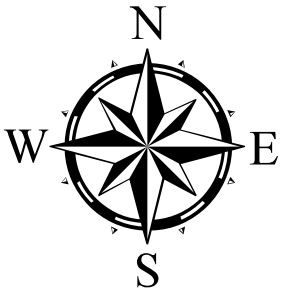
Figure A14

Tannery Sludge Farm Fields Site
Location ID Field: 221 and 222
Dekalb County
180 Acres



Legend

- Acres
- Sampled Acres



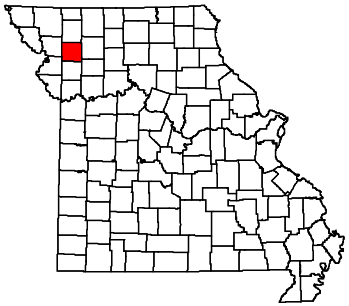


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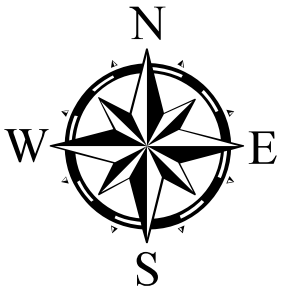
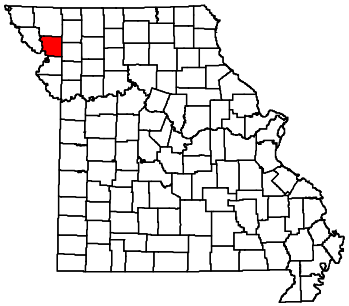
Figure A15

Tannery Sludge Farm Fields Site
Location ID Field: 223
Andrew County
N/A Acres

Legend

- Acres
- Sampled Acres





0 125 250 500 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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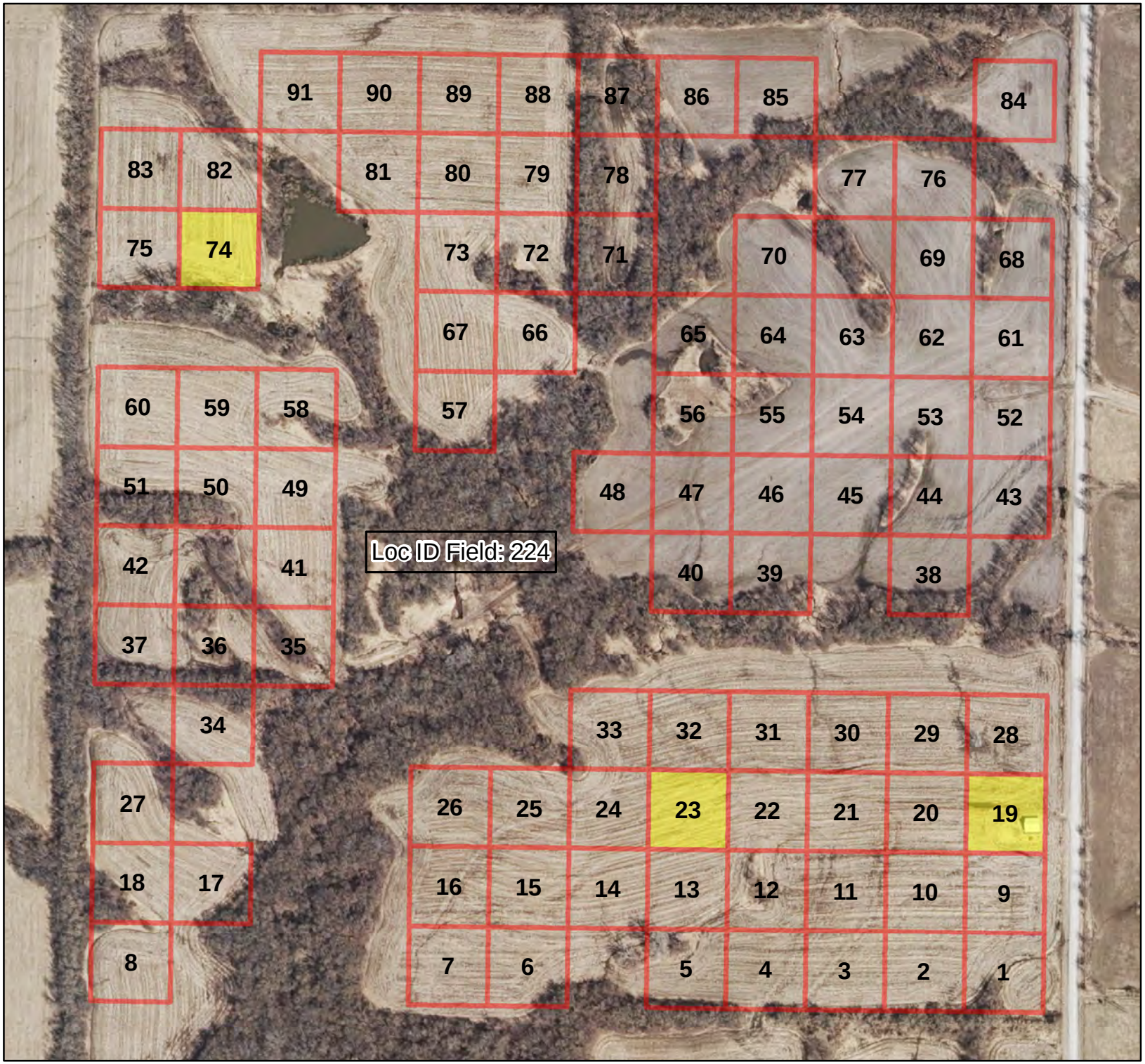
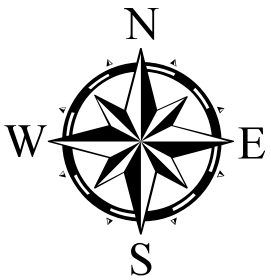
Figure A16

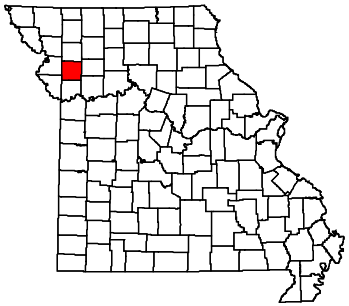
Tannery Sludge Farm Fields Site
Location ID Field: 224
Clinton County
N/A Acres



Legend

- Acres
- Sampled Acres





0 125 250 500 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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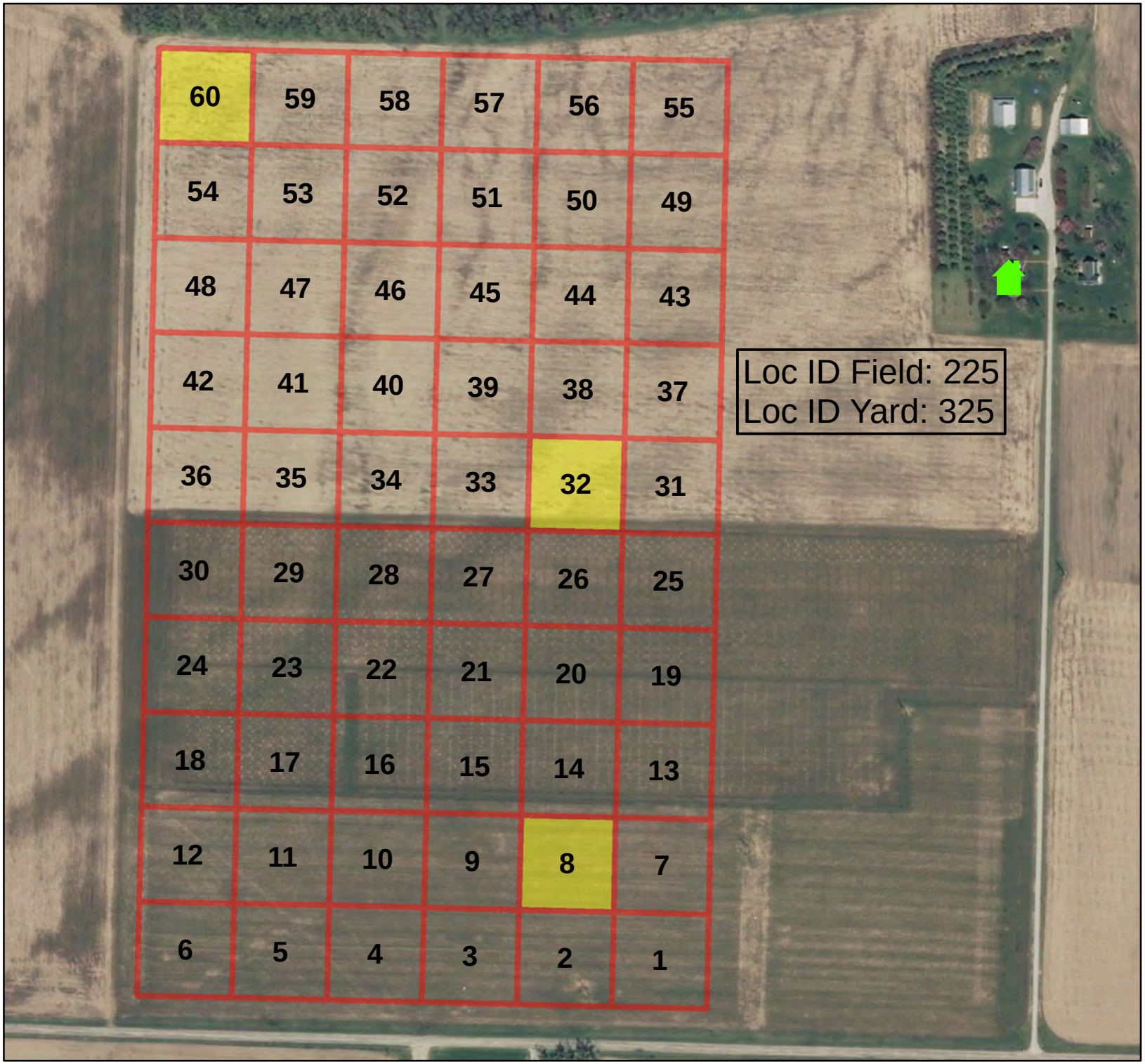
Figure A17

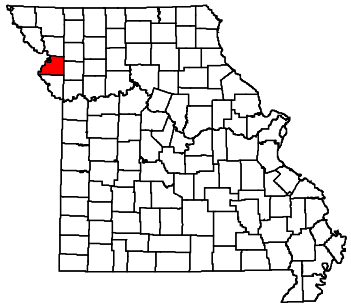
Tannery Sludge Farm Fields Site
Location ID Field: 225
Location ID Yard: 325
Buchanan County
N/A Acres



Legend

- Residence
- Acres
- Sampled Acres

N
W E
S



0 95 190 380 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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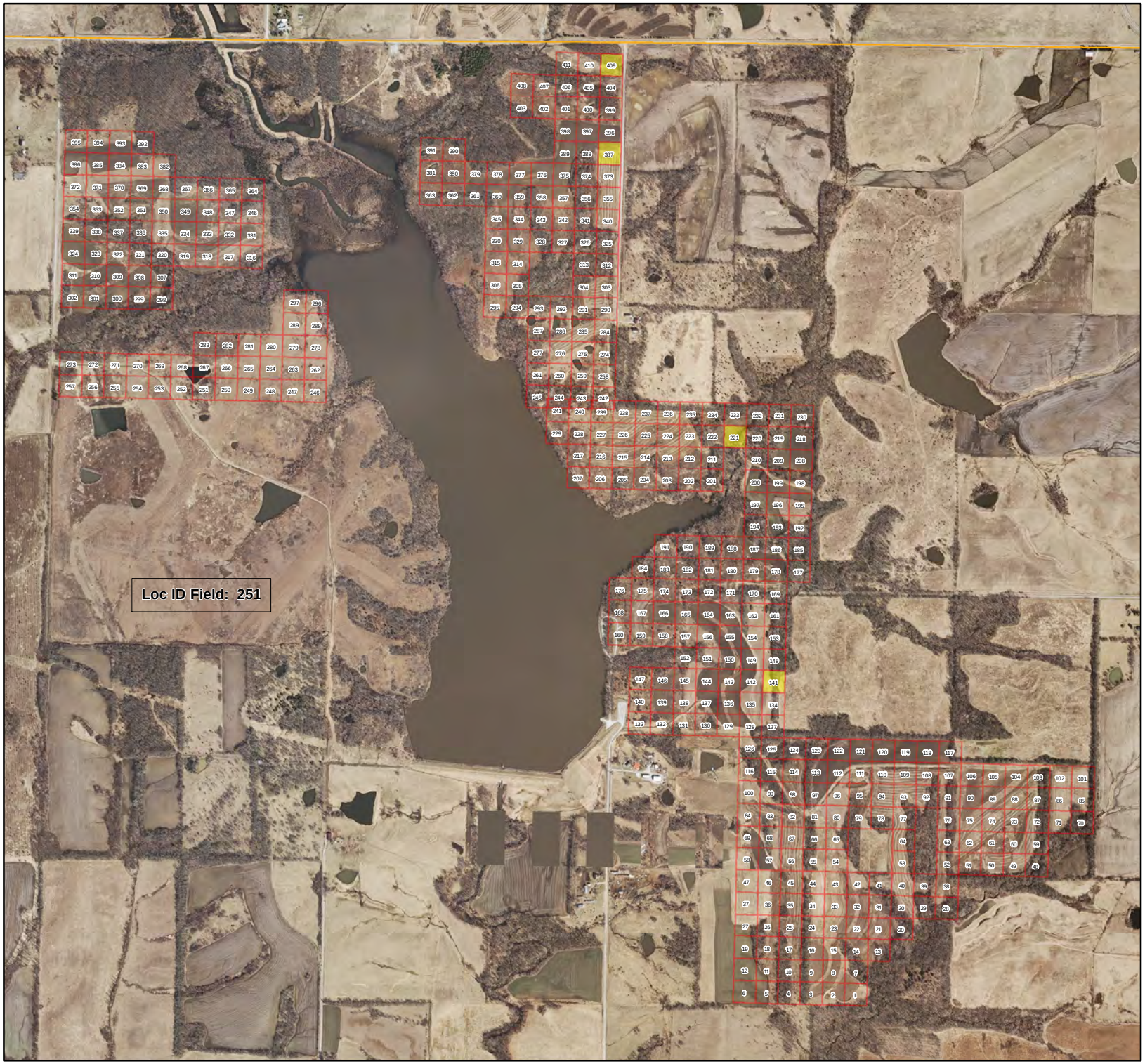
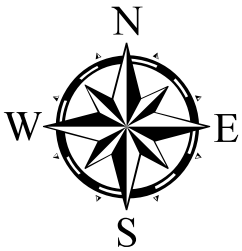
Figure A18

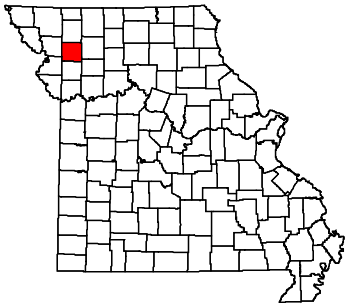
Tannery Sludge Farm Fields Site
Location ID Field: 251
Dekalb County
NA Acres



Legend

- Acres
- Sampled Acres





0 455 910 1,820 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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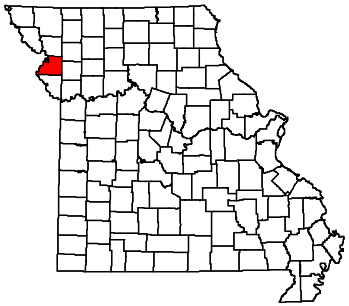
Figure A19

Tannery Sludge Farm Fields Site
Location ID Field: 252
Location ID Yard: 352
Buchanan County
360 Acres

Legend

- Residence
- Acres
- Sampled Acres

N
W E
S



0 220 440 880
Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

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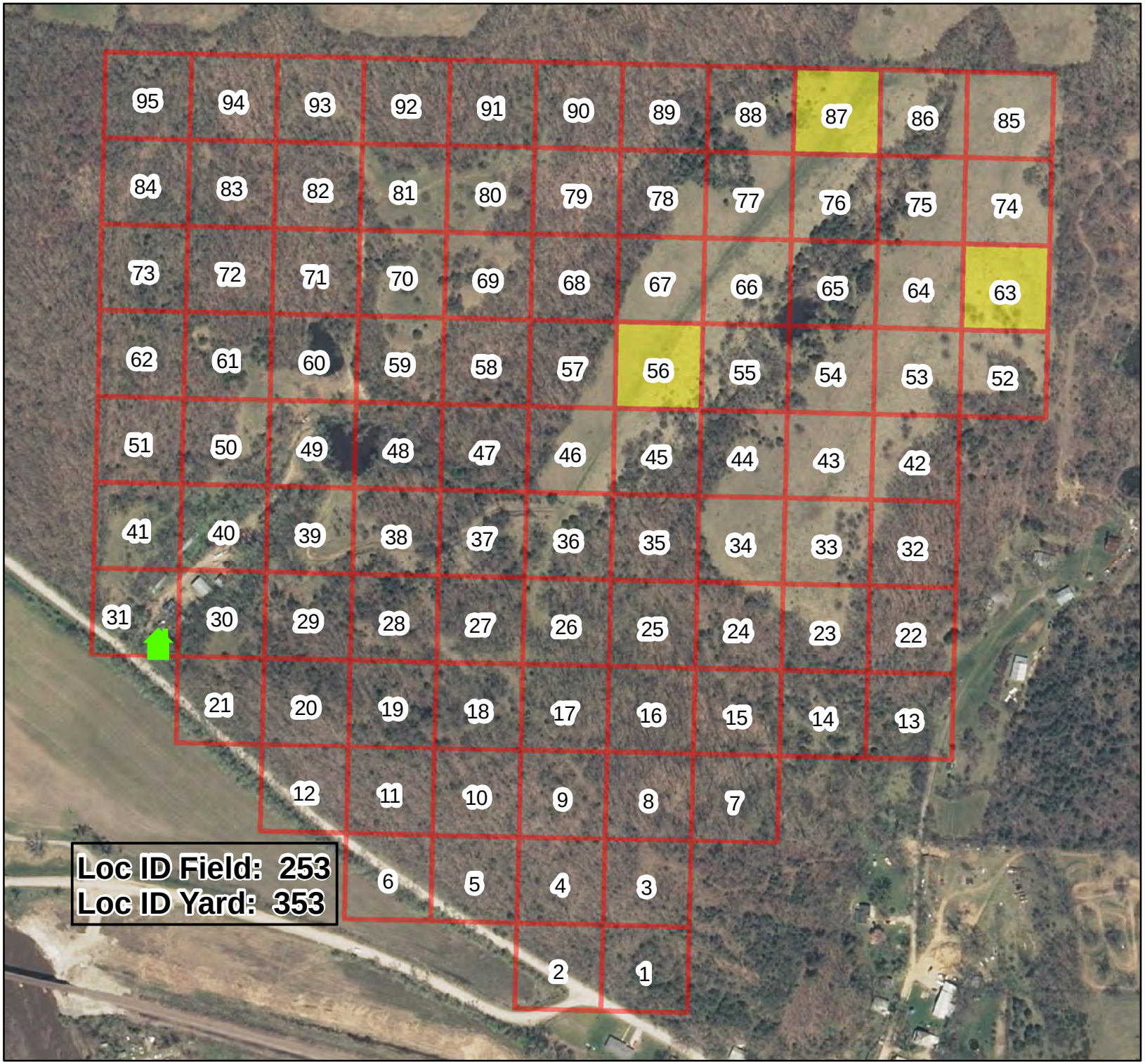
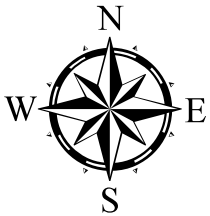


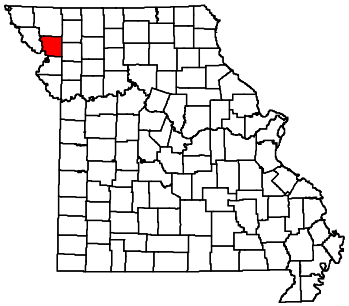
Figure A20

Tannery Sludge Farm Fields Site
Location ID Field: 253
Location ID Yard: 353
Andrew County
80 Acres

Legend

- Residence
- Acres
- Sampled Acres





0 120 240 480 Yards

Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

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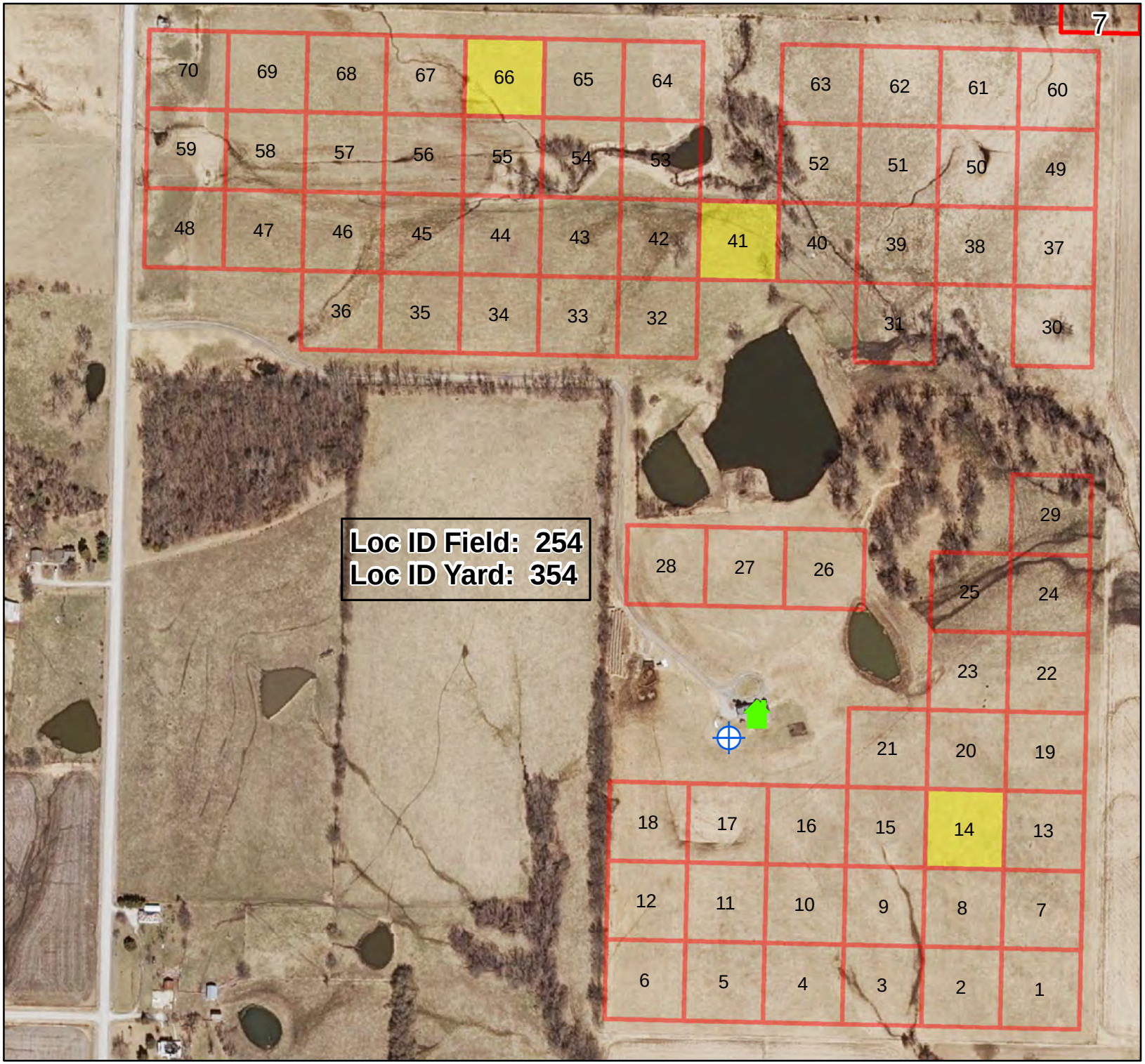
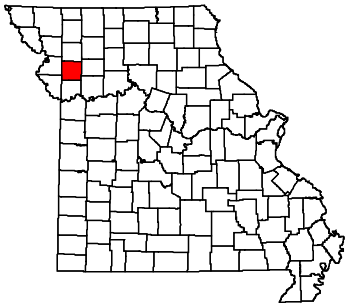


Figure A21

Tannery Sludge Farm Fields Site
Location ID Field: 254
Location ID Yard: 354
Clinton County
NA Acres

Legend

- Residence
- Private Drinking Water Well
- Acres
- Sampled Acres



Map Created in August 2010 by Paul Embree. This map is located at M:\Superfund\Tannery_Sludge_Farm_Fields\Maps\Report Maps.

Base Maps: Digital orthophoto Quarter Quad. Flight date 2007.

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

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APPENDIX B
PHOTOGRAPHS

Tannery Sludge Farm Fields Site
Pre-CERCLIS Site Screening

Photograph 1
Taken by Ken Hannon, DNR
August 12, 2009

Farm field pilot study sampling event. Establishing variogram plot.

Photograph 2
Taken by Ken Hannon, DNR
August 12, 2009

Farm field pilot study sampling event. Variogram layout showing discrete sampling locations spaced at 2ft apart.

Photograph 3
Taken by Michael Stroh, DNR
August 18, 2009

Dried soil sample collected during farm field pilot study. Tannery sludge remnants visible as indicated by arrows.

Photograph 4
Taken by Michael Stroh
August 18, 2009

Disaggregating soil sample collected during farm field pilot study prior to sieving.

Photograph 5
Taken by Michael Stroh
August 18, 2009

Sieved farm field pilot study sample ready for XRF analysis.

Photograph 6
Taken by Michael Stroh, DNR
October 2, 2009

Residential yard pilot study sampling event. View of the east side of the yard.

Photograph 7
Taken by Michael Stroh, DNR
October 2, 2009

Residential yard pilot study sampling event. View of the western boundary of the yard adjacent to a sludge-applied soybean field.

Photograph 8
Taken by Michael Stroh, DNR
October 7, 2009

Processed and unprocessed residential yard pilot study samples.

Photograph 9
Taken by Valerie Wilder, DNR
January 27, 2010

Residential yard at Location ID 301.

Photograph 10
Taken by Valerie Wilder, DNR
January 26, 2010

Residential yard at Location ID 302

Photograph 11
Taken by Valerie Wilder, DNR
January 27, 2010

Residential yard at Location ID 305

Photograph 12
Taken by Valerie Wilder, DNR
January 27, 2010

Residential yard at Location ID 306

Photograph 13
Taken by Valerie Wilder, DNR
January 26, 2010

Residential yard at Location ID 319

Photograph 14
Taken by Valerie Wilder, DNR
January 26, 2010

Residential yard at Location ID 320

Photograph 15
Taken by Shelly Jackson, DNR
January 26, 2010

Residential yard at Location ID.325

Photograph 16
Taken by Shelly Jackson, DNR
January 26, 2010

Residential yard at Location ID 326

Photograph 17
Taken by Michael Stroh, DNR
January 27, 2010

Residential Yard at Location ID 353

Photograph 18
Taken by Michael Stroh, DNR
April 6, 2010

Farm field Location ID 221.

Photograph 19
Taken by Michael Stroh, DNR
April 6, 2010

Farm field Location ID 251.
Background location, row crop field.

Photograph 20
Taken by Michael Stroh, DNR
April 6, 2010

Farm field Location ID 251.
Background location, pasture.

Photograph 21
Taken by Michael Stroh, DNR
April 6, 2010

Farm field Location ID 251.
Background location, row crop field.

Photograph 22
Taken by Michael Stroh, DNR
January 27, 2010

Farm field Location ID 215. Closeup view of pasture soil with evidence of tannery sludge visible.

Photograph 23
Taken by Shelly Jackson, DNR
January 26, 2010

Farm field pasture sampling showing technique used to extract soil samples from frozen ground.

Photograph 24
Taken by Michael Stroh, DNR
January 28, 2010

Laying out soil samples in pans to air dry at ESP.

Photograph 25
Taken by Michael Stroh, DNR
February 3, 2010

Air-dried soil samples collected from residential yard. Pan to the right shows fully processed samples from other two SUs collected at the residence.

Photograph 26
Taken by Michael Stroh, DNR
February 3, 2010

Disaggregating dried soil samples prior to sieving.

Photograph 27
Taken by Michael Stroh, DNR
February 3, 2010

Sieving of dried and disaggregated soil samples.

Photograph 28
Taken by Michael Stroh
February 5, 2010

XRF analysis of bagged soil samples prior to sending off for Cr VI analysis.

Photograph 29
Taken by Ben , Applied Speciation
February 15, 2010

Subsampling of soil sample at the analytical laboratory.

Photograph 30
Taken by EPA Region VI Staff
June 9, 2009

Truck used to spread tannery sludge waste on farm fields. Photo taken at the NBL facility.

Photograph 31
Taken by Sean Counihan, ESP
May 1, 2009

NBL facility. Back of tannery sludge storage shed depicting the color difference between newer and older sludge.

APPENDIX C
TABLES

TABLE C1: SELECTED ANALYTICAL RESULTS FOR TANNERY FACILITY SAMPLES COLLECTED IN APRIL AND MAY 2009
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

- All values listed in parts per million (mg/kg) unless otherwise noted. NA - Not Analyzed
- NL denotes benchmark value not listed in reference source.

Sample ID	SS01		SS02	SS03	SS04	SS05		SS06		SS07			MRBCA RBTL[3]			EPA SL[4]	
Sample Collected By	MDNR	MDNR	MDNR	MDNR	MDNR	MDNR	EPA	MDNR	EPA	MDNR	EPA						
Sample Location Description	Grab of WWT sludge from belt press in shed		Composite of dark WWT colored sludge from shed in NE corner of property	Grab of light colored WWT sludge in back of NE corner of shed	Composite of light colored WWT sludge in back of NE corner of shed	Grab of blue/green shavings pit sludge near loading area	Grab of blue/green shavings pit sludge near loading area	Composite of blue/green havings pit sludge from near loading area	Composite of blue/green havings pit sludge from near loading area	Composite of brown & blue/green shavings pit sludge mix from near loading area	Composite sludge from storage bin	SCDM[2]	Res.	Non-Res	Migrn to GW	Res.	Ind.
Laboratory Number	0910040	0910041 Replicate of 0910040	0910042	0910043	0910044	0910048	4425-101	0910049	4425-102	0910050	4425-2						
Metals																	
Aluminum	310.0	296.0	265.0	242.0	228.0	174.0	200 (j)	717.0 203(j)		260.0 299(j)		NL	75500	933000	137000	77332	100000
Arsenic	1.42 (e)	<1.0	<1.0	1.84 (e)	<1.0	21.9 (k,f)	<8.3	13.5 (k)	<10.6	20.3 (k)	<15.8	0.43	3.89	15.9	7.22	0.39	1.77
Barium	27.7 27.7		26.7	30.1	24.0	37.3	32.8(j)	31.6	30.4(j)	33.4	35.5	5500	15000	181000	2040	15642	100000
Barium, TCLP, mg/l	<.1	<.1	<.1	.17	.16	<.1	<0.0812	<.1 (f)	<0.138	<.1	<0.0484	NL	NL	NL	NL	NL	NL
Cadmium	.137 (e)	.149 (e)	<.1	.107 (e)	<.1	<.1	<1.7	.292 (e)	<2.1	<.1	<3.2	39	16.8	74.8	9.32	39	564
Chromium, TCLP, mg/l	<.1	<.1	.11	.13	.16	495.0	224	108.0	67.8	318.0	<0.015	NL	NL	NL	NL	NL	NL
Chromium, total	334.0	329.0	348.0	469.0	391.0	22,300.0	17,300	14,900.0	15,100	23,600.0	269	230	74600	472000	4470000	210	500
Cobalt	16.6 16.0		16.3	22.1	21.3	<.25	3.3	.518	3.4(j)	.544	5.2	NL	NL	NL	NL	900	2130
Hexavalent Chromium	35.0 (a)	30.0 (a)	46.0 (a)	13.0 (a)	7.7 (a)	1.7 (a)	12(b)	29.0 (a)	4.3(b)	21.0 (a)	<3.3	230	0.147	0.639	0.0016	30	71
Hexavalent Chromium, TCLP	NA	NA	NA	NA	NA	NA	<10(j)	NA	<10(j)	NA	67.3(j)	NL	NL	NL	NL	NL	NL
Iron	NA	NA	NA	NA	NA	NA	2630(j)	NA	61,900(j)	NA	82,600	NL	1220	12300	NL	54750	100000
Lead	12.9 (k)	12.3 (k)	10.0 (k)	8.72 (k)	8.27 (k)	1.79 (e)	<8.3	4.26	<10.6	2.32 (e)	<15.8	NL	260	660	3.76	400	800
Manganese	758.0 753.0		665.0	869.0	895.0	87.0	99.4	50.9	432	92.9	653(j)	11000	9680	96700	2720	3470	35000
Mercury	<.0025 <.0025		<.0025	<.0025	<.0025	.107	0.208	<.0025 (f)	0.216	.113	<0.0002	23	46.3	630	NL	23	340
Molybdenum-TCLP	11.3	11.1	11.5	12.9	10.7	5.13	NA	7.59 NA		5.43 NA		NL	NL	NL	NL	NL	NL
Nickel	NA	NA	NA	NA	NA	NA	<3.3	NA	<4.2	NA	46.2	1600	1510	18600	505	1570	22700
Silver	<.25	<.25	<.25	.28 (e)	<.25	.723 (k)	<3.3	.332 (e)	<4.2	.615 (k)	<6.3	390	374	4480	16.3	390	5680
Zinc	75.8	74.6	77.6	97.3	82.6	36.0 (k)	44.2	47.8 (k)	59.1(j)	41.7 (k)	87.8(j)	23000	22800	288000	7220	23500	100000
Volatile Organic Compounds (VOCs)																	
1,2,4-Trimethylbenzene	.503	.5	.535	<.125 (i)	<.125 (i)	.31	NA	3.22	NA	1.36	NA	NL	749	10100	3.94	5.73	223
1,3,5-Trimethylbenzene	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	NA	.638	NA	<.25 (i)	NA	NL	749	10100	0.891	21	77
2-Butanone (MEK)	<.625 (i)	<.625 (i)	3.95	.741 (e)	2.01	<.625 (i)	NA	<.625 (i)	NA	29.8	NA	47000	44200	579000	0.127	32089	34092
acetone	<2.5 (i)	<2.5 (i)	16.8	13.2	17.9	<2.5 (i)	NA	<2.5 (i)	NA	8.63 (e)	NA	70000	61500	807000	8.61	14150	60479
carbon disulfide	.552	.504	.353	.317	.331	.216 (e)	NA	.574	NA	.355 (e)	NA	7800	7290	95600	7.99	721	721
Chloroform	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	NA	.911	NA	<.25 (i)	NA	780	180	678	0.753	0.24	0.58
Naphthalene	.777 (e)	.794 (e)	.872 (e)	<.625 (i)	<.625 (i)	<.625 (i)	NA	1.27	NA	2.4 (e)	NA	3100	36.3	119	0.327	124	209
n-Butylbenzene	2.06	2.01	2.36	.211 (e)	.333	3.25	NA	50.4 NA		13.2 NA		NL	2730	35900	14.8	144	237
n-Propylbenzene (Isocumene)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	NA	.268	NA	<.25 (i)	NA	NL	2730	35900	13.2	144	237
p-Isopropyltoluene (p-Cymene)	.403	.397	.153 (e)	<.125 (i)	<.125 (i)	.258	NA	1.02	NA	.395 (e)	NA	NL	20500	269000	272	NL	NL
sec-Butylbenzene	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	<.125 (i)	NA	.252	NA	<.25 (i)	NA	NL	2730	35900	35.3	111	223
Tetrahydrofuran	<.625 (i)	<.625 (i)	<.625 (i)	<.625 (i)	<.625 (i)	<.625 (i)	NA	<.625 (i)	NA	1.53 (e)	NA	NL	501	3350	0.0602	9	23
Semi-Volatile Organic Compounds (SVOCs)																	
4-Chloro-3-methylphenol	34.2	37.8	20.3	6.27	19.0	1,840.0	NA	4,140.0 NA		2,940.0 NA							
4-Methylphenol (p-Cresol)	55.9	66.6	55.4	1.37 (e)	3.29	<.711 (i)	NA	<1.58 (i)	NA	<.929 (i)	NA	390	275	2840	0.751	305	3420
Di-n-octyl phthalate	<.402 (i)	<.399 (i)	<.24 (i)	<.667 (i)	<.678 (i)	2.83	NA	1.59	NA	3.45	NA	1600	2320	22800	76.1	NL	NL
Naphthalene	<.402 (i)	<.399 (i)	<.24 (i)	<.667 (i)	<.678 (i)	<.356 (i)	NA	2.44	NA	<.464 (i)	NA	3100	36.3	119	0.327	124	209
Phenol	16.6	16.2	8.8	2.79	10.5	<.356 (i)	NA	<.788 (i)	NA	<.464 (i)	NA	23000	11800	128000	32.4	18331	100000

* - Results in mg/L

[2] SCDM - Superfund Chemical Data Matrix, January 28, 2004, lower of reference dose and cancer risk benchmarks for soil pathway

[3] MRBCA RBTL- Missouri Risk-Based Corrective Action Risk-Based Target Level, June 2006. RBTLs are for soil type 2 (silty), residential and non-residential land use, and soil concentrations protective of groundwater

[4] EPA SL - EPA Region 6 Screening Levels, March 8, 2008, residential and industrial use.

[5] TCLP - Toxicity Characteristic Leaching Procedure regulatory limit, 40 CFR Part 261, Subpart C.

a - Analyzed by colorimetric method (SW846 7196A)

b - Analyzed by ion chromatographic method (SW846 7199)

e - Estimated value, detected below PQL

f - Estimated value, QC data outside limits

h - Analyte present in blank at > 1/2 reported value

i - PQL elevated due to sample dilution

k - Estimated value, matrix interference

TABLE C2: SELECTED ANALYTICAL RESULTS FOR TANNERY SLUDGE SAMPLE COLLECTED AUGUST 4, 2010
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

- All values listed in parts per million (mg/kg) unless otherwise noted.
- NL denotes benchmark value not listed in reference source.
- -- denotes benchmark not applicable

Sample ID	Sludge Pile	SCDM[1]	MRBCA RBTL[2]			EPA SL[3]	
Date Collected	08/04/10		Res.	Non-Res	Migrn to GW	Res.	Ind.
Laboratory Number	1001612						
Metals							
Aluminum	338.0 NL		75500	933000	137000	77332	100000
Arsenic	<1	0.43	3.89	15.9	7.22	0.39	1.77
Barium	95.5 5500		15000	181000	2040	15642	100000
Cadmium	.124 (e)	39	16.8	74.8	9.32	39	564
Chromium, hexavalent[5]	.21 (d)	230	0.147	0.639	0.0016	30	71
Chromium, TCLP, mg/l	<0.1	NL	NL	NL	NL	NL	NL
Chromium, total	398.0	230	74600	472000	4470000	210	500
Copper	12.5 NL		3040	38100	618	2905	42177
Cyanide	4.1 (d)	1600	1220	12300	77.6	1200	13680
Iron	119,000.0 NL		1220	12300	NL	54750	100000
Lead	6.71 (k)	NL	260	660	3.76	400	800
Zinc	179.0 23000		22800	288000	7220	23500	100000
Volatile Organic Compounds (VOCs)							
2-Butanone (MEK)	.717	47000	44200	579000	0.127	32089	34092
Acetone	6.42 70000		61500	807000	8.61	14150	60479
Benzene	<0.0125	12	177	763	0.063	0.65	1.59
Carbon disulfide	.0202 (f,e)	7800	7290	95600	7.99	721	721
Chlorobenzene	<0.0125	1600	1340	17600	2.02	273	503
Chloroform	<0.0125	780	180	678	0.753	0.24	0.58
n-Butylbenzene	<0.0125	NL	2730	35900	14.8	144	237
p-Isopropyltoluene (p-Cymene)	<0.0125	NL	20500	269000	272	NL	NL
Tetrahydrofuran	.0793 (e)	NL	501	3350	0.0602	9	23
Toluene	<0.0125	16000	6240	81100	31.1	521	521
Semi-Volatile Organic Compounds (SVOCs)							
4-Chloro-3-methylphenol	171.0 NL		NL	NL	NL	6100	62000
4-Methylphenol (p-Cresol)	194.0	390	275	2840	0.751	305	3420
Phenol	19.1 23000		11800	128000	32.4	18331	100000

[1] SCDM - Superfund Chemical Data Matrix, January 28, 2004, lower of reference dose and cancer risk benchmarks for soil pathway

[2] MRBCA RBTL- Missouri Risk-Based Corrective Action Risk-Based Target Level, June 2006. RBTLs are for soil type 2 (silty), residential and non-residential land use, and soil concentrations protective of groundwater.

[3] EPA SL - EPA Region 6 Screening Levels, March 8, 2008, residential and industrial use.

[4] TCLP - Toxicity Characteristic Leaching Procedure regulatory limit, 40 CFR Part 261, Subpart C

[5] Analyzed by modified EPA SW-846 Method 7199

d - Analyzed by Contract Laboratory

e - Estimated value, detected below PQL

f - Estimated value, QC data outside limits

k - Estimated value, matrix interference

TABLE C3: ANALYTICAL RESULTS FOR PRIVATE WELL WATER SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

- All values listed in parts per billion (ug/l) unless otherwise noted.
- NA denotes not analyzed
- -- denotes not available/applicable
- Sample results in bold are significantly[1] above background concentrations

Location ID	101 Bkgnd	108 Bkgnd	111 Bkgnd	Bkgnd Average	103	104	105 replicate1	105 replicate2	105 replicate3	106	107	102	102 resample	102 duplicate	Field Blank	112	109	110	RBSL[2]	MCL[3]
Date Collected	12/16/09	12/16/09	12/16/09		12/16/09	12/16/09	12/17/09	12/17/09	12/17/09	12/17/09	12/17/09	12/16/09	1/26/10	1/26/10	1/26/10	12/17/09	12/17/09	12/17/09		
Laboratory Number	H0900210	H0900203	H0900212		H0900201	H0900202	H0900204	H0900205	H0900206	H0900207	H0900208	H0900211	1000501	1000503	1000502	H0900213	H0900214	H0900215		
Water Quality Indicators																				
Oxidation Reduction Potential, mV	39.0	-80.0	33	--	120.0	122.0	160.0	NA	NA	162.0	130.0	-17	177	NA	NA	-23	158	-74	--	--
pH	7.3	7.47 6.92		--	7.45	7.73 6.85		NA	NA	6.72	8.23	7.42	6.82	NA	NA	7.68	7.66	7.75	--	--
Specific Conductivity, uS/cm	504	652	344	--	300	828	833	NA	NA	654	420	472	483	NA	NA	760	848	584	--	--
Metals																				
*Chromium, hexavalent, dissolved	0.039 (e)	0.022 (e)	<0.017	0.026	<0.017	<0.017	**0.157 (e)**	**0.131 (e)**	**0.125 (e)**	0.033 (e)	**0.139 (e)**	**0.301****	**0.269**	**0.263**	<0.022	**0.230 (e)**	<0.017	<0.017	0.30	--
Chromium, total	0.35 (e)	0.38 (e)	0.30(e)	0.34	2.77	0.32 (e)	0.59 (e)	0.60 (e)	0.67 (e)	0.68 (e)	0.49 (e)	0.51(e)	<0.25	<0.25	<0.25	0.60(e)	0.39(e)	3.52	--	100
Chromium, dissolved	1.92	3.36	2.14	2.47	0.71 (e)	2.85	0.76 (e)	0.73 (e)	0.92 (e)	1.64	1.56	1.95	NA	NA	NA	1.86	3.41	1.70	--	100

[1] Three times the background average. Non-detect background results are treated as the MDL for calculating average.

[2] Risk-based Screening Level for hexavalent chromium developed for the site

[3] EPA Maximum Contaminant Level for drinking water

e - Estimated value, detected above the method detection limit (MDL), but below the practical quantitation limit (PQL)

* - Hexavalent Chromium subcontracted to outside laboratory for analysis

** - Department of Health and Senior Services does not consider this value an exceedance of the screening level.

Avg. for 102	0.282
RPD	13.475
%RSD	9.528
CV	0.095
SD	0.027
n	3
1-sided 95% UCL	**0.327**

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**218**							**Loc ID**	**218**						
Date Sampled:	1/27/2010	XRF SerNum:	5444	SU	146			Date Sampled:	1/27/2010	XRF	5444	SU	87		
Sample ID	Total Cr	SD						Sample ID	Total Cr	SD					
146.03	361	14.5						87.01	176	9.6					
146.08	424	16.5						87.06	172	13.4					
146.06	156	11.7			VSP output:	2		87.04	68	11			VSP output:	2	
146.10	291	19.2						87.07	205.5	15.6					
146.05	199	8.6						87.10	72	1.8					
													%RSD		
		Width of Grey Region (WGR)											46.17907051		
			WGR		%RSD							WGR			
ave =	**286**		1394		38.73634853			**ave =**	**139**			1541			
SD =	**111**							**SD =**	**64**						
1 sided 95% UCL	**350**							**1 sided 95% UCL**	**176**						
Loc ID	**218**							**Inter SU Check**							
Date Sampled:	1/27/2010	XRF SerNum:	5444	SU	102			Loc ID		XRF SerNum:	5444				
								SU Total	Cr	SD					
Sample ID	Total Cr	SD						146	286	111			VSP output:	2	
102.02	205.8	8.5						102	197	64					
102.03	102.3	5						87	139	64			SUIS	Mean	SD
102.08	208.1	24.5											102	152.3	8.2
102.06	282.4	14			VSP output:	2					%RSD		146	285.5	25.4
102.10	188.3	7.5									35.711952		87	153.5	10.5
													DUIS	204	23
					%RSD										
					32.57567996										
			WGR								WGR				
ave =	**197**		1483					**ave =**	**207**		1473				
SD =	**64**							**SD =**	**74**						
1 sided 95% UCL	**235**							**1 sided 95% UCL**	**250**						
Loc ID	**202**							**Loc ID**	**202**						
Date Sampled:	1/26/2010	XRF SerNum:	5420	SU	59			Date Sampled:	1/26/2010	XRF SerNum:	5420	**SU**	**29**		
Sample ID	Total Cr	SD						Sample ID	Total Cr	SD					
59.10	329	21.1						29.02	122.8	7.8					
59.07	616	35			VSP output:	2		29.03	74.5	6			VSP output:	2	
59.09	302	20.7						29.04	80.8	3.2					
59.05	104	5.3						29.05	48	7					
59.02	181	19.3						29.10	64.5	3.7					
			WGR								WGR				
ave =	**306**	**20**	1374					**ave =**	**78**	**6**	1602				
SD =	**196**	**11**						**SD =**	**28**	**2**					
1 sided 95% UCL	**420**							**1 sided 95% UCL**	**94**						
Loc ID	**202**							**Inter SU Check**							
Date Sampled:	1/26/2010	XRF SerNum:	5420	SU	79			Loc ID		XRF SerNum:	5420				
								SU Total	Cr	SD					
Sample ID	Total Cr	SD							306	196					
79.01	95.5	2.4							116	18			VSP output:	2	
79.03	132	8.4							78	28					
79.07	116	3.8			VSP output:	2							SUIS	Mean	SD
79.08	136	6.4											29	103	3.9
79.10	100	3.8											59	179	16.7
													79	124	5.1
													DUIS	131	5.8
			WGR								WGR				
ave =	**116**	**5**	1564					**ave =**	**167**	**81**	1513				
SD =	**18**	**2**						**SD =**	**122**	**100**					
1 sided 95% UCL	**126**							**1 sided 95% UCL**	**237**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**214**							**Loc ID**	**214**						
Date Sampled:	1/27/2010	XRF SerNum:	5420	SU	23			Date Sampled:	1/27/2010	XRF SerNum:	5420	**SU**	**25**		
Sample ID	Total Cr	SD						Sample ID	Total Cr	SD					
23.01	87	2.2						25.02	83.3	3					
23.05	73.3	2.9						25.06	589.3	9.6					
23.06	123.8	9.1						25.07	911.5	38.1					
23.08	84.5	4.7						25.08	1279.8	20					
23.10	70.8	5.3						25.10	88	2.2			%RSD		
			VSP output	2				25.01	322	21.4			79.51777914		
								25.03	537	7.9					
					%RSD			25.04	1485	57			VSP output:	4	
					24.18403415			25.05	477	10.1					
			WGR					25.09	269	11.5			5-bag	WGR	
ave =	**88**	**5**	1592					**ave =**	**604**	**18**			590	1076	
SD =	**21**	**3**						**SD =**	**480**	**17**			522		
1 sided 95% UCL	**100**							**1 sided 95% UCL**	**883**						
Loc ID	**214**							**Inter SU Check**							
Date Sampled:	1/27/2010	XRF SerNum:	5420	SU	53			Loc ID		XRF SerNum:					
								SU Total	Cr	SD					
Sample ID	Total Cr	SD							88	21					
53.01	136	11.5							590	522					
53.03	103	6.7							122	57	SUIS	Mean	SD		
53.05	84.5	8.1									23	133	7		
53.06	215	12.7									25	599	25		
53.09	72.3	4.6	VSP output	2							53	133	6.7		
											DUIS	225	8.7		
													VSP output:	2	
					%RSD										
			WGR		46.81462745						WGR				
ave =	**122**	**9**	1558					**ave =**	**267**	**200**	1413				
SD =	**57**	**3**						**SD =**	**281**	**279**					
1 sided 95% UCL	**155**							**1 sided 95% UCL**	**429**						
Loc ID	**209**							**Loc ID**	**209**						
Date Sampled:		XRF SerNum:	5444	**SU**	**109**			**Date Sampled:**		XRF SerNum:	5444	**SU**	**144**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
109.01	35.8	2.2						144.03	89	9.3					
109.08	23.5	7.9						144.06	70	13.8					
109.10	27	4.8						144.05	59	8.8					
109.05	35.3	9.5						144.10	123	25					
109.06	35	8.5						144.07	63	13					
			VSP output	2							VSP output	2			
					%RSD								%RSD		
			WGR		18.15071618						WGR		32.490865		
ave =	**31**	**7**	1649					**ave =**	**81**	**14**	1599				
SD =	**6**	**3**						**SD =**	**26**	**7**					
1 sided 95% UCL	**35**							**1 sided 95% UCL**	**96**						
Loc ID	209							**Inter SU Check**							
Date Sampled:		XRF SerNum:		**SU**	**138**			**Loc ID**	209	XRF SerNum:					
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						**109**	**31**	**6**					
138.01	58.5	8.5						**144**	**81**	**26**					
138.03	56.5	5.9						**138**	**43**	**13**					
138.05	37	11											SUIS	Mean	SD
138.06	33	10.6											109	30	3.9
138.09	32.3	5.1									VSP output	2	144	95	18.9
			VSP output	2									138	42	5.3
													DU	48.3	5.6
					%RSD										
			WGR		29.82242428						WGR				
ave =	**43**	**8**	1637					**ave =**	**52**	**15**	1628				
SD =	**13**	**3**						**SD =**	**26**	**10**					
1 sided 95% UCL	**51**							**1 sided 95% UCL**	**67**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	203							**Loc ID**	203						
Date Sampled:		XRF SerNum:	5420	**SU**	**7**			**Date Sampled:**		XRF SerNum:	5420	**SU**	**18**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
7.01	71.5	8.7						18.07	49	6.2					
7.05	73	4						18.04	59.3	2.2					
7.06	67.3	2.9						18.01	51.5	3.7		VSP out	2		
7.08	58.3	4.8						18.03	49.8	3.2					
7.10	67	3.6						18.06	50	2.9			%RSD		
													8.13441307		
			VSP output	2											
													SUIS	Mean	SD
					%RSD								7	62	2.9
			WGR		8.493018931						WGR		27	82.5	8.5
ave =	**67**	**5**	1613					**ave =**	**52**	**4**	1628		18	58	4.8
SD =	**6**	**2**						**SD =**	**4**	**2**			DUIS	67	5.3
1 sided 95% UCL	**71**							**1 sided 95% UCL**	**54**						
Loc ID	203							**Inter SU Check**							
Date Sampled:		XRF SerNum:	5420	**SU**	**27**			**Loc ID**	203	XRF SerNum:					
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						7	**67**	**6**					
27.04	64.08	2.2						18	52	**4**					
27.07	76	2.2						27	75	9					
27.09	70.5	1													
27.01	87.5	11													
27.06	76	6.4													
			VSP output	2							VSP output	2			
					%RSD										
			WGR		11.52856592						WGR				
ave =	**75**	**5**	1605					**ave =**	**65**	**6**	1615				
SD =	**9**	**4**						**SD =**	**12**	**3**					
1 sided 95% UCL	**80**							**1 sided 95% UCL**	**71**						
Loc ID	**212**							**Loc ID**	212						
Date Sampled:		XRF SerNum:	5444	**SU**	**16**			**Date Sampled:**		XRF SerNum:	5444	**SU**	**86**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
16.01	237.5	16.4						86.02	85.8	2.5					
16.02	209.3	9.2						86.03	124.1	13.5					
16.05	209	6.3						86.05	87	3.9					
16.06	205	19.3						86.07	191	17.5					
16.09	262.8	5.2						86.10	220	17.3					
													VSP output:	2	
					VSP output:	2									
			WGR								WGR				
ave =	**225**	**11**	1455					**ave =**	**142**	**11**	1538				
SD =	**25**	**6**						**SD =**	**61**	**7**					
1 sided 95% UCL	**239**							**1 sided 95% UCL**	**177**						
Loc ID	212							**Inter SU Check**							
Date Sampled:		XRF SerNum:	5444	**SU**	**53**			**Loc ID**		XRF SerNum:	5444				
								SU	Total Cr	SD					
Sample ID	Total Cr	**SD**						16	**225**	**25**					
53.03	625	20.8						86	142	**61**					
53.04	121	6.8						53	411	335			VSP output:	2	
53.06	163	6.2													
53.08	893.8	27.3											SUIS	Mean	SD
53.10	252.7	3.8			VSP output:	2							86	124.8	14.7
													16	264.3	12.3
													53	292.3	17.5
													DU	251	25.5
			WGR								WGR				
ave =	**411**	**13**	1269					**ave =**	**259**	**140**	1421				
SD =	**335**	**10**						**SD =**	**138**	**170**					
1 sided 95% UCL	**605**							**1 sided 95% UCL**	**339**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	204					
Date Sampled:		XRF SerNum:	5420	**SU**	**99**	
Sample ID	Total Cr	**SD**				
99.03	81.3	2.2				
99.04	86.3	6.3				
99.01	132.8	3.9				
99.05	118.5	10.7				
99.07	160.3	9.2				
					VSP output:	2
					%RSD	
			WGR		28.42547749	
ave =	**116**	**6**	1564			
SD =	**33**	**4**				
1 sided 95% UCL	**135**					
Loc ID	204					
Date Sampled:		XRF SerNum:	5420	**SU**	**23**	
Sample ID	Total Cr	**SD**				
23.03	132.5	6.5				
23.04	87.5	5.1				
23.06	71.3	9.6				
23.08	66	3.9			VSP output:	2
23.10	254	12.9				
					%RSD	
			WGR		63.92241019	
ave =	**122**	**8**	1558			
SD =	**78**	**4**				
1 sided 95% UCL	**168**					

Loc ID	204					
Date Sampled:		XRF SerNum:	5420	**SU**	**42**	
Sample ID	Total Cr	**SD**				
42.02	123.3	4.6				
42.03	346.8	21.3	X			
42.04	100.8	5				
42.09	108	6.7				
42.10	91.8	6.7				
					VSP output:	2
					%RSD	
			WGR		70.27109862	
ave =	**154**	**9**	1526			
SD =	**108**	**7**				
1 sided 95% UCL	**217**					
Inter SU Check			42			
Loc ID	204	XRF SerNum:	5420			
SU	Total Cr	SD				
99	**116**	**33**				
42	154	**108**			VSP output:	2
23	122	78				
					SUIS	Mean	SD
					23	122.8	9.5
					99	128	9.6
					42	147	7.8
					DUIS	126	2.2
			WGR				
ave =	**131**	**73**	1549			
SD =	**20**	**38**				
1 sided 95% UCL	**143**					

Loc ID	205					
Date Sampled:		XRF SerNum:	5444	**SU**	**34**	
Sample ID	Total Cr	**SD**				
34.07	144.4	15.1				
34.02	109.3	13.2				
34.09	113.5	13.4				
34.06	119.8	8.8				
34.05	109.8	6.8				
					VSP output:	2
			WGR			
ave =	**119**	**11**	1561			
SD =	**15**	**3**				
1 sided 95% UCL	**128**					
Loc ID	205					
Date Sampled:		XRF SerNum:	5444	**SU**	**96**	
Sample ID	Total Cr	**SD**				
96.01	309	24				
96.03	135.8	6.5				
96.05	237	10.2				
96.07	243.2	20.7			VSP output:	2
96.09	310	13.4				
			WGR			
ave =	**247**	**15**	1433			
SD =	**71**	**7**				
1 sided 95% UCL	**288**					

Loc ID	205					
Date Sampled:		XRF SerNum:	5444	**SU**	**71**	
Sample ID	Total Cr	**SD**				
71.01	76.2	12.6				
71.03	105	8				
71.04	104.3	9.2				
71.07	83	5.5		VSP out	2	
71.10	78	9.8				
			WGR			
ave =	**89**	**9**	1591			
SD =	**14**	**3**				
1 sided 95% UCL	**98**					
Inter SU Check						
Loc ID	205	XRF SerNum:	5444			
SU	Total Cr	SD				
34	119	15				
71	89	14			VSP output:	2
96	247	71			SUIS	Mean	SD
					34	111	9.9
					71	93	2.6
					96	242	7.9
					DU	140.8	7.1
			WGR				
ave =	**152**	**33**	1528			
SD =	**84**	**33**				
1 sided 95% UCL	**200**					

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	210							**Loc ID**	210						
Date Sampled:		XRF SerNum:	5420	**SU**	**15**			**Date Sampled:**		XRF SerNum:	5420	**SU**	**62**		
								Parcel ID:			**5420**				
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
15.10	69.4	7.7						62.08	45.5	2.5					
15.02	78.5	6.4						62.02	46.5	8.3					
15.03	73	4.2						62.06	66.3	7.6					
15.06	42.3	7.6						62.01	99.8	7.9					
15.08	69.3	3.1						62.09	55.5	3.5					
					VSP output:	**2**							VSP output:	**2**	
			WGR								WGR				
ave =	**67**	**6**	1614					**ave =**	**63**	**6**	1617				
SD =	**14**	**2**						**SD =**	**22**	**3**					
1 sided 95% UCL	**75**							**1 sided 95% UCL**	**76**						
Loc ID	210							**Inter SU Check**							
Date Sampled:		XRF SerNum:	5420	**SU**	**30**			**Loc ID**	210	XRF SerNum:	5420				
								SU	Total Cr	SD					
Sample ID	Total Cr	**SD**						15	**67**	**14**			VSP output:	**2**	
30.08	47.5	6.9						62	63	**22**			SUIS	Mean	SD
30.04	68	5.4						30	62	17			15	65.5	6.2
30.01	77.8	5.7											30	57.5	4.9
30.03	75.8	5.3			VSP output:	**2**							62	59.8	6.5
30.09	41.8	0.5											DUIS	61	1.9
			WGR								WGR				
ave =	**62**	**5**	1618					**ave =**	**64**	**18**	1616				
SD =	**17**	**2**						**SD =**	**3**	**4**					
1 sided 95% UCL	**72**							**1 sided 95% UCL**	**66**						
Loc ID	215							**Loc ID**	215						
Date Sampled:		XRF SerNum:	5444	**SU**	**110**			**Date Sampled:**		XRF SerNum:	5444	**SU**	**82**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
110.05	288.8	17.6						82.06	403	21					
110.02	602.5	20.6						82.03	426	40					
110.01	346.5	18						82.07	122	19					
110.07	536	23.8						82.09	291	8.7			VSP output:	**2**	
110.09	143	2			VSP output:	**2**		82.1	225	17.8					
					%RSD								%RSD		
					48.69518439								42.99655507		
			WGR								WGR				
ave =	**383**	**16**	1297					**ave =**	**293**	**21**	1387				
SD =	**187**	**8**						**SD =**	**126**	**11**					
1 sided 95% UCL	**492**							**1 sided 95% UCL**	**367**						
Loc ID	215							**Inter SU Check**							
Date Sampled:		XRF SerNum:	5444	**SU**	**55**			**Loc ID**	215	XRF SerNum:	5444				
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						**110**	**383**	**187**					
55.01	77	5.8						**82**	**293**	**126**					
55.05	38	6.8						**55**	**67**	**50**			VSP output:	**2**	
55.07	37	2.7			VSP output:	**2**									
55.09	33	3											SUIS	MEAN	SD
55.1	150	10.8											82	318	4.9
													110	422.5	12.9
													55	47	3.9
					%RSD								DUIS	282	14.2
			WGR		192.7385136						WGR				
ave =	**67**	**6**	1613					**ave =**	**248**	**121**	1432				
SD =	**50**	**3**						**SD =**	**163**	**69**					
1 sided 95% UCL	**96**							**1 sided 95% UCL**	**342**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	219					
Date Sampled:		XRF SerNum:	5444	**SU**	**15**	
Sample ID	Total Cr	**SD**				
15.01	128	7.9				
15.03	64	6.6				
15.04	59	4.3				
15.07	71	14.4				
15.1	66	6.5				
					VSP output:	2
			WGR			
ave =	**78**	**8**	1602			
SD =	**29**	**4**				
1 sided 95% UCL	**94**					

Loc ID	219					
Date Sampled:		XRF SerNum:	5444	**SU**	**42**	
Sample ID	Total Cr	**SD**				
42.02	60	6.2				
42.04	110	6.7				
42.06	68	4.7				
42.07	69	3.5				
42.08	52	4.4			VSP output:	2
			WGR			
ave =	**72**	**5**	1608			
SD =	**22**	**1**				
1 sided 95% UCL	**85**					

Loc ID	219					
Date Sampled:		XRF SerNum:	5444	**SU**	**55**	
Sample ID	Total Cr	**SD**				
55.01	47.8	7.4				
55.03	49.5	7.9				
55.05	42.5	3.7			VSP output:	2
55.07	45.8	2.1				
55.09	46.5	3.7				
			WGR			
ave =	**46**	**5**	1634			
SD =	**3**	**3**				
1 sided 95% UCL	**48**					

Inter SU Check		Parcel ID:				
Loc ID	219	XRF SerNum:	5444			
SU	Total Cr	SD				
15	78	29				
42	72	22			VSP output:	2
55	46	3				
					SUIS	Mean	SD
					15	68	6.8
					42	70	9.5
					55	42	3.4
					DU 219	62.8	8.7
			WGR			
ave =	**65**	**18**	1615			
SD =	**17**	**13**				
1 sided 95% UCL	**75**					

Loc ID	217					
Date Sampled:		XRF SerNum:	5420	**SU**	**103**	
Sample ID	Total Cr	**SD**				
103.08	110.5	5.4				
103.09	323	15.7				
103.06	81.8	3.9				
103.05	1189.3	34.5				
103.01	318.8	11.5				
					VSP output:	3
					%RSD	
					111.9152649	
			WGR			
ave =	**405**	**14**	1275			
SD =	**453**	**12**				
1 sided 95% UCL	**667**					

Loc ID	217					
Date Sampled:		XRF SerNum:	5420	**SU**	**22**	
Sample ID	Total Cr	**SD**				
22.06	577.8	5.1				
22.09	272	16				
22.01	205	8.1				
22.1	226.8	8.5				
22.04	215	10.9			VSP output:	2
					%RSD	
					52.70875387	
			WGR			
ave =	**299**	**10**	1381			
SD =	**158**	**4**				
1 sided 95% UCL	**391**					

Loc ID	**217**					
Date Sampled:		XRF SerNum:	5420	**SU**	**50**	
Sample ID	Total Cr	**SD**				
50.09	169.5	4.5				
50.03	234.3	16				
50.04	187.3	8.6			VSP output:	2
50.1	178.8	8.3				
50.07	253.8	14.4				
					%RSD	
					18.11055466	
			WGR			
ave =	**205**	**10**	1475			
SD =	**37**	**5**				
1 sided 95% UCL	**226**					

Inter SU Check		Parcel ID:				
Loc ID		XRF SerNum:				
SU	Total Cr	**SD**				
103	405	453				
22	299	158				
50	205	37			VSP output:	2
					SUIS	Mean	SD
					22	326	12
					103	299	18.1
					50	180	14.2
					DUIS	264	4.2
			WGR			
ave =	**303**	**216**	1377			
SD =	**100**	**214**				
1 sided 95% UCL	**361**					

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**216**							**Loc ID**	216						
Date Sampled:		XRF SerNum:	5444	**SU**	**32**			**Date Sampled:**		XRF SerNum:	5444	**SU**	**50**		
Sample ID	Total Cr	**XRF error (1SD)**						Sample ID	Total Cr	**SD**					
32.10	60.3	3.4						50.03	107	7.6					
32.09	83	11.3						50.1	72.3	11.8					
32.05	124.5	5.5						50.02	102.3	9.5			VSP output:	2	
32.01	181.8	14.8			VSP output:	2		50.08	121.8	5.7					
32.03	97.5	9						50.01	286	19.2					
					%RSD										
					42.66878915								**%RSD**		
			WGR								WGR		**61.45375951**		
ave =	**109**	**9**	1571					**ave =**	**138**	**11**	1542				
SD =	**47**	**5**						**SD =**	**85**	**5**					
1 sided 95% UCL	**136**							**1 sided 95% UCL**	**187**						
Loc ID	**216**							**Inter SU Check**		Parcel ID:					
Date Sampled:		XRF SerNum:	5444	**SU**	**16**			**Loc ID**	216	XRF SerNum:	5444				
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						32	**109**	**47**					
16.03	121.3	1.5						50	138	**85**			VSP output:	2	
16.01	101	6.9						16	101	16					
16.04	79	6.3			VSP output:	2							SUIS	Mean	SD
16.05	93	6											16	96	6.3
16.09	109.8	8.1											32	104	8.2
													50	126	6.9
													DUIS	116	8.4
					%RSD										
			WGR		15.97311928						WGR				
ave =	**101**	**6**	1579					**ave =**	**116**	**49**	1564				
SD =	**16**	**3**						**SD =**	**19**	**35**					
1 sided 95% UCL	**110**							**1 sided 95% UCL**	**127**						
Loc ID	**221**							**Loc ID**	**221**						
Date Sampled:		XRF SerNum:	5420	**SU**	**109**			**Date Sampled:**		XRF SerNum:	5420	**SU**	**164**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
109.01	65	11						164.02	98	11					
109.03	58	5.9						164.05	108.5	6.8					
109.05	54	1.7						164.06	89.3	3.3					
109.06	64.3	6.4						164.08	106.3	5.3					
109.09	68.5	3.1						164.10	94.8	9.7			VSP output:	2	
					VSP output:	2									
											WGR				
ave =	**62**	**6**	WGR					**ave =**	**99**	**7**	1581				
SD =	**6**	**4**	1674					**SD =**	**8**	**3**					
1 sided 95% UCL	**65**							**1 sided 95% UCL**	**104**						
Loc ID	**221**							**Inter SU Check**		Parcel ID:					
Date Sampled:		XRF SerNum:	5420	**SU**	**150**			**Loc ID**	**221**	XRF SerNum:					
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						109	62	6					
150.01	203	16.6						164	99	8					
150.03	144	10.5						150	155	43					
150.05	119	8.7			VSP output:	2									
150.7	108	8.6											VSP output:	2	
150.9	103	7.1											SUIS	Mean	SD
													109	64.3	3.9
													150	146	4.6
													164	100	5.4
			WGR								WGR		DUIS	96	2.9
ave =	**135**	**10**	1545					**ave =**	**105**	**19**	1575				
SD =	**41**	**4**						**SD =**	**47**	**21**					
1 sided 95% UCL	**159**							**1 sided 95% UCL**	**132**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**213**							**Loc ID**	213						
Date Sampled:		XRF SerNum:	5420	**SU**	**9**			**Date Sampled:**		XRF SerNum:	5420	**SU**	**44**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
9.08	128	1.7						44.02	223	16.9					
9.02	120	5.3						44.08	261	3.3					
9.01	123	2.2						44.06	98.5	7.6					
9.05	133	12.2						44.1	709	29.5					
9.09	129	2.6						44.04	788	63	X		VSP output:	2	
					VSP output:	2									
			WGR								WGR				
ave =	**127**	**5**	1553					**ave =**	**416**	**24**	1264				
SD =	**5**	**4**						**SD =**	**311**	**24**					
1 sided 95% UCL	**130**							**1 sided 95% UCL**	**596**						
Loc ID	**213**							**Inter SU Check**		Parcel ID:					
Date Sampled:		XRF SerNum:	5420	**SU**	**15**			**Loc ID**	213	XRF SerNum:	5420				
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						**9**	**127**	**5**			VSP output:	2	
15.02	225	4.7						**44**	**416**	**311**					
15.05	390	15.1						**15**	**301**	**68**			SUIS	Mean	SD
15.06	287	9.5			VSP output:	2							9	119	3.7
15.08	301	19.9											44	319	4.6
15.10													15	295	4.6
													DUIS	254	16.2
			WGR								WGR				
ave =	**301**	**12**	1379					**ave =**	**281**	**128**	1399				
SD =	**68**	**7**						**SD =**	**146**	**162**					
1 sided 95% UCL	**340**							**1 sided 95% UCL**	**366**						
Loc ID	**222**							**Loc ID**	222						
Date Sampled:		XRF SerNum:	5444	**SU**	**10**			**Date Sampled:**		XRF SerNum:	5444	**SU**	**41**		
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**					
10.04	132	5.7						41.02	119	6.4					
10.02	143	19						41.03	81.5	7					
10.06	80	4.9			VSP output:	2		41.07	116	6.3					
10.08	115	6.2						41.05	107	12.1			VSP output:	2	
10.1	117	7						41.09	146	12.3					
ave =	**117**	**9**						**ave =**	**114**	**9**					
SD =	**24**	**6**						**SD =**	**23**	**3**					
1 sided 95% UCL	**131**							**1 sided 95% UCL**	**127**						
Loc ID	**222**							**Inter SU Check**		Parcel ID:					
Date Sampled:		XRF SerNum:	5444	**SU**	**27**			**Loc ID**	222	XRF SerNum:	5444				
								SU	Total Cr	**SD**					
Sample ID	Total Cr	**SD**						10	117	24					
27.02	136	7.8						41	114	23			VSP output:	2	
27.04	106	8.8						27	124	22					
27.06	117.5	1			VSP output:	2							SUIS	Mean	SD
27.07	156.5	4.5											10	114	8.6
27.08	103	5.7											41	113	9.5
													27	128	11.2
													DUIS	108	11.2
ave =	**124**	**6**						**ave =**	**118**	**23**					
SD =	**22**	**3**						**SD =**	**5**	**1**					
1 sided 95% UCL	**137**							**1 sided 95% UCL**	**121**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**223**					
Date Sampled:		XRF SerNum:	5420	**SU**	**4**	
Sample ID	Total Cr	**SD**				
4.02	52	4.1				
4.04	55	6.3				
4.06	59	8.7				
4.08	50	4.6				
4.10	54	4.8			VSP output:	**2**
ave =	**54**	**6**				
SD =	**3**	**2**				
1 sided 95% UCL	**56**					
Loc ID	**223**					
Date Sampled:		XRF SerNum:	223	**SU**	**28**	
Sample ID	Total Cr	**SD**				
28.01	61	6				
28.03	81	6			VSP output:	**2**
28.05	64	4.7				
28.07	65	5				
28.09	69	5.9				
ave =	**68**	**6**				
SD =	**8**	**1**				
1 sided 95% UCL	**73**					
Loc ID	**224**					
Date Sampled:		XRF SerNum:	5444	**SU**	**74**	
Parcel ID:						
Sample ID	Total Cr	**SD**				
74.01	35	7.3				
74.02	38	2.6				
74.04	46	5.7			VSP output:	**2**
74.07	54	9.7				
74.10	43	3.9				
					%RSD	
					17.12024267	
ave =	**43**	**6**				
SD =	**7**	**3**				
1 sided 95% UCL	**47**					
Loc ID	**224**					
Date Sampled:		XRF SerNum:		**SU**	**19**	
Sample ID	Total Cr	**SD**				
19.01	38	2.5				
19.02	36.3	6.8				
19.05	39.3	3.8			VSP output:	**2**
19.08	39.8	6.2				
19.10	38	5.7				
					%RSD	
					3.55986905	
ave =	**38**	**5**				
SD =	**1**	**2**				
1 sided 95% UCL	**39**					

Loc ID	**223**					
Date Sampled:		XRF SerNum:		**SU**	**44**	
Sample ID	Total Cr	**SD**				
44.03	124	7.5				
44.05	89	4.3				
44.06	106	12.4				
44.08	133	3.4			VSP output:	**2**
44.09	109	3.6				
ave =	**112**	**6**				
SD =	**17**	**4**				
1 sided 95% UCL	**122**					
Inter SU Check		Parcel ID:			SUIS	MEAN	SD
Loc ID	223	XRF SerNum:			44	108	7.4
SU	Total Cr	**SD**			**28**	71	5.2
4	54	3			4	54	1.3
44	112	17			DUIS	80	5.6
28	68	8					
					VSP output:	**2**	
ave =	**78**	**9**					
SD =	**30**	**7**					
1 sided 95% UCL	**96**						
Loc ID	224					
Date Sampled:		XRF SerNum:	5444	**SU**	**23**	
Parcel ID:						
Sample ID	Total Cr	**SD**				
23.01	39	5.1				
23.06	39	3				
23.07	37	7.5	VSP output	**2**		
23.08	36	3.4				
23.10	45	6.9				
					%RSD	
					8.910331223	
ave =	**39**	**5**				
SD =	**3**	**2**				
1 sided 95% UCL	**41**					
Inter SU Check		Parcel ID:					
Loc ID	224	XRF SerNum:					
SU	Total Cr	**SD**					
74	43	7					
23	39	3			VSP output:	**2**	
19	38	1					
					SUIS	Mean	SD
					19	44	7.3
					23	40	2.2
					74	47.3	3.1
					DUIS	39	5.2
ave =	**40**	**4**					
SD =	**3**	**3**					
1 sided 95% UCL	**42**						

TABLE C4: SUMMARY OF TOTAL CHROMIUM XRF RESULTS FOR FARM FIELD SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

This spreadsheet summarizes the XRF analyses and provides results from VSP analysis showing the number of increments of soil needed to represent each SU and the number of SU's needed to represent the DU

Loc ID	**225**							**Loc ID**	225					
Date Sampled:		XRF SerNum:	5420	**SU**	**8**			**Date Sampled:**		XRF SerNum:		**SU**	**32**	
Sample ID	Total Cr	**SD**						Sample ID	Total Cr	**SD**				
8.03	253	9.6						32.02	108	6.1				
8.09	142	6.5			VSP output:	**2**		32.04	81	6.6				
8.07	104	2.9						32.1	88	9.5	VSP output	**2**		
8.05	111	11.8						32.06	114	7.7				
8.01	135	7.4						32.08	90	7.9				
					%RSD									
					40.44981532								%RSD	
ave =	**149**	**8**						**ave =**	**96**	**8**			14.63446172	
SD =	**60**	**3**						**SD =**	**14**	**1**				
1 sided 95% UCL	**184**							**1 sided 95% UCL**	**104**					
Loc ID	**225**							**Inter SU Check**		Parcel ID:				
Date Sampled:		XRF SerNum:		**SU**	**60**			**Loc ID**	225	XRF SerNum:				
								SU	Total Cr	**SD**			SUIS	Mean	SD
Sample ID	Total Cr	**SD**						8	149	60			8	140	15
60.08	62	3.5						32	96	14			32	100	6.4
60.09	67	3.7						60	61	4			60	70	7.6
60.03	59	4.4			VSP output:	**2**							DUIS	**97**	**7**
60.01	56	5.6													
60.05	63	7											VSP output:	**2**	
					%RSD										
					6.774147994										
ave =	**61**	**5**						**ave =**	**102**	**26**					
SD =	**4**	**1**						**SD =**	**44**	**30**					
1 sided 95% UCL	**64**							**1 sided 95% UCL**	**128**						

TABLE C5: SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED FROM FARM FIELDS
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

Tag Number	LIMS Number	DU	SU	Sample Type	Date Collected	Cr 6^{+}, mg/kg	Total Cr, mg/kg (XRF)	Ratio Cr^{+}6:Cr (%)	ORP (mV)	TOC, %	pH	Fe	Mn	Mo	V	Al
1000361	AB14350	218	102.02	Discrete	1/26/2010	1.710	206	0.83	NA	NA	NA	NA	NA	NA	NA	NA
1000362	AB14351	218	87.04	Discrete	1/26/2010	1.000	68	1.47	NA	NA	NA	NA	NA	NA	NA	NA
1000363	AB14352	202	59.09	Discrete	1/26/2010	1.760	302	0.58	NA	NA	NA	NA	NA	NA	NA	NA
1000364	AB14353	202	59.07	Discrete	1/26/2010	4.880	612	0.80	NA	NA	NA	NA	NA	NA	NA	NA
1000365	AB14354	202	79.03	Discrete	1/26/2010	2.080	132	1.58	NA	NA	NA	NA	NA	NA	NA	NA
1000366	AB14355	218	146.08	Discrete	1/26/2010	1.590	424	0.38	NA	NA	NA	NA	NA	NA	NA	NA
1000371	AB14421	202	79	SUIS	1/26/2010	1.130	124	0.91	NA	NA	NA	NA	NA	NA	NA	NA
1000354	AB14404	202	59	SUIS	1/26/2010	0.607	179	0.34	449	4.4	6.28	24,400	527	1.34	35.7	11,700
1000370	AB14420	202	29	SUIS	1/26/2010	0.269	103	0.26	NA	NA	NA	NA	NA	NA	NA	NA
1000372	AB14422	202	0	DUIS	1/26/2010	NA	131	--	NA	NA	NA	NA	NA	NA	NA	NA
1000374	AB14424	203	27	SUIS	1/27/2010	0.278	83	0.33	NA	NA	NA	NA	NA	NA	NA	NA
1000355	AB14405	203	18	SUIS	1/26/2010	0.418	58	0.72	433	4.1	6.85	13,300	449	0.365	36.4	13,400
1000373	AB14423	203	7	SUIS	1/27/2010	0.386	62	0.62	NA	NA	NA	NA	NA	NA	NA	NA
1000375	AB14425	203	0	DUIS	1/27/2010	NA	67	--	NA	NA	NA	NA	NA	NA	NA	NA
1000376	AB14426	204	99	SUIS	1/27/2010	0.406	128	0.32	NA	NA	NA	NA	NA	NA	NA	NA
1000356	AB14406	204	42	SUIS	1/27/2010	0.666	147	0.45	465	4.9	7.86	25,000	33.4	0.815	45.1	18,300
1000377	AB14427	204	23	SUIS	1/27/2010	0.462	123	0.38	NA	NA	NA	NA	NA	NA	NA	NA
1000378	AB14428	204	0	DUIS	1/27/2010	NA	126	--	NA	NA	NA	NA	NA	NA	NA	NA
1000357	AB14407	205	96	SUIS	1/26/2010	1.050	242	0.43	477	4.5	5.90	34,300	410	2.07	31.9	12,300
1000357	AB14407	205	96	SUIS Lab Dup	1/26/2010	0.942	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000379	AB14429	205	71	SUIS	1/26/2010	1.270	93	1.37	NA	NA	NA	NA	NA	NA	NA	NA
1000380	AB14430	205	34	SUIS	1/26/2010	0.624	111	0.56	NA	NA	NA	NA	NA	NA	NA	NA
1000381	AB14431	205	0	DUIS	1/26/2010	0.626	141	0.44	NA	NA	NA	NA	NA	NA	NA	NA
1004736		205	88	SUIS Repl1	4/6/2010	1.110	105	1.06	467	3	6.57	27000	575	1.11	38.2	15100
1004736		205	88	SUIS Repl1 Lab Dup	4/6/2010	0.938	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1004737		205	88	SUIS Repl2	4/6/2010	0.652	149	0.63	NA	NA	NA	NA	NA	NA	NA	NA
1004738		205	88	SUIS Repl3	4/6/2010	0.779	159	0.41	NA	NA	NA	NA	NA	NA	NA	NA
1000383	AB14433	209	144	SUIS	1/25/2010	1.560	81	1.93	NA	NA	NA	NA	NA	NA	NA	NA
1000382	AB14432	209	138	SUIS	1/25/2010	0.694	43	1.61	NA	NA	NA	NA	NA	NA	NA	NA
1000358	AB14408	209	109	SUIS	1/25/2010	0.657	31	2.12	351	0.81	7.84	16,000	649	0.259	19.9	7,440
1000384	AB14434	209	0	DUIS	1/25/2010	NA	48	--	NA	NA	NA	NA	NA	NA	NA	NA
1000386	AB14436	210	62	SUIS	1/26/2010	0.803	60	1.34	NA	NA	NA	NA	NA	NA	NA	NA
1000359	AB14409	210	30	SUIS	1/26/2010	0.225	58	0.39	352	0.47	7.87	16,300	472	0.328	34.2	12,700
1000385	AB14435	210	15	SUIS	1/26/2010	0.242	66	0.37	NA	NA	NA	NA	NA	NA	NA	NA
1000387	AB14437	210	0	DUIS	1/26/2010	NA	61	--	NA	NA	NA	NA	NA	NA	NA	NA
1000389	AB14439	212	86	SUIS	1/27/2010	1.100	125	0.88	NA	NA	NA	NA	NA	NA	NA	NA
1000360	AB14410	212	53	SUIS	1/27/2010	0.605	292	0.21	469	4.5	6.61	44,300	58.5	3.21	31.4	12,600
1000360	AB14410	212	53	SUIS Lab Dup	1/27/2010	0.750	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000388	AB14438	212	16	SUIS	1/27/2010	0.468	264	0.18	NA	NA	NA	NA	NA	NA	NA	NA
1000390	AB14440	212	0	DUIS	1/27/2010	0.490	251	0.20	NA	NA	NA	NA	NA	NA	NA	NA

TABLE C5: SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED FROM FARM FIELDS
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

Tag Number	LIMS Number	DU	SU	Sample Type	Date Collected	Cr 6^+, mg/kg	Total Cr, mg/kg (XRF)	Ratio Cr^+6:Cr (%)	ORP (mV)	TOC, %	pH	Fe	Mn	Mo	V	Al
1000361	AB14411	213	44	SUIS	1/26/2010	0.833	319	0.26	407	5.5	6.62	34,400	358	2.31	42.2	15,000
1000361	AB14411	213	44	SUIS Lab Dup	1/26/2010	0.788	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000392	AB14442	213	15	SUIS	1/26/2010	0.760	295	0.26	NA	NA	NA	NA	NA	NA	NA	NA
1000391	AB14441	213	9	SUIS	1/26/2010	1.540	119	1.29	NA	NA	NA	NA	NA	NA	NA	NA
1000393	AB14443	213	0	DUIS	1/26/2010	0.703	254	0.28	NA	NA	NA	NA	NA	NA	NA	NA
1000394	AB14444	214	53	SUIS	1/27/2010	0.387	133	0.29	NA	NA	NA	NA	NA	NA	NA	NA
1000362	AB14412	214	25	SUIS	1/27/2010	1.610	599	0.27	487	5.4	6.78	55,400	472	5.31	30.6	13,900
1000362	AB14412	214	25	SUIS Lab Dup	1/27/2010	1.620	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000395	AB14445	214	23	SUIS	1/27/2010	0.240	133	0.18	NA	NA	NA	NA	NA	NA	NA	NA
1000396	AB14446	214	0	DUIS	1/27/2010	0.350	225	0.16	NA	NA	NA	NA	NA	NA	NA	NA
1004739		214	37	SUIS Repl1	4/7/2010	1.13	264	0.43	413	5.8	7.89	30000	417	2.05	39.5	16000
1004740		214	37	SUIS Repl2	4/7/2010	0.715	289	0.25	NA	NA	NA	NA	NA	NA	NA	NA
1004741		214	37	SUIS Repl3	4/7/2010	0.674	267	0.25	NA	NA	NA	NA	NA	NA	NA	NA
1000398	AB14448	215	110	SUIS	1/27/2010	1.050	423	0.25	NA	NA	NA	NA	NA	NA	NA	NA
1000397	AB14447	215	82	SUIS	1/27/2010	0.728	318	0.23	NA	NA	NA	NA	NA	NA	NA	NA
1000363	AB14413	215	55	SUIS	1/27/2010	0.069	47	0.15	420	4.4	6.45	18,300	402	0.971	50.5	16,800
1000363	AB14413	215	55	SUIS Lab Dup	1/27/2010	0.080	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000399	AB14449	215	0	DUIS	1/27/2010	1.730	282	0.61	NA	NA	NA	NA	NA	NA	NA	NA
1000364	AB14414	216	50	SUIS	1/26/2010	0.692	126	0.55	422	5.1	6.81	31,500	462	1.62	40.5	16,400
1000400	AB14450	216	32	SUIS	1/26/2010	1.140	104	1.10	NA	NA	NA	NA	NA	NA	NA	NA
1000401	AB14451	216	16	SUIS	1/26/2010	1.580	96	1.65	NA	NA	NA	NA	NA	NA	NA	NA
1000402	AB14452	216	0	DUIS	1/26/2010	NA	116	--	NA	NA	NA	NA	NA	NA	NA	NA
1000365	AB14415	217	103	SUIS	1/26/2010	0.793	299	0.27	468	6.4	5.91	40,900	298	3.23	41.9	14,000
1000365	AB14415	217	103	SUIS Lab Dup	1/26/2010	0.775	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000404	AB14454	217	50	SUIS	1/26/2010	0.821	180	0.46	NA	NA	NA	NA	NA	NA	NA	NA
1000403	AB14453	217	22	SUIS	1/26/2010	1.550	326	0.48	NA	NA	NA	NA	NA	NA	NA	NA
1000405	AB14455	217	0	DUIS	1/26/2010	1.160	264	0.44	NA	NA	NA	NA	NA	NA	NA	NA
1000366	AB14416	218	146	SUIS	1/26/2010	1.830	285	0.64	444	6.3	7.59	42,500	493	2.58	39.3	16,100
1000406	AB14456	218	102	SUIS	1/26/2010	1.190	152	0.78	NA	NA	NA	NA	NA	NA	NA	NA
1000407	AB14457	218	87	SUIS	1/26/2010	0.812	154	0.53	NA	NA	NA	NA	NA	NA	NA	NA
1000408	AB14458	218	0	DUIS	1/26/2010	NA	204	--	NA	NA	NA	NA	NA	NA	NA	NA
1000367	AB14417	219	55	SUIS	1/26/2010	1.110	42	2.64	475	1.3	6.34	21,100	517	0.602	45.3	19,100
1000409	AB14459	219	42	SUIS	1/26/2010	1.040	70	1.49	NA	NA	NA	NA	NA	NA	NA	NA
1000410	AB14460	219	15	SUIS	1/26/2010	1.290	68	1.90	NA	NA	NA	NA	NA	NA	NA	NA
1000411	AB14461	219	0	DUIS	1/26/2010	NA	63	--	NA	NA	NA	NA	NA	NA	NA	NA
1000412	AB14462	221	164	SUIS	1/25/2010	2.450	100	2.45	NA	NA	NA	NA	NA	NA	NA	NA
1000368	AB14418	221	150	SUIS	1/25/2010	3.400	146	2.33	434	2.1	7.25	21,400	356	0.514	52.5	23,600
1000413	AB14463	221	109	SUIS	1/25/2010	0.487	64	0.76	NA	NA	NA	NA	NA	NA	NA	NA
1000414	AB14464	221	0	DUIS	1/25/2010	1.640	96	1.71	NA	NA	NA	NA	NA	NA	NA	NA
1004742		221	162	SUIS Repl1	4/6/2010	3.45	97	3.56	425	2.1	7.58	20300	383	0.461	47.2	17300

TABLE C5: SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED FROM FARM FIELDS
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

Tag Number	LIMS Number	DU	SU	Sample Type	Date Collected	Cr 6^+, mg/kg	Total Cr, mg/kg (XRF)	Ratio Cr^+6:Cr (%)	ORP (mV)	TOC, %	pH	Fe	Mn	Mo	V	Al
1004743		221	162	SUIS Repl2	4/6/2010	**4.57**	115	3.97	NA	NA	NA	NA	NA	NA	NA	NA
1004744		221	162	SUIS Repl3	4/6/2010	4.38	105	4.17	NA	NA	NA	NA	NA	NA	NA	NA
1004745		221	162	SUIS Blind Repl. Of 744	4/6/2010	3.76	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1000369	AB14419	222	41	SUIS	1/25/2010	3.290	113	2.91	422	2.2	7.38	23,100	456	0.701	59.5	25,700
1000416	AB14466	222	27	SUIS	1/25/2010	2.250	128	1.76	NA	NA	NA	NA	NA	NA	NA	NA
1000415	AB14465	222	10	SUIS	1/25/2010	2.520	114	2.21	NA	NA	NA	NA	NA	NA	NA	NA
1000417	AB14467	222	0	DUIS	1/25/2010	NA	108	--	NA	NA	NA	NA	NA	NA	NA	NA
1000428	AB14478	223	44	SUIS	1/26/2010	0.474	108	--	415	2.9	7.42	28,700	854	0.986	51.3	23,500
1000423	AB14473	223	28	SUIS	1/26/2010	0.279	71	0.39	NA	NA	NA	NA	NA	NA	NA	NA
1000422	AB14472	223	4	SUIS	1/26/2010	0.234	54	0.43	NA	NA	NA	NA	NA	NA	NA	NA
1000424	AB14474	223	0	DUIS	1/26/2010	NA	80	--	NA	NA	NA	NA	NA	NA	NA	NA
1000420	AB14470	224	74	SUIS	1/27/2010	0.872	47	1.86	NA	NA	NA	NA	NA	NA	NA	NA
1000419	AB14469	224	23	SUIS	1/27/2010	0.296	40	0.74	NA	NA	NA	NA	NA	NA	NA	NA
1000418	AB14468	224	19	SUIS	1/27/2010	0.166	44	0.38	NA	NA	NA	NA	NA	NA	NA	NA
1000421	AB14471	224	0	DUIS	1/27/2010	NA	39	--	NA	NA	NA	NA	NA	NA	NA	NA
1000425	AB14475	225	60	SUIS	1/26/2010	0.518	70	0.74	NA	NA	NA	NA	NA	NA	NA	NA
1000430	AB14479	225	32	SUIS	1/26/2010	1.360	100	1.36	397	1.3	7.66	14,600	433	0.409	31	10,800
1000426	AB14476	225	8	SUIS	1/26/2010	2.270	140	1.62	NA	NA	NA	NA	NA	NA	NA	NA
1000427	AB14477	225	0	DUIS	1/26/2010	1.480	97	--	NA	NA	NA	NA	NA	NA	NA	NA
1004716		201	0	DUIS	4/6/2010	0.060	33		442	3.1	6.52	15500	281	0.797	43.9	13200
1004716		201	0	DUIS Lab Dup	4/6/2010	0.063	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
1004717		251	0	DUIS	4/6/2010	0.178	29		460	1.2	6.03	14200	288	0.538	41.2	14800
1004718		252	0	DUIS	4/6/2010	0.132	32		546	2.3	6.31	18400	462	0.582	43.2	18200
1004719		253	0	DUIS	4/6/2010	0.083	30		470	2.1	6.47	15000	487	0.488	32.8	12700
1004720		254	0	DUIS	4/6/2010	0.039	26		482	3.7	6.19	14000	411	0.827	32.9	12100

TABLE C6: 95% UPPER AND LOWER CONFIDENCE LIMITS ON Cr+6 RESULTS FOR SUIS SAMPLES FROM EACH FARM FIELD DECISION UNIT
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

Location ID 218			**Location ID 219**			**Location ID 221**	
[Cr+6] from first SUIS, mg/kg	1.83		[Cr+6] from first SUIS, mg	1.11		[Cr+6] from first SUIS, mg/kg	2.45
[Cr+6] from second SUIS	1.19		[Cr+6] from second SUIS	1.04		[Cr+6] from second SUIS	4.03
[Cr+6] from third SUIS	0.812		[Cr+6] from third SUIS	1.29		[Cr+6] from third SUIS	3.4
Avg. [Cr+6] for DU	1.277		Avg. [Cr+6] for DU	1.147		[Cr+6] from fourth SUIS	0.487
SD	0.515		SD	0.129		ave Cr6 for DU-205	2.592
n	3		n	3		SD	1.546
95%LCL-Cr6	-0.001		95%LCL-Cr6	0.826		n	4
95%UCL-Cr6	**2.572**		95%UCL-Cr6	**1.467**		95%LCL-Cr6	0.131
						95%UCL-Cr6	**5.052**
Location ID 222			**Location ID 223**			**Location ID 224**	
[Cr+6] from first SUIS, mg/kg	3.29		[Cr+6] from first SUIS, mg	0.474		[Cr+6] from first SUIS, mg/kg	0.872
[Cr+6] from second SUIS	2.25		[Cr+6] from second SUIS	0.279		[Cr+6] from second SUIS	0.296
[Cr+6] from third SUIS	2.52		[Cr+6] from third SUIS	0.234		[Cr+6] from third SUIS	0.166
Avg. [Cr+6] for DU	2.687		Avg. [Cr+6] for DU	0.329		Avg. [Cr+6] for DU	0.445
SD	0.540		SD	0.128		SD	0.376
n	3		n	3		n	3
95%LCL-Cr6	1.346		95%LCL-Cr6	0.012		95%LCL-Cr6	-0.489
95%UCL-Cr6	**4.027**		95%UCL-Cr6	**0.646**		95%UCL-Cr6	**1.378**
Location ID 225							
[Cr+6] from first SUIS, mg/kg	0.518						
[Cr+6] from second SUIS	1.36						
[Cr+6] from third SUIS	2.27						
Avg. [Cr+6] for DU	1.383						
SD	0.876						
n	3						
95%LCL-Cr6	-0.794						
95%UCL-Cr6	**3.559**						

TABLE C7: SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED FROM RESIDENTIAL YARD TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI														
Tag Number	LIMS Number	DU	SU	Sample Type	Date Collected	Cr 6+, mg/kg	TOC (%)	ORP, mV	pH	Fe, mg/kg	Mn, mg/kg	Mo, mg/kg	V, mg/kg	Al, mg/kg
1000300	AB14289	319	y1	SUIS	1/27/2010	<0.014	NA	NA	NA	NA	NA	NA	NA	NA
1000300	AB14289	319	y1	SUIS Lab Dup	1/27/2010	<0.014	NA	NA	NA	NA	NA	NA	NA	NA
1000301	AB14290	319	y2	SUIS	1/27/2010	0.022 (J)	NA	NA	NA	NA	NA	NA	NA	NA
1000302	AB14291	319	y3	SUIS	1/27/2010	0.019 (J)	NA	NA	NA	NA	NA	NA	NA	NA
1000303	AB14292	319	y4	SUIS	1/27/2010	0.069	NA	NA	NA	NA	NA	NA	NA	NA
1000304	AB14293	319	--	DUIS	1/27/2010	<0.014	NA	NA	NA	NA	NA	NA	NA	NA
1000304	AB14293	319	--	DUIS Lab Dup	1/27/2010	<0.014	NA	NA	NA	NA	NA	NA	NA	NA
1004729		319	--	DUIS	4/6/2010	0.073	3.1	444	7.25	20600	800	0.893	44.5	17600
1000305	AB14294	305	Y1	SUIS	1/27/2010	0.063	NA	NA	NA	NA	NA	NA	NA	NA
1000306	AB14295	305	Y2	SUIS	1/27/2010	0.163	NA	NA	NA	NA	NA	NA	NA	NA
1000307	AB14296	305	Y3	SUIS	1/27/2010	0.061	NA	NA	NA	NA	NA	NA	NA	NA
1000308	AB14297	305	--	DUIS	1/27/2010	0.066	NA	NA	NA	NA	NA	NA	NA	NA
1004725		305	--	DUIS	4/6/2010	0.233	3.2	431	7.54	16100	705	0.779	34.5	13500
1000309	AB14298	320	Y1	SUIS	1/26/2010	0.319	NA	NA	NA	NA	NA	NA	NA	NA
1000310	AB14299	320	Y2	SUIS	1/26/2010	0.035	NA	NA	NA	NA	NA	NA	NA	NA
1000311	AB14300	320	Y3	SUIS	1/26/2010	0.025	NA	NA	NA	NA	NA	NA	NA	NA
1000312	AB14301	320	Y4	SUIS	1/26/2010	0.293	NA	NA	NA	NA	NA	NA	NA	NA
1000313	AB14302	320	--	DUIS	1/26/2010	0.106	NA	NA	NA	NA	NA	NA	NA	NA
1004730		320	--	DUIS	4/6/2010	0.325	1.4	443	7.14	21200	757	0.71	44.2	17800
1004730		320	--	DUIS Lab Dup	4/6/2010	0.312	NA	NA	NA	NA	NA	NA	NA	NA
1000314	AB14303	325	Y1	SUIS	1/26/2010	0.111	NA	NA	NA	NA	NA	NA	NA	NA
1000315	AB14304	325	Y2	SUIS	1/26/2010	0.053	NA	NA	NA	NA	NA	NA	NA	NA
1000315	AB14304	325	Y2	SUIS Lab Dup	1/26/2010	0.043	NA	NA	NA	NA	NA	NA	NA	NA
1000316	AB14305	325	Y3	SUIS	1/26/2010	0.069	NA	NA	NA	NA	NA	NA	NA	NA
1000317	AB14306	325	Y4	SUIS	1/26/2010	0.052	NA	NA	NA	NA	NA	NA	NA	NA
1000318	AB14307	325	--	DUIS	1/26/2010	0.068	NA	NA	NA	NA	NA	NA	NA	NA
1004731		325	--	DUIS	4/6/2010	0.153	2.3	441	7.55	14100	374	0.549	27.7	8850
1000319	AB14308	326	Y1	SUIS	1/26/2010	0.116	NA	NA	NA	NA	NA	NA	NA	NA
1000320	AB14309	326	Y2	SUIS	1/26/2010	0.098	NA	NA	NA	NA	NA	NA	NA	NA
1000321	AB14310	326	Y3	SUIS	1/26/2010	0.211	NA	NA	NA	NA	NA	NA	NA	NA
1000321	AB14310	326	Y3	SUIS Lab Dup	1/26/2010	0.158	NA	NA	NA	NA	NA	NA	NA	NA
1000322	AB14311	326	Y4	SUIS	1/26/2010	0.277	NA	NA	NA	NA	NA	NA	NA	NA
1000323	AB14312	326	--	DUIS	1/26/2010	0.217	NA	NA	NA	NA	NA	NA	NA	NA
1004732		326	--	DUIS	4/6/2010	0.086	1.4	451	7.54	13500	345	0.527	26.3	8420
1000324	AB14313	312	Y1	SUIS	1/27/2010	0.081	NA	NA	NA	NA	NA	NA	NA	NA
1000325	AB14314	312	Y2	SUIS	1/27/2010	0.094	NA	NA	NA	NA	NA	NA	NA	NA
1000326	AB14315	312	Y3	SUIS	1/27/2010	0.086	NA	NA	NA	NA	NA	NA	NA	NA
1000327	AB14316	312	--	DUIS	1/27/2010	0.078	NA	NA	NA	NA	NA	NA	NA	NA
1004727		312	--	DUIS	4/6/2010	0.049	1.5	430	7.72	19000	687	1.04	40.1	15900
1000328	AB14317	313	Y1	SUIS	1/26/2010	0.484	NA	NA	NA	NA	NA	NA	NA	NA
1000329	AB14318	313	Y2	SUIS	1/26/2010	0.118	NA	NA	NA	NA	NA	NA	NA	NA
1000329	AB14318	313	Y2	SUIS Lab Dup	1/26/2010	0.144	NA	NA	NA	NA	NA	NA	NA	NA
1000330	AB14319	313	Y3	SUIS	1/26/2010	0.763	NA	NA	NA	NA	NA	NA	NA	NA
1000331	AB14320	313	Y4	SUIS	1/26/2010	0.195	NA	NA	NA	NA	NA	NA	NA	NA
1000333	AB14321	313	--	DUIS	1/26/2010	0.18	NA	NA	NA	NA	NA	NA	NA	NA
1000333	AB14321	313	--	DUIS Lab Dup	1/26/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA
1004728		313	--	DUIS	4/6/2010	0.148	2.3	435	7.25	13500	559	0.578	35.3	14800
1000339	AB14327	304	Y1	SUIS	1/27/2010	0.057	NA	NA	NA	NA	NA	NA	NA	NA
1000340	AB14328	304	Y1	SUIS repl.1	1/27/2010	0.054	NA	NA	NA	NA	NA	NA	NA	NA
1000341	AB14329	304	Y1	SUIS repl.2	1/27/2010	0.106	NA	NA	NA	NA	NA	NA	NA	NA
1000342	AB14330	304	Y2	SUIS	1/27/2010	0.061	NA	NA	NA	NA	NA	NA	NA	NA
1000343	AB14331	304	Y3	SUIS	1/27/2010	0.156	NA	NA	NA	NA	NA	NA	NA	NA
1000344	AB14332	304	Y4	SUIS	1/27/2010	0.117	NA	NA	NA	NA	NA	NA	NA	NA
1000345	AB14333	304	--	DUIS	1/27/2010	0.087	NA	NA	NA	NA	NA	NA	NA	NA
1000345	AB14333	304	--	DUIS Lab Dup	1/27/2010	0.088	NA	NA	NA	NA	NA	NA	NA	NA
1004724		304	--	DUIS	4/6/2010	0.290	5.2	416	7.78	16700	549	0.631	38.3	14600
1000346	AB14334	303	Y1	SUIS	1/27/2010	0.049	NA	NA	NA	NA	NA	NA	NA	NA
1000347	AB14335	303	Y2	SUIS	1/27/2010	0.042	NA	NA	NA	NA	NA	NA	NA	NA
1000348	AB14336	303	Y3	SUIS	1/27/2010	0.058	NA	NA	NA	NA	NA	NA	NA	NA
1000349	AB14337	303	Y4	SUIS	1/27/2010	0.036	NA	NA	NA	NA	NA	NA	NA	NA
1000350	AB14338	303	--	DUIS	1/27/2010	0.054	NA	NA	NA	NA	NA	NA	NA	NA
1004723		303	--	DUIS	4/6/2010	0.02(J)	3.7	433	7.15	13900	224	0.495	35.9	
1004723		303	--	DUIS Lab Dup	4/6/2010	0.022 (J)	NA	NA	NA	NA	NA	NA	NA	NA
1000351	AB14339	306	Y1	SUIS	1/27/2010	0.139	NA	NA	NA	NA	NA	NA	NA	NA
1000352	AB14340	306	Y2	SUIS	1/27/2010	0.206	NA	NA	NA	NA	NA	NA	NA	NA

TABLE C7: SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED FROM RESIDENTIAL YARD TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI														
Tag Number	LIMS Number	DU	SU	Sample Type	Date Collected	Cr 6+, mg/kg	TOC (%)	ORP, mV	pH	Fe, mg/kg	Mn, mg/kg	Mo, mg/kg	V, mg/kg	Al, mg/kg
1000353	AB14341	306	Y3	SUIS	1/27/2010	0.220	NA	NA	NA	NA	NA	NA	NA	NA
1000354	AB14342	306	--	DUIS	1/27/2010	0.192	NA	NA	NA	NA	NA	NA	NA	NA
1004726		306	--	DUIS	4/6/2010	0.096	2	436	7.47	17600	768	0.49	33.5	13300
1000355	AB14343	302	Y1	SUIS	1/26/2010	0.098	NA	NA	NA	NA	NA	NA	NA	NA
1000356	AB14344	302	Y2	SUIS	1/26/2010	0.115	NA	NA	NA	NA	NA	NA	NA	NA
1000357	AB14345	302	Y3	SUIS	1/26/2010	0.100	NA	NA	NA	NA	NA	NA	NA	NA
1000357	AB14345	302	Y3	SUIS Lab Dup	1/26/2010	0.081	NA	NA	NA	NA	NA	NA	NA	NA
1000358	AB14346	302	Y3	SUIS repl.1	1/26/2010	0.057	NA	NA	NA	NA	NA	NA	NA	NA
1000359	AB14347	302	Y3	SUIS repl.2	1/26/2010	0.093	NA	NA	NA	NA	NA	NA	NA	NA
1000360	AB14348	302	--	DUIS	1/26/2010	0.116	NA	NA	NA	NA	NA	NA	NA	NA
1004722		302	--	DUIS	4/6/2010	0.110	2.4	464	6.49	16300	535	0.552	38.3	15700
1004728		313	--	DUIS	4/6/2010	0.148	2.3	435	7.25	13500	559	0.578	35.3	14800
1000334	AB14322	301	Y1	SUIS	1/27/2010	0.059	NA	NA	NA	NA	NA	NA	NA	NA
1000335	AB14323	301	Y2	SUIS	1/27/2010	0.108	NA	NA	NA	NA	NA	NA	NA	NA
1000336	AB14324	301	Y3	SUIS	1/27/2010	0.076	NA	NA	NA	NA	NA	NA	NA	NA
1000337	AB14325	301	Y4	SUIS	1/27/2010	0.076	NA	NA	NA	NA	NA	NA	NA	NA
1000338	AB14326	301	--	DUIS	1/27/2010	0.071	NA	NA	NA	NA	NA	NA	NA	NA
1000338	AB14326	301	--	DUIS Lab Dup	1/27/2010	0.066	NA	NA	NA	NA	NA	NA	NA	NA
1004721		301	--	DUIS	4/6/2010	0.053	3.9	454	7.03	15200	510	0.627	37.7	15900
1000334	AB14322	301	Y1	SUIS	1/27/2010	0.059	NA	NA	NA	NA	NA	NA	NA	NA
1000335	AB14323	301	Y2	SUIS	1/27/2010	0.108	NA	NA	NA	NA	NA	NA	NA	NA
1000336	AB14324	301	Y3	SUIS	1/27/2010	0.076	NA	NA	NA	NA	NA	NA	NA	NA
1000337	AB14325	301	Y4	SUIS	1/27/2010	0.076	NA	NA	NA	NA	NA	NA	NA	NA
1000338	AB14326	301	--	DUIS	1/27/2010	0.071	NA	NA	NA	NA	NA	NA	NA	NA
1000338	AB14326	301	--	DUIS Lab Dup	1/27/2010	0.066	NA	NA	NA	NA	NA	NA	NA	NA
1004721		301	--	DUIS	4/6/2010	0.053	3.9	454	7.03	15200	510	0.627	37.7	15900
1004734		353	--	DUIS	4/6/2010	0.050	2.2	442	7.90	15400	636	0.938	22.2	9260
1004735		354	--	DUIS	4/6/2010	0.095	2.2	440	7.00	16400	384	0.552	36.8	16300

TABLE C8: 95% UPPER AND LOWER CONFIDENCE LIMITS ON Cr+6 RESULTS FOR SUIS SAMPLES FROM EACH RESIDENTIAL YARD DECISION UNIT

TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

Location ID 302			**Location ID 303**			**Location ID 304**	
[Cr+6] from SUIS from Y1, mg/kg	0.098		[Cr+6] from SUIS from Y1, mg/kg	0.049		[Cr+6] from SUIS from Y1, mg/kg	0.072
[Cr+6] fromSUIS from Y2	0.115		[Cr+6] fromSUIS from Y2	0.042		[Cr+6] fromSUIS from Y2	0.061
[Cr+6] fromSUIS from Y3	0.08		[Cr+6] fromSUIS from Y3	0.058		[Cr+6] fromSUIS from Y3	0.156
Avg. [Cr+6] for DU	0.098		[Cr+6] fromSUIS from Y4	0.036		[Cr+6] fromSUIS from Y4	0.117
SD	0.018		Avg. [Cr+6] for DU	0.046		Avg. [Cr+6] for DU	0.102
n	3		SD	0.009		SD	0.044
95%LCL-Cr6	0.054		n	4		n	4
95%UCL-Cr6	**0.141**		95%LCL-Cr6	0.031		95%LCL-Cr6	**0.032**
			95%UCL-Cr6	**0.061**		95%UCL-Cr6	0.171
Location ID 305			**Location ID 306**			**Location ID 312**	
[Cr+6] from SUIS from Y1, mg/kg	0.063		306 SUISs-Cr6	0.139		[Cr+6] from SUIS from Y1, mg/kg	0.081
[Cr+6] fromSUIS from Y2	0.163		3 SUs (Y1-3) in DU	0.206		[Cr+6] fromSUIS from Y2	0.094
[Cr+6] fromSUIS from Y3	0.061			0.22		[Cr+6] fromSUIS from Y3	0.086
ave Cr6 for DU-305	0.096		ave Cr6 for DU-306	0.188		Avg. [Cr+6] for DU	0.087
SD	0.058		SD	0.043		SD	0.007
n	3		n	3		n	3
95%LCL-Cr6	-0.049		95%LCL-Cr6	**0.081**		95%LCL-Cr6	0.071
95%UCL-Cr6	**0.241**		95%UCL-Cr6	0.296		95%UCL-Cr6	**0.103**
Location ID 313			**Location ID 319**			**Location ID 320**	
[Cr+6] from SUIS from Y1, mg/kg	0.484		[Cr+6] from SUIS from Y1, mg/kg	<0.014		[Cr+6] from SUIS from Y1, mg/kg	0.319
[Cr+6] fromSUIS from Y2	0.131		[Cr+6] fromSUIS from Y2	0.022		[Cr+6] fromSUIS from Y2	0.035
[Cr+6] fromSUIS from Y3	0.763		[Cr+6] fromSUIS from Y3	0.019		[Cr+6] fromSUIS from Y3	0.025
[Cr+6] fromSUIS from Y4	0.195		[Cr+6] fromSUIS from Y4	0.069		[Cr+6] fromSUIS from Y4	0.293
Avg. [Cr+6] for DU	0.393		Avg. [Cr+6] for DU	0.029		Avg. [Cr+6] for DU	0.168
SD	0.290		SD	0.027		SD	0.160
n	4		n	4		n	4
95%LCL-Cr6	-0.069		95%LCL-Cr6	-0.014		95%LCL-Cr6	-0.086
95%UCL-Cr6	**0.855**		95%UCL-Cr6	**0.073**		95%UCL-Cr6	**0.422**
Location ID 325			**Location ID 326**				
[Cr+6] from SUIS from Y1, mg/kg	0.111		[Cr+6] from SUIS from Y1, mg/kg	0.116			
[Cr+6] fromSUIS from Y2	0.048		[Cr+6] fromSUIS from Y2	0.098			
[Cr+6] fromSUIS from Y3	0.069		[Cr+6] fromSUIS from Y3	0.185			
[Cr+6] fromSUIS from Y4	0.052		[Cr+6] fromSUIS from Y4	0.277			
Avg. [Cr+6] for DU	0.07		Avg. [Cr+6] for DU	0.169			
SD	0.029		SD	0.081			
n	4		n	4			
95%LCL-Cr6	0.024		95%LCL-Cr6	0.040			
95%UCL-Cr6	**0.116**		95%UCL-Cr6	**0.298**			

APPENDIX D
SAMPLING AND ANALYTICAL DATA

Site Investigation Findings Report
Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO
Order Numbers 091218004 & 091218005

Site Information:

ESP LDPR Code: FEPA8 ESP Staff: Ken Hannon, Sean Counihan
Job Code: NJ10TSFF Investigation Date: 12/16 & 12/17

Introduction:

The Missouri Department of Natural Resources (MDNR) Hazardous Waste Program (HWP) requested Environmental Services Program (ESP) personnel to conduct sampling related to an ongoing investigation involving the Prime Tanning Corporation located at 205 Florence Road in St. Joseph, Missouri. ESP Environmental Specialists Ken Hannon and Sean Counihan traveled to the site on December 16 and 17, 2009, to collect grab samples of private well water from selected residences near farm fields where tannery sludge was historically applied as a fertilizer. Additional MDNR personnel on site included Valerie Wilder and Shelly Jackson with the HWP, site assessment unit. Sampling was conducted in accordance with established standard operating procedures (SOPs) within the MDNR, ESP and outlined in the Tannery Sludge Farm Field Sampling and Analysis Plan (SAP).

Observations:

Personnel arrived on-site and began sampling. Custody of all samples collected was maintained by ESP personnel. Weather conditions were sunny to partly cloudy with temperatures around 30 degrees Fahrenheit. Winds were moderate and from the south. Two wells (Location ID wells 108 and 107) were sampled by using a peristaltic pump and 0.25 inch diameter food grade poly tubing because the wells did not contain a dedicated pump for sampling. Weighted tubing was lowered approximately 25 feet down both wells and samples were collected in accordance to SOP and the SAP. No deviations were noted at any wells sampled. Specific information regarding the owner's names and addresses are not documented in this report due to confidentiality concerns. Names and addresses of residents and property owners are kept on file with the HWP project manager.

Field Methods:

All wells (with exceptions noted above) were sampled from the tap nearest the wellhead after five minutes of flow and the stabilization of field parameters (pH, temperature, specific conductivity, and oxidation/reduction potential) had occurred. The samples were analyzed for total and dissolved chromium and hexavalent chromium. Samples collected for total chromium were preserved with nitric acid while samples collected for dissolved and hexavalent chromium were first filtered then placed into sample containers. Dissolved metals were further preserved with nitric acid while hexavalent chromium samples were preserved in a buffer solution containing ammonium sulfate.

Table 1: Sample Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected & Description**
H0900201	12/16/09	1258	Water grab sample GW-03 collected from residence 103. Clear odorless sample with a slight brown tinge.
H0900202	12/16/09	1340	Water grab sample GW-04 collected from residence 104. Clear colorless and odorless.
H0900203	12/16/09	1456	Water grab sample GW-08 collected from residence 108. Clear colorless and odorless.
H0900204	12/17/09	1525	Water grab sample GW-05 collected from residence 105. Clear colorless and odorless.
H0900205	12/17/09	1525	Blind triplicate of H0900204.
H0900206	12/17/09	1525	Blind triplicate of H0900204.
H0900207	12/17/09	1237	Water grab sample GW-06 collected from residence 106. Clear colorless and odorless.
H0900208	12/17/09	1300	Water grab sample GW-07 collected from residence 107. Clear colorless and odorless.
H0900210	12/16/09	1250	Water grab sample GW-01 collected from residence 101. Clear colorless and odorless.
H0900211	12/16/09	1352	Water grab sample GW-02 collected from residence 102. Clear colorless and odorless.
H0900212	12/16/09	1624	Water grab sample GW-11 collected from residence 111. Clear colorless and odorless. Background A.
H0900213	12/17/09	1218	Water grab sample GW-12 collected from residence 112. Clear colorless and odorless.
H0900214	12/17/09	1326	Water grab sample GW-09 collected from residence 109. Clear colorless and odorless.
H0900215	12/17/09	1345	Water grab sample GW-10 collected from residence 110. Clear colorless and odorless.

Submitted by:

Kenneth Hannon

Kenneth Hannon
Environmental Specialist
Field Services Unit
Environmental Services Program

Approved by:

Eric Sappington

Digitally signed by Eric Sappington
DN: cn=Eric Sappington, c=US, o=Environmental Services Program, ou=Department of Natural Resources, email=eric.sappington@dnr.mo.gov
Date: 2010.01.25 11:40:36 -06'00'

Eric Sappington
Unit Chief
Field Services Unit
Environmental Services Program

ES:khd

c: Michael Stroh, Environmental Specialist, HWP

APPENDIX A

Chain of Custody/Analytical Results

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

B16

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 091218004

Collector's Name: Kenneth Hannon
(Please Print)

Affiliation: (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
Shipped-Carrier:
Tape scaled and initialed
X Hand Delivered
No. Of Containers: (K) 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
H0900201 (Sample A)	Date: 12/16/09	Total and Dissolved Cr. Hex Cr EJ 12/22/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11002	Time: 1258	D.O	Flow	pH 7.45	Spec. Cond. 300 µs	Temp. 10.8 °C	Other: ORP 120 mV				
H0900202 (Sample B)	Date: 12/16/09	Total and Dissolved Cr. Hex Cr EJ 12/22/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11003	Time: 1340	D.O	Flow	pH 7.73	Spec. Cond. 828 µs	Temp. 6.8 °C	Other: ORP 122				
H0900203 (Sample C)	Date: 12/16/09	Total and Dissolved Cr. Hex Cr EJ 12/22/09						x Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11004	Time: 1456	D.O	Flow	pH 7.47.	Spec. Cond. 652 µs	Temp. 12.2 °C	Other: ORP -80 mV				
H0900204 (Sample D)	Date: 12/17/09	Total and Dissolved Cr. Hex Cr EJ 12/23/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11005	Time: 1525	D.O	Flow	pH 6.85	Spec. Cond. 833 µs	Temp. 9.1 °C	Other: ORP 160 mV				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Derek Rutledge	12-15-09	0845

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Dekalb	**LDPR Code:** FEPA~~3~~8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-03 colleted from residence 103. Bottle reference number B02193.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 103	
Sample B	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Dekalb	**LDPR Code:** FEPA~~3~~8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-04 colleted from residence 104. Bottle reference number B02347.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 104	
Sample C	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA~~5~~B	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-08 colleted from residence 108. Bottle reference number B02~~347~~ 1021.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 108	
Sample D	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA~~5~~ B	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-05 colleted from residence 105. Bottle reference number B02300.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 105	

REMARKS:
Print each sample results separately.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B16

LABORATORY ORDER ID: 091218004

Collector's Name: Kenneth Hannon
(Please Print)

Affiliation: (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
Shipped-Carrier:
Tape sealed and initialed
X Hand Delivered
No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
H0900205 (Sample A)	Date: 12/17/09	Total and Dissolved Cr. Hex Cr Et 12/23/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11006	Time: 0	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
H0900206 (Sample B)	Date: 12/17/09	Total and Dissolved Cr. Hex Cr Et 12/23/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11007	Time: 0	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
H0900207 (Sample C)	Date: 12/17/09	Total and Dissolved Cr. Hex Cr Et 12/23/09						x Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11008	Time: 1237	D.O	Flow	pH 6.72	Spec. Cond. 654 µs	Temp. 10.3 °C	Other: ORP 162 mv					
H0900208 (Sample D)	Date: 12/17/09	Total and Dissolved Cr. Hex Cr Et 12/23/09						X Grab / Composite / Modified / Other:	2 Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 2 500mL / 250mL	H_2SO_4 / 2 HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB11009	Time: 1300	D.O	Flow	pH 8.23	Spec. Cond. 420 µs	Temp. 12.1 °C	Other: ORP 130 mv					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	[illegible]	12-18-09	0844

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B27

LABORATORY ORDER ID: 091218005

Collector's Name: (Please Print)	Sean Counihan
Affiliation: (circle one)	ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- ___ Shipped-Carrier:
- ___ Tape sealed and initialed
- X Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
H0900210 (Sample A)	Date: 12/16/09	Total Cr, Dissolved Cr Hex Cr Ef 12/22/09						x Grab ___ Composite ___ Modified ___ Other:	2 Water ___ Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ Cubitainer ___ 2 oz glass ___ 8 oz glass ___ VOA vial ___ Encore ___ Other:	___ 120 mL ___ Nalgene ___ 1L 2 500mL ___ 250mL	___ H_2SO_4 2 HNO_3 ___ NAOH ___ HCL ___ 4° C(None) ___ Disinfected ___ Other
For Lab Use Only A011010	Time: 1250	D.O	Flow	pH 7.3	Spec. Cond. 504µs	Temp. 8.0°C	Other: ORP 39mv					
H0900211 (Sample B)	Date: 12/16/09	Total Cr, Dissolved Cr Hex Cr Ef 12/22/09						x Grab ___ Composite ___ Modified ___ Other:	2 Water ___ Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ Cubitainer ___ 2 oz glass ___ 8 oz glass ___ VOA vial ___ Encore ___ Other:	___ 120 mL ___ Nalgene ___ 1L 2 500mL ___ 250mL	___ H_2SO_4 2 HNO_3 ___ NAOH ___ HCL ___ 4° C(None) ___ Disinfected ___ Other
For Lab Use Only A011011	Time: 1352	D.O	Flow	pH 7.42	Spec. Cond. 472µs	Temp. 13.9°C	Other: ORP -17mv					
H0900212 (Sample C)	Date: 12/16/09	Total Cr, Dissolved Cr Hex Cr Ef 12/22/09						x Grab ___ Composite ___ Modified ___ Other:	2 Water ___ Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ Cubitainer ___ 2 oz glass ___ 8 oz glass ___ VOA vial ___ Encore ___ Other:	___ 120 mL ___ Nalgene ___ 1L 2 500mL ___ 250mL	___ H_2SO_4 2 HNO_3 ___ NAOH ___ HCL ___ 4° C(None) ___ Disinfected ___ Other
For Lab Use Only A011012	Time: 1624	D.O	Flow	pH 6.92	Spec. Cond. 344µs	Temp. 8.6°C	Other: ORP 33mv					
H0900213 (Sample D)	Date: 12/17/09	Total Cr, Dissolved Cr Hex Cr Ef 12/23/09						x Grab ___ Composite ___ Modified ___ Other:	2 Water ___ Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ Cubitainer ___ 2 oz glass ___ 8 oz glass ___ VOA vial ___ Encore ___ Other:	___ 120 mL ___ Nalgene ___ 1L 2 500mL ___ 250mL	___ H_2SO_4 2 HNO_3 ___ NAOH ___ HCL ___ 4° C(None) ___ Disinfected ___ Other
For Lab Use Only A011013	Time: 1218	D.O	Flow	pH 7.68	Spec. Cond. 760µs	Temp. 12.4°C	Other: ORP -23mv					

Relinquished By:	Received By:	Date:	Time:
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Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A H0900210	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Clinton County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 101, GW01 Sample taken at hydrant by house				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample B H0900211	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Buchanan County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 102, GW02 Taken from hydrant on side of garage, across from barn				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample C H0900212	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Andrew County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 111, GW11, Background A				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample D H0900213	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Andrew County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 112, GW12, Bottle number BO2309, Taken from hydrant by old windmill				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	

REMARKS:
Print each sample results separately

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B27

LABORATORY ORDER ID: 091218005

Collector's Name: Sean Counihan
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
Shipped-Carrier:
Tape sealed and initialed
x Hand Delivered
No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
H0900214 (Sample A)	Date: 12/17/09	Total Cr, Dissolved Cr Hex Cr Et 12/23/09						x Grab Composite Modified Other:	2 Water Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 2 500mL 250mL	H_2SO_4 2 HNO_3 NAOH HCL 4° C(None) Disinfected Other
For Lab Use Only AB11014	Time: 1326	D.O	Flow	pH 7.66	Spec. Cond. 848uS	Temp. 13.6°C	Other: ORP 158mv					
H0900215 Sml (Sample B)	Date: 12/17/09	Total Cr, Dissolved Cr Hex Cr Et 12/23/09						x Grab Composite Modified Other:	2 Water Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 2 500mL 250mL	H_2SO_4 2 HNO_3 NAOH HCL 4° C(None) Disinfected Other
For Lab Use Only AB11015	Time: 1345	D.O	Flow	pH 7.75	Spec. Cond. 584uS	Temp. 12°C	Other: ORP -74mV					
(Sample C)	Date:							Grab Composite Modified Other:	Water Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 4° C(None) Disinfected Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
(Sample D)	Date:							Grab Composite Modified Other:	Water Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 4° C(None) Disinfected Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
[signature]	Bunk Lindsey	12-18-09	0847
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A H0900214	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Andrew County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 109, GW09, Taken from hydrant behind house, Bottle number BO2307				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample B H0900215	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Andrew County	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Loc. ID 110, GW10, Taken from windmill operated pump				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:**	**LDPR Code:**	**Job Code:**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:**	**LDPR Code:**	**Job Code:**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy**	(check one)	**Sample Reference ID:**
	X Easting	**Y Northing**		EPE (meters)	
				PDOP	

REMARKS:
Print each sample results separately

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA58 (KH)	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Blind Triplicate.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA58 (KH)	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Blind Triplicate.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA58 (KH)	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-06 colleted from residence 106. Bottle reference number B02328.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 106	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Prime Tanning	**County:** Clinton	**LDPR Code:** FEPA58 (KH)	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Groundwater sample GW-07 colleted from residence 107. Bottle reference number B02197.				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 107	
	X Easting	**Y Northing**	EPE (meters) / PDOP		

REMARKS:
Print each sample results separately.

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11002

Customer #: H0900201

Facility ID:
County: Dekalb
Collector: KENNETH HANNON
Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/16/2009 12:58:00PM

Sample Comment: Groundwater sample GW-3 collected from residence 103. Bottle reference number B02193. Samples were sent directly from the field to contract lab for Hexavalent Chromium analyses.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	0.71	05	µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	2.77		µg/L	2,740	SW 846 6020
Field pH	Field pH	7.45		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	300 uS/cm				SM 2510
Field Temperature	Field Temperature	10.8 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	<0.017	04, ND	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	120		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11003

Customer #: H0900202

Facility ID:
County: Dekalb
Collector: KENNETH HANNON

Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP

Collect Date: 12/16/2009 1:40:00PM

Sample Comment: Groundwater sample GW-4 collected from residence 104. Bottle reference number B02347. Samples were sent directly from the field to contract lab for Hexavalent Chromium analyses.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	2.85		µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.32	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	7.73		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	828 uS/cm				SM 2510
Field Temperature	Field Temperature	6.8 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	<0.017	04, ND	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	122		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11004

Customer #: H0900203

Facility ID:
County: Dekalb
Collector: KENNETH HANNON

Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/16/2009 2:56:00PM

Sample Comment: Groundwater sample GW-8 collected from residence 108. Bottle reference number B02104. Samples were sent directly from the field to contract lab for Hexavalent Chromium analyses.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	3.36		µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.38	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	7.47		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	652 uS/cm				SM 2510
Field Temperature	Field Temperature	12.2 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.022	04 05	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	-80		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11005

Customer #: H0900204

Facility ID:
County: Dekalb
Collector: KENNETH HANNON
Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 3:25:00PM

Sample Comment: Groundwater sample GW-5 collected from residence 105. Bottle reference number B02300.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	0.76	05	µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.59	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	6.85		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	833 uS/cm				SM 2510
Field Temperature	Field Temperature	9.1 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.157	04, 05	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	160		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11006

Customer #: H0900205

Facility ID:
County: Dekalb
Collector: KENNETH HANNON
Sample Comment: Blind Triplicate.

Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 12:00:00AM

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	0.73	05	µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.6	05	µg/L	2,740	SW 846 6020
Hexavalent Chromium	Hexavalent Chromium	0.131	04, 05	mg/L	2,719	SW 846 7196A

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11007

Customer #: H0900206

Facility ID:
County: Dekalb
Collector: KENNETH HANNON
Sample Comment: Blind Triplicate

Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 12:00:00AM

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	0.92	05	µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.67	05	µg/L	2,740	SW 846 6020
Hexavalent Chromium	Hexavalent Chromium	0.125	04, 05	mg/L	2,719	SW 846 7196A

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: **AB11008**

Customer #: H0900207

Facility ID:
County: Dekalb
Collector: KENNETH HANNON
Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 12:37:00PM

Sample Comment: Groundwater sample GW-06 collected from residence 106. Bottle reference number B02328.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	1.64		µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.68	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	6.72		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	654 uS/cm				SM 2510
Field Temperature	Field Temperature	10.3 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.033	04, 05	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	162		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: LDPR CHANGED PER PROJECT MANAGER

Order ID 091218004 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB11009

Customer #: H0900208

Facility ID:
County: Dekalb
Collector: KENNETH HANNON

Site: Prime Tanning
Sample Reference ID:
Affiliation: ESP

Collect Date: 12/17/2009 1:00:00PM

Sample Comment: Groundwater sample GW-07 collected from residence 107. Bottle reference number B02197.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	1.56		µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.49	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	8.23		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	420 uS/cm				SM 2510
Field Temperature	Field Temperature	12.1 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.139	04, 05	mg/L	2,719	SW 846 7196A
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	130		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Missouri Department of Natural Resources
Environmental Services Program

Order ID 091218005 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8

Order Comment:

Sample: AB11011

Customer #: H0900211

Facility ID:
County: Clinton
Collector: SEAN COUNIHAN

Site: Tannery Sludge Farm Fields
Sample Reference ID:
Affiliation: ESP **Collect Date:** 12/16/2009 1:52:00PM

Sample Comment: Loc. ID 102, GW02 Taken from hydrant on side of garage, across from barn.
Samples were sent directly from the field to contract lab for Hexavalent Chromium analyses.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	1.95		µg/L	2,728	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.51	05	µg/L	2,740	SW 846 6020
Field pH	Field pH	7.42		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	472 uS/cm				SM 2510
Field Temperature	Field Temperature	13.9 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.301	04	ug/L	2,719	Contract Lab Dep
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	-17		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Missouri Department of Natural Resources
Environmental Services Program

Order ID 091218005 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8

Order Comment:

Sample: AB11012

Customer #: H0900212

Facility ID:
County: Clinton
Collector: SEAN COUNIHAN

Site: Tannery Sludge Farm Fields
Sample Reference ID:
Affiliation: ESP **Collect Date:** 12/16/2009 4:24:00PM

Sample Comment: Loc. ID 111, GW11, Background A
Samples were sent directly from the field to contract lab for Hexavalent Chromium analyses.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	2.14		µg/L	2,729	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.3	05	µg/L	2,741	SW 846 6020
Field pH	Field pH	6.92		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	344 uS/cm				SM 2510
Field Temperature	Field Temperature	8.6 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	<0.017	04, ND	ug/L	2,719	Contract Lab Dep
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	33		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value

Missouri Department of Natural Resources
Environmental Services Program

Order ID 091218005 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8

Order Comment:

Sample: AB11013

Customer #: H0900213

Facility ID:
County: Clinton
Collector: SEAN COUNIHAN
Site: Tannery Sludge Farm Fields
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 12:18:00PM
Sample Comment: Loc. ID 112, GW12, Bottle number BO2309, Taken from hydrant by old windmill

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	1.86		µg/L	2,729	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.6	05	µg/L	2,741	SW 846 6020
Field pH	Field pH	7.68		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	760 uS/cm				SM 2510
Field Temperature	Field Temperature	12.4 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	0.230	04, 05	ug/L	2,719	Contract Lab Dep
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	-23		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Missouri Department of Natural Resources
Environmental Services Program

Order ID 091218005 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8

Order Comment:

Sample: AB11014

Customer #: H0900214

Facility ID:
County: Clinton
Collector: SEAN COUNIHAN

Site: Tannery Sludge Farm Fields
Sample Reference ID:
Affiliation: ESP **Collect Date:** 12/17/2009 1:26:00PM

Sample Comment: Loc. ID 109, GW09, Taken from hydrant behind house, Bottle number BO2307

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	3.41		µg/L	2,729	SW 846 6020
6020 Metals-Total Recoverable	Chromium	0.39	05	µg/L	2,741	SW 846 6020
Field pH	Field pH	7.66		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	848 uS/cm				SM 2510
Field Temperature	Field Temperature	13.6 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	<0.017	04, ND	ug/L	2,719	Contract Lab Dep
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	158		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Missouri Department of Natural Resources
Environmental Services Program

Order ID 091218005 **Program, Contact:** HWP Julieann Warren

Report Date: 01/05/2010 **LDPR/JobCode:** FEPA8

Order Comment:

Sample: AB11015

Customer #: H0900215

Facility ID:
County: Clinton
Collector: SEAN COUNIHAN
Site: Tannery Sludge Farm Fields
Sample Reference ID:
Affiliation: ESP
Collect Date: 12/17/2009 1:45:00PM
Sample Comment: Loc. ID 110, GW10 Taken from windmill operated pump

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Dissolved	Chromium	1.70		µg/L	2,729	SW 846 6020
6020 Metals-Total Recoverable	Chromium	3.52		µg/L	2,741	SW 846 6020
Field pH	Field pH	7.75		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	584 uS/cm				SM 2510
Field Temperature	Field Temperature	12 C				EPA 170.1
Hexavalent Chromium	Hexavalent Chromium	<0.017	04, ND	ug/L	2,719	Contract Lab Dep
Oxidation Reduction Potential-Dissolved	Oxidation Reduction Potential-Dissolved	-74		mV		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is > reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

APPENDIX B

Field Notes

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

KA
12/16/09

Prince Tanning - H_2O Collection — Date: 12/16/09
FEPAS / NJDOTSEF — Arrival Time: 11:30
Depart Time: 1700

Participants: Val Wilder
Sean Cunnihan
Shelly Jackson

Conditions: Sunny ≈ 34° Winds moderate South

Calibrations: pH 7.0 = 6.97 (OK)
pen - 002 4.0 = 4.10 (OK)

ORP = 228 (OK)

Loc ID # 103

ID # H0900201 — Time: 1258
B02193

pH	7.36	7.45
Temp	10.8	10.8
Cond	330	330
ORP	128	132

- Slight Brown tinge

B02347

Loc #104 | ID # H0900202

Time: 1340

pH	7.72	7.73
Temp	6.3	6.8
Cond	833	828
ORP	143	122

-Clear colorless, odorless

Loc #108 | ID# H0900203

B02104

Time: 1456

pH	7.41	7.47
Temp	11.3	12.2
Cond	680	652
ORP	-65	-80

Rate = 350 L/min.

- Clear colorless water

Day 2 ****

Loc #165 | ID H0900204

H0900205

H0900206

B02300

B02304

B02352

pH	6.87	6.75	6.85
Temp	10.3	9.5	9.1
Cond	947	828	833
ORP	182	162	160

Time: 1525

- Clear, colorless, odorless

Loc. # 106 | ID # H0900207

B02328

pH	6.73	6.72
Temp	11.0	10.3
Cond	723	654
ORP	178	162

Rate: 350

Time: 1237

-Clear, colorless, odorless

Loc # 107 | ID# H0900208

B02197

pH	8.15	8.23
Temp	12.0	12.1
Cond	463	420
ORP	150	130

Rate: 350 L/min

Time: 1300

12/16/09 Tannery Sludge Farm Fields
Well sampling
Sam Cunnihan
Shelly Jackson
1230 Hrs Partly Cloudy 37°F

Parcel: BKGC Clinton Co.
Loc. ID 101, GW01
Started water @ 1240
1245
Temp 8.4°C
Cond. 515 us
pH ~~7.52 smc~~ 7.40
ORP 38mv
1250 sample taken
Temp 8.0
Cond. 504 us
pH 7.30
ORP 39mv
Sample taken H0900210
Taken from Hydrant at corner of House

Parcel # 3383 Buchanan Co.
Loc. ID 102, GW02
Water on @ 1344
~~Temp~~ Sme @ 1349 Measurements taken
ORP -23
Temp 13.3°
Cond. 482
pH 7.50
Taken @ 1352
Temp 13.9°
ORP -17
Cond 472
pH 7.42 Sample # H0900211
Taken from Hydrant on side of Garage across from House & Barn

~~Parcel: BKGA~~
~~Loc. ID 111, GW11~~
~~Started Water @~~
~~Taken measurements @~~
~~Temp~~ Nodaway Valley C.A.
~~Cond.~~ Could not Do
~~ORP~~
~~pH~~ Pump Was Frozen.

Going to 6450 CR 27 Balcow, MO 64427

[redacted]

Well is Approx 34 years old and about 35 ft Deep.

Keeping Same ID # For Background A
Parcel: BKGA Andrew Co.
Loc. ID 111, GW11
Started water @ 1616 Hrs
Taking Measurements @ 1621
Temp 9.0°
Cond. 345 us
ORP 35
pH. 6.95
Measurements taken @ 1627
Temp 8.6°
Cond 344 us
ORP 33
pH 6.97
Sample taken # H0900212
12/17/09
Tannery Sludge Farm Fields ground water Sampling
Mostly Cloudy 41° F

Parcel # 5180 ~~Clinton~~ Andrew Co.
Loc. ID 112, GW12
Water started @ 1204 Hrs
1st Measurement taken @ 1209
Temp 12.3°C pH 7.69
Cond 753 ORP -17

Second Measurement taken @ 1212
Temp 12.5°C
Cond 761
pH 7.65
ORP -26
Third Measurement taken @ 1216
Temp 12.4°C
Cond 760
pH 7.68
ORP -23
Sample taken @ 1218 from hydrant by old windmill
Sample # H0900213
Bottle ID # B02309
Parcel # - 9949 Andrew Co.
Loc. ID 109 + ~~110~~ same pump by house
GW 09 + ~~GW 10~~ same
Started water @ 1317
1st measurement @ 1322
Temp 13.6°
Cond 833
pH 7.62
ORP 158
2nd measurement @ 1325
Temp 13.9°
Cond 848 ORP 158
pH 7.66
Sample Taken @ 1326 H0900214 Bottle ID B02307

Loc. ID 110 GW 10
same pump off windmill in field
Started water @ 1333
1st Measurement @ 1338
Temp 13.8°C
Cond 606
pH 7.64
ORP -55
2nd Measurement @ 1341
Temp 11.6°
Cond 586
pH 7.76
ORP -76
Third Measurement @ 1344
Temp 12.0°
Cond 584
pH 7.75
ORP -74
Sample taken @ 1345
Sample # H0900215 Bottle # B02348
pump from windmill trasted through approx.
3 foot steel/iron pipe to fill cattle trough
Had mouse nest inside with lots of soil + Plant Matter.
Water samples had a lot of debris in them.

ANALYTICAL RESULTS FOR PRIVATE WELL WATER SAMPLES
TANNERY SLUDGE FARM FIELDS SITE, NORTHWEST MISSOURI

- All values listed in parts per billion (ug/l) unless otherwise noted.
- NA denotes not analyzed
- -- denotes not available/applicable
- Sample results in bold are significantly[1] above background concentrations

Location ID	101 Bkgnd	108 Bkgnd	111 Bkgnd	Bkgnd Average	103	104	105	105 replicate	105 replicate	106	107	102	102 resample	102 duplicate	Field Blank	112	109	110	RBSL[2]	MCL[3]
Date Collected	12/16/09	12/16/09	12/16/09		12/16/09	12/16/09	12/17/09	12/17/09	12/17/09	12/17/09	12/17/09	12/16/09	1/26/10	1/26/10	1/26/10	12/17/09	12/17/09	12/17/09		
Laboratory Number	H0900210	H0900203	H0900212		H0900201	H0900202	H0900204	H0900205	H0900206	H0900207	H0900208	H0900211	1000501	1000503	1000502	H0900213	H0900214	H0900215		
Water Quality Indicators																				
Oxidation Reduction Potential, mV	39.0	-80.0	33	--	120.0	122.0	160.0	NA	NA	162.0	130.0	-17	177	NA	NA	-23	158	-74	--	--
pH	7.3	7.47	6.92	--	7.45	7.73	6.85	NA	NA	6.72	8.23	7.42	6.82	NA	NA	7.68	7.66	7.75	--	--
Specific Conductivity, uS/cm	504	652	344	--	300	828	833	NA	NA	654	420	472	483	NA	NA	760	848	584	--	--
Metals																				
*Chromium, hexavalent, dissolved	0.039 (e)	0.022 (e)	<0.017	0.026	<0.017	<0.017	**0.157 (e)**	**0.131 (e)**	**0.125 (e)**	0.033 (e)	**0.139 (e)**	**0.301****	**0.269**	**0.263**	<0.022	**0.230 (e)**	<0.017	<0.017	0.30	--
Chromium, total	0.35 (e)	0.38 (e)	0.30(e)	0.34	2.77	0.32 (e)	0.59 (e)	0.60 (e)	0.67 (e)	0.68 (e)	0.49 (e)	0.51(e)	<0.25	<0.25	<0.25	0.60(e)	0.39(e)	3.52	--	100
Chromium, dissolved	1.92	3.36	2.14	2.47	0.71 (e)	2.85	0.76 (e)	0.73 (e)	0.92 (e)	1.64	1.56	1.95	NA	NA	NA	1.86	3.41	1.70	--	100

[1] Three times the background average. Non-detect background results are treated as the MDL for calculating average.

[2] Risk-based Screening Level for hexavalent chromium developed for the site

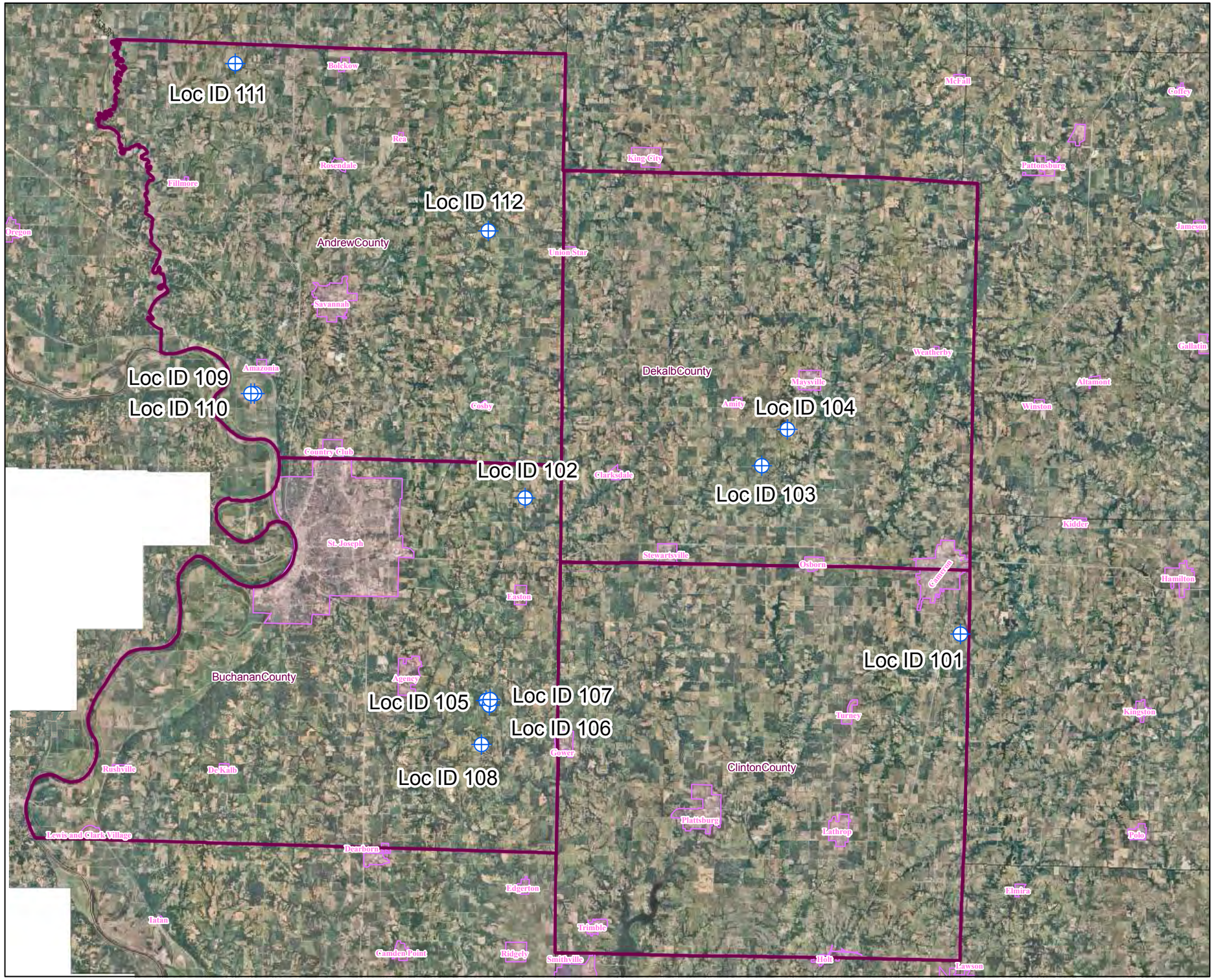
[3] EPA Maximum Contaminant Level for drinking water

e - Estimated value, detected above the method detection limit (MDL), but below the practical quantitation limit (PQL)

* - Hexavalent Chromium subcontracted to outside laboratory for analysis

** - Department of Health and Senior Services does not consider this value an exceedance of the screening level.

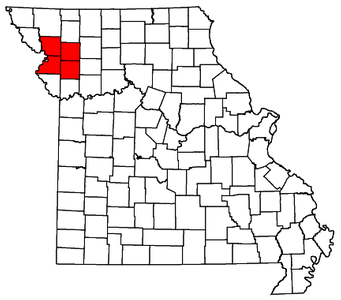
Groudnwater Sampling Locations
Tannery Sludge Farm Field Site
Andrew, Buchanan, Clinton and Dekalb Counties
Northwest Missouri
December 16 and 17, 2009



Legend

- Private Well
- Municipality
- County Boundary

N
W E
S



Map Created in January 2010 by Shelly Jackson

This map can be found at M:\Superfund\Tannery Sludge Farm Fields\Maps\WaterSamplingLocMap.mxd

Base Map: 2007 Missouri State Leaf-Off Imagery Program. Flight Date: 2008.

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

Missouri Department of Natural Resources

Division of Environmental Quality
Hazardous Waste Program

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

December 22, 2009

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109
(573) 522-4681

Re: Prime Tanning

Dear Mr. Stroh,

Attached is the report associated with the six (6) groundwater samples submitted for hexavalent chromium quantitation on December 16, 2009. The samples were received on December 17, 2009 in a sealed cooler at 2.7°C. Hexavalent chromium quantitation was performed by ion chromatography inductively coupled plasma mass spectrometry (IC-ICP-MS). Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109

Project: Prime Tanning

December 22, 2009

1. Sample Reception

Six (6) groundwater samples were submitted in 125mL HDPE bottles (provided by Applied Speciation and Consulting) for hexavalent chromium quantitation on December 16, 2009. The samples were received in acceptable condition on December 17, 2009 in a sealed cooler at 2.7°C.

All samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and designated discrete sample identifiers. The pH of each sample was checked to confirm the field-preservation, then all samples were placed in a secure monitored refrigerator (maintained at a temperature of $\leq 4^{o}$C) until the analyses could be performed.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS Applied Speciation and Consulting provided a buffered ammonium hydroxide/ammonium sulfate solution in each HDPE bottle to adjust the sample pH between 9 and 9.5. Upon reception the pH of each sample was checked to confirm it was within this range. Since the pH of each sample was acceptable, no further sample preparation was performed prior to analysis.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each

species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All samples for hexavalent chromium quantitation were analyzed on December 17, 2009 via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

4. Analytical Issues

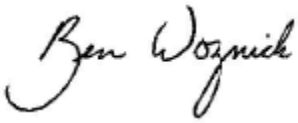
The overall analyses went very well and no significant analytical issues were encountered. All quality control parameters associated with the samples were within acceptance limits with the following exception:

The submitted samples were analyzed as soon as practically possible after sample receipt, although all samples were analyzed outside the 24-hour holding time recommended in EPA Method 7199. However, all samples were field-preserved with an ammonium hydroxide/ammonium sulfate buffer solution designed to stabilize hexavalent chromium in solution.

In accordance with Applied Speciation and Consulting's SOP for hexavalent chromium quantitation via IC-ICP-DRC-MS, the estimated method detection limit (eMDL) has been generated from replicate analyses of the lowest standard in the calibration curve.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,



Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date & Time Collected*	Date & Time Analyzed*	Cr(VI)
H0900201 / ID#103	12/16/09 12:58	12/17/09 18:05	< 0.017 U
H0900202 / ID#104	12/16/09 13:40	12/17/09 18:10	< 0.017 U
H0900203 / ID#108	12/16/09 14:56	12/17/09 18:15	0.022 J
H0900210 / ID#101	12/16/09 12:50	12/17/09 18:47	0.039 J
H0900211 / ID#102	12/16/09 13:52	12/17/09 18:52	0.301
H0900212 / ID#111	12/16/09 16:24	12/17/09 18:57	< 0.017 U

All results are reported in µg/L
* Times reported in CST
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL at 5x	RL at 5x
Cr(VI)	0.017	-0.006	-0.002	-0.004	0.001	0.011	0.017	0.25

eMDL = Estimated Method Detection Limit; please see narrative regarding eMDL calculations
RL = Reporting Limit

Quality Control Summary - Laboratory Control Samples

Analyte (µg/L)	LCS	True Value	Result	Recovery
Cr(VI)	LCS	10.00	10.32	103.2

Quality Control Summary - Matrix Duplicate

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Cr(VI)	H0900203 / ID#108	0.022 J	< 0.017 U	NC	NC

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(VI)	H0900203 / ID#108	25.00	23.26	93.0	25.00	22.96	91.8	1.3

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.062	123.3
0.050	0.057	113.4
0.050	0.054	108.2
0.050	0.057	113.7
0.500	0.498	99.6
5.000	5.101	102.0
50.00	49.99	100.0
0.050	0.057	113.1
0.050	0.050	99.8
0.050	0.054	108.6
0.050	0.045	90.9
0.500	0.513	102.6
5.000	4.985	99.7
25.00	24.98	99.9
0.050	0.053	106.3
0.050	0.055	110.8
0.050	0.055	109.3
0.050	0.053	106.1
0.500	0.498	99.6
5.000	5.031	100.6
25.00	24.98	99.9

All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	4.958	99.2
5.000	5.437	108.7
5.000	5.285	105.7
5.000	5.219	104.4
5.000	5.488	109.8
5.000	5.384	107.7
5.000	4.932	98.6
5.000	5.272	105.4
5.000	5.407	108.1
5.000	5.611	112.2
5.000	4.928	98.6
5.000	4.725	94.5
5.000	4.659	93.2
5.000	4.971	99.4
5.000	4.680	93.6
5.000	4.817	96.3
5.000	4.769	95.4
5.000	4.833	96.7
5.000	5.093	101.9
5.000	4.895	97.9

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
10.00	9.875	98.7
10.00	9.266	92.7
10.00	10.28	102.8
10.00	10.18	101.8
10.00	10.38	103.8
10.00	11.12	111.2
10.00	9.916	99.2
10.00	9.171	91.7
10.00	9.440	94.4
10.00	10.15	101.5
10.00	9.630	96.3
10.00	10.05	100.5
10.00	10.31	103.1
10.00	10.58	105.8
10.00	10.66	106.6
10.00	9.531	95.3
10.00	10.41	104.1
10.00	9.807	98.1
10.00	10.08	100.8
10.00	10.32	103.2

Second-source standard = Initial Calibration Verification (ICV) Standard
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
< 0.032 U	25.00	23.26	93.0	25.00	22.96	91.8	1.3
10.42	50.00	62.63	104.4	50.00	62.69	104.5	0.1
0.126	25.00	23.77	94.6	25.00	23.19	92.3	2.5
< 0.032 U	25.00	23.39	93.6	25.00	24.02	96.1	2.7
< 1.5 U	500.0	484.0	96.8	500.0	499.3	99.9	3.1
< 0.37 U	125.0	131.2	105.0	125.0	130.2	104.1	0.8
0.830	125.0	134.5	106.9	125.0	135.8	108.0	1.0
309.0	250.0	539.1	92.1	250.0	534.5	90.2	0.9
421.4	500.0	862.9	88.3	500.0	892.1	94.2	3.3
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
0.54	25.00	25.59	100.2	25.00	26.27	102.9	2.6
229.4	250.0	491.0	104.7	250.0	475.4	98.4	3.2
< 37 U	5000	4843	96.9	5000	4952	99.0	2.2
9.36	50.00	60.96	103.2	50.00	57.09	95.5	6.5
0.36	50.00	47.06	93.4	50.00	46.30	91.9	1.6
568.9	500.0	1089	104.1	500.0	1072	100.6	1.6
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
< 0.23 U	50.00	44.25	88.5	50.00	41.14	82.3	7.3
274.2	5000	5144	97.4	5000	5237	99.2	1.8
190.2	500.0	643.2	90.6	500.0	642.1	90.4	0.2

All results are reported in µg/L

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway
Bothell, WA 98011

Phone (425) 483-3300
Fax (425) 483-9818

Company Name: Missouri Dept. of Natural Resources
Contact Person: Michael Stroh / Kenneth Hannon
Address: 2710 W. Main St.
Jefferson City, MO 65109
Phone Number: (573) 522-5656 or (573) ~~759~~-526-3373
Fax Number:
Email Address: Ken.Hannon@dnr.mo.gov or Michael.Stroh@dnr.mo.gov
Project Name: Prime Tanning
Project Number:
PO Number:

ASC Project Manager:

By submitting of samples the client agrees to all terms and conditions set forth in the quotation provided by the ASC project manager. If you are not familiar with the term and conditions associated with your project, please contact your ASC representative as soon as possible (425) 483-3300.

Requested Turn Around Time: 24 hr.
Method of Sample Delivery: Fed Ex
Currier Tracking Number:
Confirmation of Sample Reception: ☒ Yes ☐ No

Sample ID	Bottle ID	Date and Time	Matrix*	Volume	Preservative	Initials	Requested Analytes and Methods	Comments
H0900201 / ID# 103	B02193	12/16/09 / 1258	GW	25	Pre.	KH	Hex Cr Method 218.6	
H0900202 / ID# 104	B02347	12/16/09 / 1340	GW	25	Pre.	KH	Hex Cr Method 218.6	
H0900203 / ID# 108	B02104	12/16/09 / 1456	GW	25	Pre.	KH	Hex Cr Method 218.6	
H0900210 / ID# 101	B02345	12/16/09 / 1250	GW	25	Pre.	KH/SMC	" "	
H0900211 / ID# 102	B02316	12/16/09 / 1352	GW	25	Pre.	KH/SK	" "	
H0900212 / ID# 111	B02350	12/16/09 / 1624	GW	25	Pre.	KH/SK	" "	
~~H09~~	~~B0~~	~~12/16/~~	~~GW~~		~~Pre~~	~~KH/SK~~	~~" "~~	

Relinquished by: (sign) Ken Hannon (print) Ken Hannon Date/Time: 12/16 @
Received by: (sign) Stefanie Cunningham (print) Stefanie Cunningham Date/Time: 12/17/09 1154
Comments:
Temp: 2.7°C

Relinquished by: (sign) _____ (print) _____ Date/Time: _____
Received by: (sign) _____ (print) _____ Date/Time: _____
Comments:
Temp:

Please account for each sample bottle as a seperate line item for verification purposes.

*Matrix: Air, Freshwater (FW), seawater (SW), groundwater (GW), wastewater (WW), soil (SL), sediment (SD), tissue (TS), product (P), other (O)

Rev 1.1 (April 2005)

* all samples were confirmed to be at pH 9.0

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

December 22, 2009

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109
(573) 522-4681

Re: Prime Tanning

Dear Mr. Stroh,

Attached is the report associated with the eight (8) groundwater samples submitted for hexavalent chromium quantitation on December 17, 2009. The samples were received on December 18, 2009 in a sealed cooler at 4.1°C. Hexavalent chromium quantitation was performed by ion chromatography inductively coupled plasma mass spectrometry (IC-ICP-MS). Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109

Project: Prime Tanning

December 22, 2009

1. Sample Reception

Eight (8) groundwater samples were submitted in 125mL HDPE bottles (provided by Applied Speciation and Consulting) for hexavalent chromium quantitation on December 17, 2009. The samples were received in acceptable condition on December 18, 2009 in a sealed cooler at 4.1°C.

All samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and designated discrete sample identifiers. The pH of each sample was checked to confirm the field-preservation, then all samples were placed in a secure monitored refrigerator (maintained at a temperature of $\leq 4^{o}$C) until the analyses could be performed.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS Applied Speciation and Consulting provided a buffered ammonium hydroxide/ammonium sulfate solution in each HDPE bottle to adjust the sample pH between 9 and 9.5. Upon reception the pH of each sample was checked to confirm it was within this range. Since the pH of each sample was acceptable, no further sample preparation was performed prior to analysis.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each

species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All samples for hexavalent chromium quantitation were analyzed on December 18, 2009 via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

4. Analytical Issues

The overall analyses went very well and no significant analytical issues were encountered. All quality control parameters associated with the samples were within acceptance limits with the following exception:

The submitted samples were analyzed as soon as practically possible after sample receipt, although several samples were analyzed outside the 24-hour holding time recommended in EPA Method 7199. However, all samples were field-preserved with an ammonium hydroxide/ammonium sulfate buffer solution designed to stabilize hexavalent chromium in solution.

In accordance with Applied Speciation and Consulting's SOP for hexavalent chromium quantitation via IC-ICP-DRC-MS, the estimated method detection limit (eMDL) has been generated from replicate analyses of the lowest standard in the calibration curve.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date & Time Collected*	Date & Time Analyzed*	Cr(VI)
H0900204 / LOC# 105	12/17/09 15:25	12/18/09 14:38	0.157 J
H0900205 / LOC# 105	12/17/09 15:25	12/18/09 14:43	0.131 J
H0900206 / LOC# 105	12/17/09 15:25	12/18/09 14:48	0.125 J
H0900207 / LOC# 106	12/17/09 12:37	12/18/09 14:54	0.033 J
H0900208 / LOC# 107	12/17/09 13:00	12/18/09 14:59	0.139 J
H0900213 / LOC# 112	12/17/09 12:18	12/18/09 15:04	0.230 J
H0900214 / LOC# 109	12/17/09 13:20	12/18/09 15:09	< 0.017 U
H0900215 / LOC# 110	12/17/09 13:45	12/18/09 15:41	< 0.017 U

All results are reported in µg/L
* Times reported in CST
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL at 5x	RL at 5x
Cr(VI)	0.022	-0.001	-0.002	0.035	0.013	0.018	0.017	0.25

eMDL = Estimated Method Detection Limit; please see narrative regarding eMDL calculations
RL = Reporting Limit

Quality Control Summary - Laboratory Control Samples

Analyte (µg/L)	LCS	True Value	Result	Recovery
Cr(VI)	LCS	10.00	10.32	103.2

Quality Control Summary - Matrix Duplicate

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Cr(VI)	H0900214 / LOC# 109	< 0.017 U	< 0.017 U	NC	NC

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	Result	Recovery	RPD
Cr(VI)	H0900214 / LOC# 109	25.00	23.39	93.6	25.00	24.02	96.1	2.7

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.062	123.3
0.050	0.057	113.4
0.050	0.054	108.2
0.050	0.057	113.7
0.500	0.498	99.6
5.000	5.101	102.0
50.00	49.99	100.0
0.050	0.057	113.1
0.050	0.050	99.8
0.050	0.054	108.6
0.050	0.045	90.9
0.500	0.513	102.6
5.000	4.985	99.7
25.00	24.98	99.9
0.050	0.053	106.3
0.050	0.055	110.8
0.050	0.055	109.3
0.050	0.053	106.1
0.500	0.498	99.6
5.000	5.031	100.6
25.00	24.98	99.9

All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	4.958	99.2
5.000	5.437	108.7
5.000	5.285	105.7
5.000	5.219	104.4
5.000	5.488	109.8
5.000	5.384	107.7
5.000	4.932	98.6
5.000	5.272	105.4
5.000	5.407	108.1
5.000	5.611	112.2
5.000	4.928	98.6
5.000	4.725	94.5
5.000	4.659	93.2
5.000	4.971	99.4
5.000	4.680	93.6
5.000	4.817	96.3
5.000	4.769	95.4
5.000	4.833	96.7
5.000	5.093	101.9
5.000	4.895	97.9

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
10.00	9.875	98.7
10.00	9.266	92.7
10.00	10.28	102.8
10.00	10.18	101.8
10.00	10.38	103.8
10.00	11.12	111.2
10.00	9.916	99.2
10.00	9.171	91.7
10.00	9.440	94.4
10.00	10.15	101.5
10.00	9.630	96.3
10.00	10.05	100.5
10.00	10.31	103.1
10.00	10.58	105.8
10.00	10.66	106.6
10.00	9.531	95.3
10.00	10.41	104.1
10.00	9.807	98.1
10.00	10.08	100.8
10.00	10.32	103.2

Second-source standard = Initial Calibration Verification (ICV) Standard
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: December 22, 2009
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
< 0.032 U	25.00	23.26	93.0	25.00	22.96	91.8	1.3
10.42	50.00	62.63	104.4	50.00	62.69	104.5	0.1
0.126	25.00	23.77	94.6	25.00	23.19	92.3	2.5
< 0.032 U	25.00	23.39	93.6	25.00	24.02	96.1	2.7
< 1.5 U	500.0	484.0	96.8	500.0	499.3	99.9	3.1
< 0.37 U	125.0	131.2	105.0	125.0	130.2	104.1	0.8
0.830	125.0	134.5	106.9	125.0	135.8	108.0	1.0
309.0	250.0	539.1	92.1	250.0	534.5	90.2	0.9
421.4	500.0	862.9	88.3	500.0	892.1	94.2	3.3
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
0.54	25.00	25.59	100.2	25.00	26.27	102.9	2.6
229.4	250.0	491.0	104.7	250.0	475.4	98.4	3.2
< 37 U	5000	4843	96.9	5000	4952	99.0	2.2
9.36	50.00	60.96	103.2	50.00	57.09	95.5	6.5
0.36	50.00	47.06	93.4	50.00	46.30	91.9	1.6
568.9	500.0	1089	104.1	500.0	1072	100.6	1.6
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
< 0.23 U	50.00	44.25	88.5	50.00	41.14	82.3	7.3
274.2	5000	5144	97.4	5000	5237	99.2	1.8
190.2	500.0	643.2	90.6	500.0	642.1	90.4	0.2

All results are reported in µg/L

APPLIED SPECIATION AND CONSULTING, LLC

18804 Northcreek Parkway
Bothell, WA 98011

Phone (425) 483-3300
Fax (425) 483-9818

Company Name: Missouri Dept. of Natural Resources
Contact Person: ~~Ken Wolmark~~ Ken Hannon or Michael Stroh
Address: ~~#~~ 2710 West Main St.
Jefferson City, MO. 65109
Phone Number: (573) 522-5656 or (573) 522-9902
Fax Number:
Email Address: Ken.Hannon@dnr.mo.gov. or Michael.Stroh@dnr.mo.gov.
Project Name: Prime Tanning
Project Number:
PO Number:

ASC Project Manager:

By submitting of samples the client agrees to all terms and conditions set forth in the quotation provided by the ASC project manager. If you are not familiar with the term and conditions associated with your project, please contact your ASC representative as soon as possible (425) 483-3300.

Requested Turn Around Time: 24-hrs
Method of Sample Delivery: Fed Ex
Currier Tracking Number:
Confirmation of Sample Reception: ☒ Yes ☐ No

Sample ID	Bottle ID	Date and Time	Matrix*	Volume	Preservative	Initials	Requested Analytes and Methods	Comments
H0900204 / Loc #105	B02300	12/17/09 1525	GW	50ml	Pre	KH	Hex Cr. via method 218.6	
H0900205 / Loc #105	B02304	12/17/09 1525	GW	50ml	Pre	KH	" "	
H0900206 / Loc #105	B02352	12/17/09 1525	GW	50ml	Pre	KH	" "	
H0900207 / Loc # 106	B02328	12/17/09 1237	GW	50ml	Pre	KH	" "	
H0900208 / Loc # 107	B02197	12/17/09 1300	GW	50ml	Pre	KH	" "	
H0900213 / Loc # 112	B02309	12/17/09 1218	GW	50ml	Pre	SMC	" "	
H0900214 / Loc # 109	B02307	12/17/09 1320	GW	50ml	Pre	SMC	" "	
H0900215 / Loc # 110	B02348	12/17/09 1345	GW	50ml	Pre	SMC	" "	

Relinquished by: (sign) Kenneth Hannon (print) Kenneth Hannon Date/Time: 12/17/09 @ 1641-hrs
Received by: (sign) Sean Cunnihan (print) Stefanie Keever Date/Time: 12/18/09 1000
Comments:
Temp: 4.1°C

Relinquished by: (sign)_____ (print)_____ Date/Time:_____
Received by: (sign)_____ (print)_____ Date/Time:_____
Comments:
Temp:

Please account for each sample bottle as a seperate line item for verification purposes.

*Matrix: Air, Freshwater (FW), seawater (SW), groundwater (GW), wastewater (WW), soil (SL), sediment (SD), tissue (TS), product (P), other (O)

Rev 1.1 (April 2005)

* ASC confirmed all samples to have a pH of 9.0

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

February 3, 2010

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109
(573) 522-4681

Re: Prime Tanning

Dear Mr. Stroh,

Attached is the report associated with the three (3) aqueous samples submitted for hexavalent chromium quantitation on January 26, 2010. The samples were received on January 27, 2010 in a sealed cooler at 2.9°C. Hexavalent chromium quantitation was performed by ion chromatography inductively coupled plasma mass spectrometry (IC-ICP-MS). Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources
2710 W. Main St.
Jefferson City, MO 65109

Project: Prime Tanning

February 3, 2010

1. Sample Reception

Three (3) aqueous samples were submitted in 125mL HDPE bottles (provided by Applied Speciation and Consulting) for hexavalent chromium quantitation on January 26, 2010. The samples were received in acceptable condition on January 27, 2010 in a sealed cooler at 2.9°C.

All samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and designated discrete sample identifiers. The pH of each sample was checked to confirm the field-preservation, then all samples were placed in a secure monitored refrigerator (maintained at a temperature of $\leq 4^{o}$C) until the analyses could be performed.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS Applied Speciation and Consulting provided a buffered ammonium hydroxide/ammonium sulfate solution in each HDPE bottle to adjust the sample pH between 9 and 9.5. Upon reception the pH of each sample was checked to confirm it was within this range. Since the pH of each sample was acceptable, no further sample preparation was performed prior to analysis.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each

species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All samples for hexavalent chromium quantitation were analyzed on January 27, 2010 via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by a basic (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

4. Analytical Issues

The overall analyses went very well and no significant analytical issues were encountered. All quality control parameters associated with the samples were within acceptance limits with the following exception:

The submitted samples were analyzed as soon as practically possible after sample receipt, although all samples were analyzed outside the 24-hour holding time recommended in EPA Method 7199. However, all samples were field-preserved with an ammonium hydroxide/ammonium sulfate buffer solution designed to stabilize hexavalent chromium in solution.

In accordance with Applied Speciation and Consulting's SOP for hexavalent chromium quantitation via IC-ICP-DRC-MS, the estimated method detection limit (eMDL) has been generated from replicate analyses of the lowest standard in the calibration curve.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Date & Time Collected*	Date & Time Analyzed*	Cr(VI)
1000501	1/26/10 16:27	1/27/10 21:04	0.269
1000502	1/26/10 16:35	1/27/10 20:58	< 0.022 U
1000503	1/26/2010	1/27/10 21:10	0.263

All results are reported in µg/L
* Times reported in CST
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh
Project: Prime Tanning

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL at 5x	RL at 5x
Cr(VI)	0.006	-0.017	-0.015	-0.008	-0.009	0.010	0.022	0.25

eMDL = Estimated Method Detection Limit; please see narrative regarding eMDL calculations
RL = Reporting Limit

Quality Control Summary - Laboratory Control Samples

Analyte (µg/L)	LCS	True Value	Result	Recovery
Cr(VI)	LCS	10.00	9.791	97.9

Quality Control Summary - Matrix Duplicate

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Cr(VI)	1000503	0.263	0.259	0.261	1.5

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(VI)	1000503	25.00	25.86	102.4	25.00	25.81	102.2	0.2

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.053	106.3
0.050	0.055	110.8
0.050	0.055	109.3
0.050	0.053	106.1
0.500	0.498	99.6
5.000	5.031	100.6
25.00	24.98	99.9
0.050	0.049	98.9
0.050	0.052	103.6
0.050	0.053	105.4
0.050	0.050	100.6
0.500	0.491	98.1
5.000	4.944	98.9
25.00	25.00	100.0
0.050	0.060	120.0
0.050	0.060	120.9
0.050	0.056	111.4
0.050	0.060	120.1
0.500	0.442	88.5
5.000	5.062	101.2
50.00	49.98	100.0

All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	5.043	100.9
5.000	5.181	103.6
5.000	5.013	100.3
5.000	5.063	101.3
5.000	5.055	101.1
5.000	5.018	100.4
5.000	5.162	103.2
5.000	5.395	107.9
5.000	5.616	112.3
5.000	5.328	106.6
5.000	5.385	107.7
5.000	5.390	107.8
5.000	4.659	93.2
5.000	4.971	99.4
5.000	4.680	93.6
5.000	4.817	96.3
5.000	4.769	95.4
5.000	4.833	96.7
5.000	5.093	101.9
5.000	4.895	97.9

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
10.00	9.791	97.9
10.00	9.800	98.0
10.00	10.32	103.2
10.00	9.875	98.7
10.00	9.266	92.7
10.00	10.28	102.8
10.00	10.18	101.8
10.00	10.38	103.8
10.00	11.12	111.2
10.00	9.916	99.2
10.00	9.171	91.7
10.00	9.440	94.4
10.00	10.15	101.5
10.00	9.630	96.3
10.00	10.05	100.5
10.00	10.31	103.1
10.00	10.58	105.8
10.00	10.66	106.6
10.00	9.531	95.3
10.00	10.41	104.1

Second-source standard = Initial Calibration Verification (ICV) Standard
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: February 3, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
0.261	25.00	25.86	102.4	25.00	25.81	102.2	0.2
0.606	25.00	27.22	106.5	25.00	26.89	105.1	1.2
< 0.032 U	25.00	23.26	93.0	25.00	22.96	91.8	1.3
10.42	50.00	62.63	104.4	50.00	62.69	104.5	0.1
0.126	25.00	23.77	94.6	25.00	23.19	92.3	2.5
< 0.032 U	25.00	23.39	93.6	25.00	24.02	96.1	2.7
< 1.5 U	500.0	484.0	96.8	500.0	499.3	99.9	3.1
< 0.37 U	125.0	131.2	105.0	125.0	130.2	104.1	0.8
0.830	125.0	134.5	106.9	125.0	135.8	108.0	1.0
309.0	250.0	539.1	92.1	250.0	534.5	90.2	0.9
421.4	500.0	862.9	88.3	500.0	892.1	94.2	3.3
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
0.54	25.00	25.59	100.2	25.00	26.27	102.9	2.6
229.4	250.0	491.0	104.7	250.0	475.4	98.4	3.2
9.36	50.00	60.96	103.2	50.00	57.09	95.5	6.5
0.36	50.00	47.06	93.4	50.00	46.30	91.9	1.6
568.9	500.0	1089	104.1	500.0	1072	100.6	1.6
368.2	500.0	838.8	94.1	500.0	894.5	105.3	6.4
274.2	5000	5144	97.4	5000	5237	99.2	1.8
190.2	500.0	643.2	90.6	500.0	642.1	90.4	0.2

All results are reported in µg/L

APPLIED SPECIATION AND CONSULTING, LLC Attn: Wozniack

18804 Northcreek Parkway
Bothell, WA 98011

Phone (425) 483-3300
Fax (425) 483-9818

Company Name: Missouri Department of Natural Resources
Contact Person: Michael Stroh
Address: 2710 W. Main, Jefferson City, MO 65109
Phone Number: 573-522-9902
Fax Number:
Email Address: Michael.Stroh@DNR.MO.GOV
Project Name: Tannery Sludge Farm Fields
Project Number:
PO Number:

ASC Project Manager:

By submitting of samples the client agrees to all terms and conditions set forth in the quotation provided by the ASC project manager. If you are not familiar with the term and conditions associated with your project, please contact your ASC representative as soon as possible (425) 483-3300.

Requested Turn Around Time:
Method of Sample Delivery:
Currier Tracking Number:
Confirmation of Sample Reception: ☒ Yes ☐ No

Sample ID	Bottle ID	Date and Time	Matrix*	Volume	Preservative	Initials	Requested Analytes and Methods	Comments
1000501	B02367	1/26/10 1627	Water		Pre	SMC	Hex chrome Modified 7199	True Sample
1000502	B02363	1/26/10 1635	Water		Pre	SMC	Hex chrome	Field Blank
1000503	B02391	1/26/10	Water		Pre	SMC	Hex chrome	Blind Duplicate

Relinquished by: (sign) [signature] (print) Sean Cunihan Date/Time: 1/26/10 1733 hrs
Received by: (sign) [signature] (print) Stefanie Keuer Date/Time: 1/27/10 1000

Comments:
Temp: 2.9°C

Relinquished by: (sign) _____ (print) _____ Date/Time: _____
Received by: (sign) _____ (print) _____ Date/Time: _____

Comments:
Temp:

Please account for each sample bottle as a seperate line item for verification purposes.

*Matrix: Air, Freshwater (FW), seawater (SW), groundwater (GW), wastewater (WW), soil (SL), sediment (SD), tissue (TS), product (P), other (O)

Rev 1.1 (April 2005)

Site Investigation Findings Report
Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO
Order Numbers: 100129004, 100202002, 100203001 and 100211001

Site Information:

ESP LDPR Code: FEPA8 ESP Staff: Ken Hannon, Sean Counihan, Ben Frissell, & Pam Hackler

Job Code: NJ10TSFF Investigation Date: 1/25 through 1/28, 2010

Introduction:

The Missouri Department of Natural Resources (MDNR) Hazardous Waste Program (HWP) requested Environmental Services Program (ESP) personnel to conduct sampling related to an ongoing investigation involving the Prime Tanning Corporation located at 205 Florence Road in St. Joseph, Missouri. This Findings Report is intended as an interim measure to document recent sampling activities. A full project report will be written by the HWP project manager when sample results have been received and evaluated. ESP Environmental Specialists Ken Hannon, Ben Frissell, Pam Hackler, and Sean Counihan traveled to the site on January 25 through 28, 2010, to collect grab samples of soils and a private well water from selected residences and farm fields where tannery sludge was historically applied as a fertilizer. Additional MDNR personnel on site included Valerie Wilder, Michael Stroh, Hillary Wakefield, Paul Embree, and Shelly Jackson with the HWP, site assessment unit. Ray Franson with the MDNR Kansas City Regional Office was also present to assist. Sampling was conducted in accordance with established standard operating procedures (SOPs) within the MDNR, ESP and outlined in the Tannery Sludge Farm Field Sampling and Analysis Plan (SAP), January 14, 2010.

Observations:

Personnel arrived on-site the afternoon of January 25, 2010, and began sampling agricultural field soils. Custody of all samples collected was maintained by ESP personnel. Weather conditions varied but were predominantly cold with temperatures ranging from morning lows of 16 degrees to afternoon highs around 30 degrees Fahrenheit. Winds were heavy to moderate and from the west to northwest, tapering off towards the afternoons. One private well was re-sampled to confirm the sample results obtained from sampling conducted on December 16, 2009, (Residence ID number 102). Eleven residential yard decision units (including one background yard), and 19 farm field decision units were also sampled during this event. No deviations from the SAP were noted at any sample locations. Specific information regarding the owner's names and addresses are not documented in this report due to confidentiality concerns. Names and addresses of residents and property owners are kept on file with the HWP project manager.

Field Methods:
Below is a brief discussion of the sampling activities conducted. A more detailed description of sampling procedures is outlined in the SAP.

Residential yards were divided into Sampling Units (SU) according to each specific site location and recorded on specially designed forms that are on file with the HWP project manager. Five-aliquot Incremental Samples (IS) were collected from within each SU at a depth of 0-2 inches. All soil samples were brought back to the ESP lab and allowed to thaw and dry for at least three days (some samples took four days to dry). All soil samples were then disaggregated and passed through a #60 mesh (0.25mm) sieve. Second-tier Decision Unit Incremental Samples (DUIS) were created using the Sampling Unit Incremental Samples (SUIS), and then all 60 residential yard IS were placed into sample containers and submitted for hexavalent chromium analysis on February 2, 2010.

Farm field samples were collected from the 0-2 inch depth from three SUs in 19 farm field DUs. Each SU was comprised of an acre plot of land within which ten discrete soil samples were collected. Following drying, disaggregation, and sieving, selected soil samples were then analyzed for total chromium with an x-ray fluorescence (XRF) analyzer. The discrete samples were combined to form first-tier SUIS. Second-tier DUIS samples were then created from the SUIS. All IS were then also analyzed by XRF. The resulting 76 SUIS and DUIS farm field samples were then placed into sample containers and submitted for hexavalent chromium analysis on February 11, 2010.

One private well was sampled, plus a duplicate and a field blank. All water samples were shipped overnight to the contract laboratory for hexavalent chromium analysis the same day they were collected. Water samples were also later submitted to the ESP laboratory for total chromium analysis. Water samples collected for total chromium were preserved with nitric acid while samples collected for hexavalent chromium were first filtered then placed into sample containers and preserved in a buffer solution containing ammonium sulfate.

Table 1 is a listing of the samples collected.

Table 1: Sample Collection Data

Sample Number	Date Collected	Time Collected	Location Collected & Description
AB14142	1/26/10	1627	Water grab sample collected from residence 102. Clear, colorless and odorless sample.
AB14143	1/26/10	1635	Field Blank.
AB14144	1/26/10	1627	Duplicate of AB14142.
AB14289	1/27/10	1435	Residential soil composite collected from location ID 319 at Y1.
AB14290	1/27/10	1440	Residential soil composite collected from location ID 319 at Y2.
AB14291	1/27/10	1449	Residential soil composite collected from location ID 319 at Y3.
AB14292	1/27/10	1457	Residential soil composite collected from location ID 319 at Y4.
AB14293	1/27/10	------	DUIS of residential yard 319.
AB14294	1/27/10	1026	Residential soil composite collected from location ID 305 at Y1.
AB14295	1/27/10	1037	Residential soil composite collected from location ID 305 at Y2.
AB14296	1/27/10	1046	Residential soil composite collected from location ID 305 at Y3.
AB14297	1/27/10	------	DUIS of residential yard 305.

Table 1: Sample Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected & Description**
AB14298	1/26/10	1150	Residential soil composite collected from location ID 320 at Y1.
AB14299	1/26/10	1202	Residential soil composite collected from location ID 320 at Y2.
AB14300	1/26/10	1122	Residential soil composite collected from location ID 320 at Y3.
AB14301	1/26/10	1134	Residential soil composite collected from location ID 320 at Y4.
AB14302	1/26/10	------	DUIS of residential yard 320.
AB14303	1/26/10	0930	Residential soil composite collected from location ID 325 at Y1.
AB14304	1/26/10	0910	Residential soil composite collected from location ID 325 at Y2.
AB14305	1/26/10	0900	Residential soil composite collected from location ID 325 at Y3.
AB14306	1/26/10	0920	Residential soil composite collected from location ID 325 at Y4.
AB14307	1/26/10	------	DUIS of residential yard 325.
AB14308	1/26/10	0940	Residential soil composite collected from location ID 326 at Y1.
AB14309	1/26/10	0950	Residential soil composite collected from location ID 326 at Y2.
AB14310	1/26/10	1000	Residential soil composite collected from location ID 326 at Y3.
AB14311	1/26/10	1010	Residential soil composite collected from location ID 326 at Y4.
AB14312	1/26/10	------	DUIS of residential yard 326.
AB14313	1/27/10	0820	Residential soil composite collected from location ID 312 at Y1.
AB14314	1/27/10	0835	Residential soil composite collected from location ID 312 at Y2.
AB14315	1/26/10	0850	Residential soil composite collected from location ID 312 at Y3.
AB14316	1/26/10	------	DUIS of residential yard 312.
AB14317	1/26/10	1525	Residential soil composite collected from location ID 313 at Y1.
AB14318	1/26/10	1530	Residential soil composite collected from location ID 313 at Y2.
AB14319	1/26/10	1535	Residential soil composite collected from location ID 313 at Y3.
AB14320	1/26/10	1545	Residential soil composite collected from location ID 313 at Y4.
AB14321	1/26/10	------	DUIS of residential yard 313.
AB14322	1/27/10	1435	Residential soil composite collected from location ID 301 at Y1.
AB14323	1/27/10	1440	Residential soil composite collected from location ID 301 at Y2.
AB14324	1/27/10	1449	Residential soil composite collected from location ID 301 at Y3.
AB14325	1/27/10	1457	Residential soil composite collected from location ID 301 at Y4.
AB14326	1/27/10	------	DUIS of residential yard 301.
AB14327	1/27/10	1430	Residential soil composite collected from location ID 304 at Y1.
AB14328	1/27/10	1434	Residential soil composite collected from location ID 304 at Y1, replicate #1.
AB14329	1/27/10	1438	Residential soil composite collected from location ID 304 at Y1, replicate #2.
AB14330	1/27/10	1440	Residential soil composite collected from location ID 304 at Y2.
AB14331	1/27/10	1450	Residential soil composite collected from location ID 304 at Y3.
AB14332	1/27/10	1500	Residential soil composite collected from location ID 304 at Y4.
AB14333	1/27/10	------	DUIS of residential yard 304.
AB14334	1/27/10	1500	Residential soil composite collected from location ID 303 at Y1.
AB14335	1/27/10	1510	Residential soil composite collected from location ID 303 at Y2.
AB14336	1/27/10	1520	Residential soil composite collected from location ID 303 at Y3.
AB14337	1/27/10	1530	Residential soil composite collected from location ID 303 at Y4.
AB14338	1/27/10	-------	DUIS of residential yard 303.
AB14339	1/27/10	1254	Residential soil composite collected from location ID 306 at Y1.
AB14340	1/27/10	1302	Residential soil composite collected from location ID 306 at Y2.
AB14341	1/27/10	1310	Residential soil composite collected from location ID 306 at Y3.
AB14342	1/27/10	------	DUIS of residential yard 306.
AB14343	1/26/10	1610	Residential soil composite collected from location ID 302 at Y1.
AB14344	1/26/10	1615	Residential soil composite collected from location ID 302 at Y2.
AB14345	1/26/10	1625	Residential soil composite collected from location ID 302 at Y3.
AB14346	1/26/10	1625	Residential soil composite collected from location ID 302 at Y3. replicate #1

Table 1: Sample Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected & Description**
AB14347	1/26/10	1625	Residential soil composite collected from location ID 302 at Y3. replicate #2
AB14348	1/26/10	------	DUIS of residential yard 302.
AB14404	1/26/10	1415	Farm field soil location ID 202, SUIS 59.
AB14405	1/26/10	1530	Farm field soil location ID 203, SUIS 18.
AB14406	1/27/10	1256	Farm field soil location ID 204, SUIS 42.
AB14407	1/26/10	1100	Farm field soil location ID 205, SUIS 96.
AB14408	1/25/10	1400	Farm field soil location ID 209, SUIS 109.
AB14409	1/26/10	1200	Farm field soil location ID 210, SUIS 30.
AB14410	1/27/10	0902	Farm field soil location ID 212, SUIS 53.
AB14411	1/26/10	1600	Farm field soil location ID 213, SUIS 44.
AB14412	1/27/10	1118	Farm field soil location ID 214, SUIS 25.
AB14413	1/27/10	1046	Farm field soil location ID 215, SUIS 55.
AB14414	1/26/10	1540	Farm field soil location ID 216, SUIS 50.
AB14415	1/26/10	1245	Farm field soil location ID 217, SUIS 103.
AB14416	1/26/10	0940	Farm field soil location ID218, SUIS 146.
AB14417	1/26/10	0900	Farm field soil location ID 219, SUIS 55.
AB14418	1/25/10	1704	Farm field soil location ID 221, SUIS 150.
AB14419	1/25/10	1658	Farm field soil location ID 222, SUIS 41.
AB14420	1/26/10	1444	Farm field soil location ID 202, SUIS 29.
AB14421	1/26/10	1415	Farm field soil location ID 202, SUIS 79.
*AB14422	1/26/10	1415	Farm field soil location ID 202, DUIS.
AB14423	1/27/10	1530	Farm field soil location ID 203, SUIS 7.
AB14424	1/27/10	1530	Farm field soil location ID 203, SUIS 27.
*AB14425	1/27/10	1530	Farm field soil location ID 203, DUIS.
AB14426	1/27/10	1256	Farm field soil location ID 204, SUIS 99.
AB14427	1/27/10	1350	Farm field soil location ID 204, SUIS 23.
*AB14428	1/27/10	1256	Farm field soil location ID 204, DUIS.
AB14429	1/26/10	1120	Farm field soil location ID 205, SUIS 71.
AB14430	1/26/10	1100	Farm field soil location ID 205, SUIS 34.
AB14431	1/26/10	1100	Farm field soil location ID 205, DUIS.
AB14432	1/25/10	1400	Farm field soil location ID 209, SUIS 138.
AB14433	1/25/10	1405	Farm field soil location ID 209, SUIS 144.
*AB14434	1/25/10	1400	Farm field soil location ID 209, DUIS.
AB14435	1/26/10	1530	Farm field soil location ID 210, SUIS 15.
AB14436	1/26/10	1600	Farm field soil location ID 210, SUIS 62.
*AB14437	1/26/10	150	Farm field soil location ID 210, DUIS.
AB14438	1/27/10	0948	Farm field soil location ID 212, SUIS 16.
AB14439	1/27/10	1030	Farm field soil location ID 212, SUIS 86.
AB14440	1/27/10	0902	Farm field soil location ID 212, DUIS
AB14441	1/26/10	1600	Farm field soil location ID 213, SUIS 9.
AB14442	1/26/10	1626	Farm field soil location ID 213, SUIS 15.
AB14443	1/26/10	1600	Farm field soil location ID 213, DUIS.
AB14444	1/27/10	1118	Farm field soil location ID 214, SUIS 53.
AB14445	1/27/10	1210	Farm field soil location ID 214, SUIS 23.
AB14446	1/27/10	1118	Farm field soil location ID 214, DUIS.
AB14447	1/27/10	1110	Farm field soil location ID 215, SUIS 82.
AB14448	1/27/10	1046	Farm field soil location ID 215, SUIS 110.
AB14449	1/27/10	1046	Farm field soil location ID 215, DUIS.
AB14450	1/26/10	1540	Farm field soil location ID 216, SUIS 32.

Table 1: Sample Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected & Description**
AB14451	1/26/10	1603	Farm field soil location ID 216, SUIS 16.
*AB14452	1/26/10	1540	Farm field soil location ID 216, DUIS.
AB14453	1/26/10	1321	Farm field soil location ID 217, SUIS 22.
AB14454	1/26/10	1147	Farm field soil location ID 217, SUIS 50.
AB14455	1/26/10	1245	Farm field soil location ID 217, DUIS.
AB14456	1/26/10	1055	Farm field soil location ID 218, SUIS 102.
AB14457	1/26/10	0940	Farm field soil location ID 218, SUIS 87.
AB14458	1/26/10	0940	Farm field soil location ID 218, DUIS.
AB14459	1/26/10	1255	Farm field soil location ID 219, SUIS 42.
AB14460	1/26/10	0900	Farm field soil location ID 219, SUIS 15.
*AB14461	1/26/10	0900	Farm field soil location ID 219, DUIS.
AB14462	1/25/10	1704	Farm field soil location ID 221, SUIS 164.
AB14463	1/25/10	1730	Farm field soil location ID 221, SUIS 109.
*AB14464	1/25/10	1704	Farm field soil location ID 221, DUIS.
AB14465	1/25/10	1710	Farm field soil location ID 222, SUIS 10.
AB14466	1/25/10	1730	Farm field soil location ID 222, SUIS 27.
*AB14467	1/25/10	1658	Farm field soil location ID 222, DUIS.
AB14468	1/27/10	0940	Farm field soil location ID 224, SUIS 19.
AB14469	1/27/10	0900	Farm field soil location ID 224, SUIS 23.
AB14470	1/27/10	0920	Farm field soil location ID 224, SUIS 74.
*AB14471	1/27/10	0900	Farm field soil location ID 224, DUIS.
AB14472	1/26/10	1210	Farm field soil location ID 223, SUIS 4.
AB14473	1/26/10	1240	Farm field soil location ID 223, SUIS 28.
AB14474	1/26/10	1210	Farm field soil location ID 223, DUIS.
AB14475	1/26/10	1650	Farm field soil location ID 225, SUIS 60.
AB14476	1/26/10	1120	Farm field soil location ID 225, SUIS 8.
AB14477	1/26/10	1020	Farm field soil location ID 225, DUIS.
AB14478	1/26/10	1322	Farm field soil location ID 223, SUIS 44.
AB14479	1/26/10	1020	Farm field soil location ID 225, SUIS 32.
AB14350	1/26/10	1057	Farm field soil location ID 218, SU 102.02.
AB14351	1/26/10	0946	Farm field soil location ID 218, SU 87.04.
AB14352	1/26/10	1200	Farm field soil location ID 202, SU 59.09.
AB14353	1/26/10	1150	Farm field soil location ID 202, SU 59.07.
AB14354	1/26/10	1310	Farm field soil location ID 202, SU 79.03.
AB14355	1/26/10	1330	Farm field soil location ID 218, SU 146.08.

* Denotes samples that were held at the request of HWP for possible later analysis. These samples will not appear in the analytical results section of this report.

Submitted by:

Kenneth Hannon

Kenneth Hannon
Environmental Specialist
Field Services Unit
Environmental Services Program

Eric Sappington

Digitally signed by Eric Sappington
DN: cn=Eric Sappington, c=US, o=Environmental Services Program, ou=Department of Natural Resources, email=eric.sappington@dnr.mo.gov
Date: 2010.03.25 10:25:19 -05'00'

Approved by:

Eric Sappington
Unit Chief
Field Services Unit
Environmental Services Program

ES:khd

c: Michael Stroh, Environmental Specialist, HWP

APPENDIX A

Chain of Custody/Analytical Results

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 100211001

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
Shipped-Carrier:
Tape sealed and initialed
x Hand Delivered
No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000354 (Sample A)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / ✓8 oz glass / VOA vial / Encore / ✓Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4°C(None) / Disinfected / Other
For Lab Use Only AB14404	Time: 1415	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000355 (Sample B)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4°C(None) / Disinfected / Other
For Lab Use Only AB14405	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000356 (Sample C)	Date: 1-27-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4°C(None) / Disinfected / Other
For Lab Use Only AB14406	Time: 1256	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000357 (Sample D)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr6+ only)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4°C(None) / Disinfected / Other
For Lab Use Only AB14407	Time: 1100	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Mark Stampfer	2-11-10	1058
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 59 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 202	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 18 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 203	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 42 SUIS			204 ~~SUIS~~ MS	
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): MS ~~2~~ 96 SUIS			205 ~~SUIS~~ MS	
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered
- No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000358 (Sample A)	Date: 1-25-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14408	Time: 1400	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000359 (Sample B)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14409	Time: 1200	D.O	Flow	pH	Spec Cond.	Temp.	Other:				
1000360 (Sample C)	Date: 1-27-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr^{+6} only)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14410	Time: 0902	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000361 (Sample D)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr^{6+} only)						Grab / x Composite / Modified / Other:	Water / ✓Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14411	Time: 1600	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Marda Thompson	2-11-10	1058
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 109 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 209	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 30 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 210	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 53 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 212	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 44 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 213	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

P, -5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000362 (Sample A)	Date: 1-27-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr6+ only)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14412	Time: 1118	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000363 (Sample B)	Date: 1-27-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr6+ only)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14413	Time: 1046	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000364 (Sample C)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) ~~RUN LAB DUP~~ KH						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14414	Time: 1540	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000365 (Sample D)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) RUN LAB DUP (Cr6+ only)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB14415	Time: 1245	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Marda Thompson	2-11-10	1058
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 25 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 214	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 55 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 215	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 50 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 216	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 103 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 217	
	X Easting	**Y Northing**	EPE (meters) / PDOP		

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hanhon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000366 (Sample A)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / ~~2~~ 4° C(None) / Disinfected / Other
For Lab Use Only AB14416	Time: 0940	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000367 (Sample B)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / ~~2~~ 4° C(None) / Disinfected / Other
For Lab Use Only AB14417	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000368 (Sample C)	Date: 1-25-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / ~~2~~ 4° C(None) / Disinfected / Other
For Lab Use Only AB14418	Time: 1704	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000369 (Sample D)	Date: 1-25-10 ~~1658~~ KH	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / ~~2~~ 4° C(None) / Disinfected / Other
For Lab Use Only AB14419	Time: 1658	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Maida Thompson	2-11-10	1058
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 146 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 218	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 55 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 219	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 150 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 41 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 222	

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: Ken Hannon
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000370 (Sample A)	Date: 1.26.10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14420	Time: 14:44	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL ~~Other: 2~~	✓ 4° C(None) Disinfected Other
1000371 (Sample B)	Date: 1.26.10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14421	Time: 14:15	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000372 (Sample C)	Date: 1.26.10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14422	Time: 14:15	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000373 (Sample D)	Date: 1.27.10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14423	Time: 15:30	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Melissa Thompson	2-11-10	1104
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 29 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 202	
	X Easting	**Y Northing**	EPE (meters)		
			PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 79 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 202	
	X Easting	**Y Northing**	EPE (meters)		
			PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 202	
	X Easting	**Y Northing**	EPE (meters)		
			PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 7 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 203	
	X Easting	**Y Northing**	EPE (meters)		
			PDOP		

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B-5

LABORATORY ORDER ID: _____

Collector's Name: Ken Hannon
(Please Print)

Affiliation: (ESP) KCRO NERO SERO SLRO SWRO WPP
(circle one) DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000374 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14424	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000375 (Sample B)	Date: 1-27-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14425	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000376 (Sample C)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14426	Time: 1256	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000377 (Sample D)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14427	Time: 1350	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Linda S Thompson	2-11-10	1104
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 27 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 203	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 203	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 99 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** KH ~~209~~ 204	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 23 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 204	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000378 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14428	Time: 1256	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000379 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14429	Time: 1120	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
(KH) 1000380 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14430	Time: 1100	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
(KH) 1000381 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14431	Time: 1100	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Paula S Thompson	2-11-10	1104
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 204	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 71 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 205	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 34 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 205	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 205	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B-5

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000382 (Sample A)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14432	Time: 1400	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000383 (Sample B)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14433	Time: 1405	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000384 (Sample C)	Date: 1-25-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14434	Time: 1400	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000385 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14435	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Linda S Thompson	2-11-10	1104
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 138 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 209	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 144 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 209	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 209	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 15 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 210	
	X Easting	**Y Northing**	EPE (meters) / PDOP		

REMARKS:
HWP: Michael Stroh

 B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000386 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only A614436	Time: 1600	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other
1000387 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only A614437	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other
1000388 (Sample C)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only A614438	Time: 0948	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other
1000389 (Sample D)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only A614439	Time: 1030	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Maude S Thompson	2-11-10	1104

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 62 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 210	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 210	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 16 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 212	
	X Easting	**Y Northing**	EPE (meters) / PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 86 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 212	
	X Easting	**Y Northing**	EPE (meters) / PDOP		

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000390 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture ~~Hold for later analysis~~ KH						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AG14440	Time: 0902	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000391 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AG14441	Time: 1600	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000392 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AG14442	Time: 1626	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000393 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AG14443	Time: 1600	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Melinda S. Hampton	2-11-10	1104
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 212	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 9 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 213	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 15 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 213	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 213	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID:

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000394 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 1 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL 1 4°C(None) Disinfected Other
For Lab Use Only AB14444	Time: 1118	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000395 (Sample B)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 1 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL 1 4°C(None) Disinfected Other
For Lab Use Only AB14445	Time: 1210	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000396 (Sample C)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 1 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL 1 4°C(None) Disinfected Other
For Lab Use Only AB14446	Time: 1118	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000397 (Sample D)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene 1 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL 1 4°C(None) Disinfected Other
For Lab Use Only AB14447	Time: 1110	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Mark S Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 53 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 214	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 23 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 214	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 214	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 82 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 215	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B-5

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000398 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14448	Time: 1046	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000399 (Sample B)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14449	Time: 1046	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000400 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14450	Time: 1540	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
1000401 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14451	Time: 1603	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Vada Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 110 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 215	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 215	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 32 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 216	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 16 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 216	

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: Ken Hannon
(Please Print)

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000402 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14452	Time: 1540	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000403 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14453	Time: 1321	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000404 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14454	Time: 1147	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000405 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L VOA vial 500mL Encore 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14455	Time: 1245	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	[illegible] Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**	216	
			PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 22 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**	217	
			PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 50 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**	217	
			PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**	217	
			PDOP		

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B-5

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000406 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 1 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 1 4° C(None) Disinfected Other
For Lab Use Only AB14456	Time: 1055	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000407 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 1 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 1 4° C(None) Disinfected Other
For Lab Use Only AB14457	Time: 0940	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000408 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 1 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 1 4° C(None) Disinfected Other
For Lab Use Only AB14458	Time: 0940	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000409 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 1 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL 1 4° C(None) Disinfected Other
For Lab Use Only AB14459	Time: 1255	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Michael Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 102 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 218	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): ~~218~~ 87 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 218	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 218	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 42 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 219	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

 B-5

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000410 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14460	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000411 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14461	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000412 (Sample C)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14462	Time: 1704	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000413 (Sample D)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14463	Time: 1730	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Mark Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 15 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 219	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): ~~215~~ 214 DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 219	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 164 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 109 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	

REMARKS:
HWP: Michael Stroh

 B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (CSP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000414 (Sample A)	Date: 1-25-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AG14464	Time: 1704	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000415 (Sample B)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AG14465	Time: 1710	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000416 (Sample C)	Date: 1-25-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AG14466	Time: 1730	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000417 (Sample D)	Date: 1-25-10	Hexavalent Chromium Percent Moisture HOLD FOR LATER ANALYSIS						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AG14467	Time: 1658	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Linda S Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: **FEPA8**	Job Code: **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy	(check one) EPE (meters) / PDOP	Sample Reference ID: 221
Sample B	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: **FEPA8**	Job Code: **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 10 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy	(check one) EPE (meters) / PDOP	Sample Reference ID: 222
Sample C	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: **FEPA8**	Job Code: **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 27 SuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy	(check one) EPE (meters) / PDOP	Sample Reference ID: 222
Sample D	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: **FEPA8**	Job Code: **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy	(check one) EPE (meters) / PDOP	Sample Reference ID: 222

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID:

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered
- No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000418 (Sample A)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber / 120 mL Cubitainer 2 oz glass / Nalgene ✓ 8 oz glass / 1L VOA vial / 500mL Encore / 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14468	Time: 0940	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000419 (Sample B)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber / 120 mL Cubitainer 2 oz glass / Nalgene ✓ 8 oz glass / 1L VOA vial / 500mL Encore / 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14469	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000420 (Sample C)	Date: 1-27-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber / 120 mL Cubitainer 2 oz glass / Nalgene ✓ 8 oz glass / 1L VOA vial / 500mL Encore / 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14470	Time: 0920	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000421 (Sample D)	Date: 1-27-10	Hexavalent Chromium Percent Moisture Hold for Later Analysis						Grab x Composite Modified Other:	Water ✓ Soil Organic Sludge Other:	1L amber / 120 mL Cubitainer 2 oz glass / Nalgene ✓ 8 oz glass / 1L VOA vial / 500mL Encore / 250mL Other:	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14471	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Marta Thompson	2-11-10	1114
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 19 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	Accuracy	(check one) EPE (meters) PDOP	Sample Reference ID: 224
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 23 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	Accuracy	(check one) EPE (meters) PDOP	Sample Reference ID: 224
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 74 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	Accuracy	(check one) EPE (meters) PDOP	Sample Reference ID: 224
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	Accuracy	(check one) EPE (meters) PDOP	Sample Reference ID: 224

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered
- No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000422 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14472	Time: 1210	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000423 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14473	Time: 1240	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000424 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14474	Time: 1210	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000425 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified Other:	Water ✓Soil Organic Sludge Other:	1L amber Cubitainer 2 oz glass 8 oz glass VOA vial Encore Other:	120 mL Nalgene 1L 500mL 250mL	H_2SO_4 HNO_3 NAOH HCL ✓ 4° C(None) Disinfected Other
For Lab Use Only AB14475	Time: 1050	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	[illegible] Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 4 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**	223	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 28 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**	223	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**	223	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 60 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**	225	

REMARKS:
HWP: Michael Stroh

 B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: Ken Hannon
(Please Print)

Affiliation: (PSP) KCRO NERO SERO SLRO SWRO WPP
(circle one) DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 2

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000426 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14476	Time: 1120	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other
1000427 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber Cubitainer 2 oz glass 1 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14477	Time: 1020	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	1 4° C(None) Disinfected Other
(Sample C)	Date:	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water Soil Organic Sludge	1L amber Cubitainer 2 oz glass 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	4° C(None) Disinfected Other
(Sample D)	Date:	Hexavalent Chromium Percent Moisture						Grab x Composite Modified	Water Soil Organic Sludge	1L amber Cubitainer 2 oz glass 8 oz glass	120 mL Nalgene 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial Encore Other:	500mL 250mL	4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Maida Thompson	2-11-10	1110
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 8 SUTS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 225	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUTS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 225	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)** / **PDOP**		

REMARKS:
HWP: Michael Stroh

B-5

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

Shipped-Carrier:

Tape sealed and initialed

x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000429 (Sample A)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14478	Time: 1322	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000430 (Sample B)	Date: 1-26-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / ✓ Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: Ziplock	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14479	Time: 1020	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
(Sample C)	Date:	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
(Sample D)	Date:	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Linda S Thompson	2-11-10	1058
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 44 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 223	
	X Easting	**Y Northing**	**EPE (meters)**		
			PDOP		
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): 32 SUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:** 225	
	X Easting	**Y Northing**	**EPE (meters)**		
			PDOP		
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**		
			PDOP		
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** **FEPA8**	**Job Code:** **NJ10 TSFF**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):		**Accuracy** (check one)	**Sample Reference ID:**	
	X Easting	**Y Northing**	**EPE (meters)**		
			PDOP		

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B22

LABORATORY ORDER ID: 100129004

Collector's Name: Sean Counihan
(Please Print)

Affiliation: (ESP) KCRO NERO SERO SLRO SWRO WPP
(circle one) DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 3

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000501 (Sample A)	Date: 01/26/10	Total Metals (Cr) Hex. Cr 5mL						x Grab; Composite; Modified	Water; Soil; Organic; Sludge; Other:	1L amber; Cubitainer; 2 oz glass; 8 oz glass; VOA vial; Encore; Other:	120 mL; Nalgene; 1L; 500mL; 250mL	H_2SO_4; HNO_3; NAOH; HCL; 4° C(None); Disinfected; Other
For Lab Use Only AB14142	Time: 1627	D.O	Flow	pH 6.82	Spec. Cond. 483 µs	Temp. 12.7°C	Other:	Other:				
1000502 (Sample B)	Date: 01/26/10	Total Metals (Cr) Hex. Cr 5mL						x Grab; Composite; Modified	Water; Soil; Organic; Sludge; Other:	1L amber; Cubitainer; 2 oz glass; 8 oz glass; VOA vial; Encore; Other:	120 mL; Nalgene; 1L; 500mL; 250mL	H_2SO_4; HNO_3; NAOH; HCL; 4° C(None); Disinfected; Other
For Lab Use Only AB14143	Time: 1635	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000503 (Sample C)	Date: 01/26/10	Total Metals (Cr) Hex. Cr 5mL						x Grab; Composite; Modified	Water; Soil; Organic; Sludge; Other:	1L amber; Cubitainer; 2 oz glass; 8 oz glass; VOA vial; Encore; Other:	120 mL; Nalgene; 1L; 500mL; 250mL	H_2SO_4; HNO_3; NAOH; HCL; 4° C(None); Disinfected; Other
For Lab Use Only AB14144	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
(Sample D)	Date:							Grab; Composite; Modified	Water; Soil; Organic; Sludge; Other:	1L amber; Cubitainer; 2 oz glass; 8 oz glass; VOA vial; Encore; Other:	120 mL; Nalgene; 1L; 500mL; 250mL	H_2SO_4; HNO_3; NAOH; HCL; 4° C(None); Disinfected; Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
[signature]	[signature]	1-29-10	1129
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A 1000501	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Buchanan	**LDPR Code:** FEPA8	**Job Code:** NJ10TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Sample from well head Loc. 102 Applied Specication Bottle # B02347 Tonc				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** Parcel 3383	
Sample B 1000502	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Buchanan	**LDPR Code:**	**Job Code:**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Field Blank Applied specication Bottle # B02363 Tonc				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** Parcel 3383	
Sample C 1000503	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** Buchanan	**LDPR Code:**	**Job Code:**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Duplicate Applied Specication Bottle # B02391 Tonc				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** Parcel 3383	
Sample D	**Facility ID:**	**Site/Study Name:**	**County:**	**LDPR Code:**	**Job Code:**
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	

REMARKS:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Counihan

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS (HWP) Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000300 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moisture MS						Grab / x Composite / Modified	x Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / x 4° C(None) / Disinfected / Other
For Lab Use Only AB14289	Time: 1435	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000301 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist MS						Grab / x Composite / Modified	x Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / x 4° C(None) / Disinfected / Other
For Lab Use Only AB14290	Time: 1440	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000302 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist MS						Grab / x Composite / Modified	x Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / x 4° C(None) / Disinfected / Other
For Lab Use Only AB14291	Time: 1449	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000303 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist MS						Grab / x Composite / Modified	x Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / x 4° C(None) / Disinfected / Other
For Lab Use Only AB14292	Time: 1457	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	Derek Rodriguez	2/2/10	1156

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8 ~~31~~ MS	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000300

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Cunihan

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses							Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000304 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4°C(None) / Disinfected / Other
For Lab Use Only AB14293	Time: ✓	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:				
1000305 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist, ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4°C(None) / Disinfected / Other
For Lab Use Only AB14294	Time: 1026	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:				
1000306 (Sample C)	Date: 1-27-10	Hexavalent Chromium % , moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4°C(None) / Disinfected / Other
For Lab Use Only AB14295	Time: 1037	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:				
1000307 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4°C(None) / Disinfected / Other
For Lab Use Only AB14296	Time: 1046	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:				

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1157

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 305	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 305	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 305	

REMARKS:
HWP: Michael Stroh

RUN LAB Dup on 1000304

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Counihan

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS (HWP) Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000308 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614297	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000309 (Sample B)	Date: 1-26-10	Hexavalent Chromium % moist, ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614298	Time: 1150	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000310 (Sample C)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614299	Time: 1202	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000311 (Sample D)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614300	Time: 1122	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1158

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DU IS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 305	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 320	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 320	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 320	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Corrihan

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000312 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % Moist MS						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14302	Time: 1134	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000313 (Sample B)	Date: 1-26-10	Hexavalent Chromium, % Moist MS						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14303	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000314 (Sample C)	Date: 1-26-10	Hexavalent Chromium % moist, MS						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14304	Time: 0930	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000315 (Sample D)	Date: 1-26-10	Hexavalent Chromium % moist MS						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14305	Time: 0910	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1159

Sample I.D. Letter	Site Description				
Sample A	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 320	
Sample B	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DU IS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 320	
Sample C	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 325	
Sample D	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 325	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000315

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 10020202

Collector's Name: (Please Print) Pam BACKLER

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000316 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A014305	Time: 0900	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000317 (Sample B)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A014306	Time: 0920	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000318 (Sample C)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A014307	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000319 (Sample D)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A014308	Time: 0940	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
Pam Backler	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[illegible]	2/2/10	1200

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 325	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 325	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 325	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) PAM HACKLER

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

Shipped-Carrier:

Tape sealed and initialed

x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000320 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614309	Time: 0950	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000321 (Sample B)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614310	Time: 1000	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000322 (Sample C)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614312	Time: 1010	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000323 (Sample D)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614318	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
Pamela Hackler	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	Dirk Rentz	2/2/10	1201

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	

REMARKS:
HWP: Michael Stroh

RUN LAB Dup on 1800321

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) PAM HACKLER

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000324 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14315	Time: 0820	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000325 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14314	Time: 0835	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000326 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14316	Time: 0850	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000327 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14316	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			

Relinquished By:	Received By:	Date:	Time:
Pam Hackler	Kenneth Hannon	2/2/10	1115
Kenneth Hannon	Dirk Rudiger	2/2/10	1202

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 312	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 312	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 312	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Du IS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 312	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100262002

Collector's Name: (Please Print) PAM HACKLER

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000328 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only A614318	Time: 1525	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000329 (Sample B)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only A614319	Time: 1530	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000330 (Sample C)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only A614320	Time: 1535	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000331 (Sample D)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber 120mL / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only A614320	Time: 1545	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			

Relinquished By:	Received By:	Date:	Time:
Janilyn A Hackler	Kenneth Hannon	2/2/10	1115
Kenneth Hannon	Frank Rutzge	2/2/10	1203

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP on 1000329

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Cornihan

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1006333 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14327	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000334 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14328	Time: 1435	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000335 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14329	Time: 1440	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			
1000336 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14330	Time: 1449	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:			

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1204

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Du IS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 301	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 301	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 301	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000333

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Counihan

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS (HWP) Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000337 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614325	Time: 1457	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000338 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614326	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000339 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614327	Time: 1430	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000340 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614328	Time: 1434	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1205

Sample I.D. Letter	Site Description				
Sample A 5	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 301	
Sample B 6	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 301	
Sample C 7	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 304	
Sample D 8	Facility ID:	Site/Study Name: Tannery Sludge Farm Fields	County: (Multiple)	LDPR Code: FEPA8	Job Code: NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1 DUPLICATE #1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		Accuracy (check one): EPE (meters) / PDOP	Sample Reference ID: 304	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000338

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 1002202002

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000341 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	120 mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB14329	Time: 1438	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000342 (Sample B)	Date: 1-27-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	120 mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB14330	Time: 1440	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000343 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	120 mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB14332	Time: 1450	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				
1000344 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 1 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	120 mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB14333	Time: 1500	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:				

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Derek Rudinger	2/2/10	1206

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1 DUPLICATE #2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 304	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
0	**GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):** X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 304	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
1	**GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):** X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 304	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
2	**GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only):** X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 304	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Ken Hannon ~~Pam Boecker~~

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS (HWP) Other:

Description of Shipment

- ___ Shipped-Carrier:
- ___ Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000345 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						___ Grab x Composite ___ Modified	___ Water I Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ 120 mL I Cubitainer I 2 oz glass ___ Nalgene ___ 8 oz glass ___ 1L ___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL I 4° C(None) ___ Disinfected ___ Other
For Lab Use Only AB14333	Time: ✓	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:			
1000346 (Sample B)	Date: 1-27-10	Hexavalent Chromium % moist ms						___ Grab x Composite ___ Modified	___ Water I Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene I 8 oz glass ___ 1L ___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL I 4° C(None) ___ Disinfected ___ Other
For Lab Use Only AB14334	Time: 1500	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:			
1000347 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms						___ Grab x Composite ___ Modified	___ Water I Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene I 8 oz glass ___ 1L ___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL I 4° C(None) ___ Disinfected ___ Other
For Lab Use Only AB14335	Time: 1510	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:			
1000348 (Sample D)	Date: 1-27-10	Hexavalent Chromium, % moist ms						___ Grab x Composite ___ Modified	___ Water I Soil ___ Organic ___ Sludge ___ Other:	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene I 8 oz glass ___ 1L ___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL I 4° C(None) ___ Disinfected ___ Other
For Lab Use Only AB14336	Time: 1520	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:			

Relinquished By:	Received By:	Date:	Time:
Kenneth Hannon	Derek Ritzer	2/7/10	1207

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:** 304	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8 303	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:**	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8 303	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:**	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8 303	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:**	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000345

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) PAM HACKLER / ~~SEAN Cunnan~~

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses							Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000349 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614338	Time: 1530 ~~1-27-10~~ ms	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:			
1000350 (Sample B)	Date: 1-27-10	Hexavalent Chromium % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614338	Time: /	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:			
1000351 (Sample C)	Date: 1-27-10	Hexavalent Chromium, % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614339	Time: 1254	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:			
1000352 (Sample D)	Date: 1-27-10	Hexavalent Chromium % moist ms							Grab / x Composite / Modified	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only A614340	Time: 1302	D.O	Flow	pH	Spec. Cond.	Temp.	Other:		Other:			

Relinquished By:	Received By:	Date:	Time:
Pamela A Hackler	Kenneth Hannon	2/2/10	1115
Kenneth Hannon	Derek Prudogan	2/2/10	1208

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y4				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 303	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DuIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 303	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 306	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 306	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Canihan

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000353 (Sample A)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14342	Time: 1310	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000354 (Sample B)	Date: 1-27-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14343	Time: /	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000355 (Sample C)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14344	Time: 1610	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1000356 (Sample D)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber 120 mL / Cubitainer / 2 oz glass Nalgene / 8 oz glass 1L / VOA vial 500mL / Encore 250mL / Other:	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14345	Time: 1615	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Sean Cash	Kenneth Hannon	2/2/10	1115
Kenneth Hannon	Derek Rudzer	2/2/10	1209

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 306	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 306	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	

REMARKS:
HWP: Michael Stroh

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B31

LABORATORY ORDER ID: 100202002

Collector's Name: (Please Print) Sean Counihan

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1000357 (Sample A)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14345	Time: 1625	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000358 (Sample B)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14346	Time: 1647	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000359 (Sample C)	Date: 1-26-10	Hexavalent Chromium, % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14347	Time: 1650	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1000360 (Sample D)	Date: 1-26-10	Hexavalent Chromium % moist ms						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only AB14348	Time: /	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
[signature]	Kenneth Hannon	2/2/10	11:15
Kenneth Hannon	[signature]	2/2/10	1210

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3 DUPLICATE #2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): Y3 DUPLICATE #2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): DU I S				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting	Y Northing	**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	

REMARKS:
HWP: Michael Stroh

RUN LAB DUP ON 1000357

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 1002 03001

Collector's Name: PAM HACKLER
(Please Print)

Affiliation: (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000361 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab MS X Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14350	Time: 1057	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000362 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab MS X Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14351	Time: 0946	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000363 (Sample C)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab MS X Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14352	Time: 1200	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000364 (Sample D)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab MS X Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14353	Time: 1150	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Pam Hackler	[illegible]	2-2-10	1630
[illegible]	Freda Mace	2·2·10	16:38

Sample I.D. Letter	Site Description				
Sample A 50	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 102.02				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 218	
Sample B 51	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU ~~218~~ MS 87.04				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 218	
Sample C 52	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 59.09				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 202	
Sample D 53	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 59.07				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 202	

REMARKS:
HWP: Michael Stroh

EXPIDITED 48 HR TURNAROUND

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 1002030001

Collector's Name: (Please Print) PAM HACKLER

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 2

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1000365 (Sample A)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab X Composite MS Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14354	Time: 1310	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
1000366 (Sample B)	Date: 1-26-10	Hexavalent Chromium Percent Moisture						X Grab X Composite MS Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB14355	Time: 1330	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
~~1000367~~ MS (Sample C)	Date:	Hexavalent Chromium Percent Moisture						X Grab X Composite MS Modified	Water Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
(Sample D)	Date:	Hexavalent Chromium Percent Moisture						X Grab MS X Composite Modified	Water Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Pam Hackler	[illegible]	2-2-10	1630
[illegible]	Brenda Mace	2.2.10	16:38

Sample I.D. Letter	Site Description				
Sample A 54	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 79.03				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 202	
Sample B 55	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 146.08				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 218	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	

REMARKS:
HWP: Michael Stroh

EXPIDITED 48 HR TURN AROUND

Missouri Department of Natural Resources
Environmental Services Program

Order ID 100211001 **Program, Contact:** HWP Julieann Warren

Report Date: 03/18/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB14404
Customer #: 1000354

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 2:15:00PM
Sample Comment: 59 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	11700000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	24400000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	527000		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	1340		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	35700		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.61	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	449	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	3.82		%	3,421	Infrared Drying
pH	pH	6.28	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.4	04	%	3,993	Contract Lab Dep

Sample: AB14405
Customer #: 1000355

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 203
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 3:30:00PM
Sample Comment: 18 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13400000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	13300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	449000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	365	05	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	36400		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.42	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	433	04	mV	3,991	Contract Lab Dep

Sample: AB14405

Customer #: 1000355

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 203
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 3:30:00PM
Sample Comment: 18 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Percent Moisture	Percent Moisture	3.71		%	3,421	Infrared Drying
pH	pH	6.85	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.1	04	%	3,993	Contract Lab Dep

Sample: AB14406

Customer #: 1000356

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 204
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 12:56:00PM
Sample Comment: 42 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	18300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	25000000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	334000		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	815		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	45100		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.67	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	465	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	4.15		%	3,421	Infrared Drying
pH	pH	7.86	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.9	04	%	3,993	Contract Lab Dep

Sample: AB14407

Customer #: 1000357

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:00:00AM
Sample Comment: 96 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	12300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	34300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	410000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	2070		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	31900		ug/kg	3,884	SW 846 6010B

Sample: AB14407

Customer #: 1000357

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:00:00AM
Sample Comment: 96 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.05	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	477	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	5.48		%	3,421	Infrared Drying
pH	pH	5.90	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.5	04	%	3,993	Contract Lab Dep

Sample: AB14408

Customer #: 1000358

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 209
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 2:00:00PM
Sample Comment: 109 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	7440000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16000000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	649000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	259	05	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	19900		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.66	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	351	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4		%	3,421	Infrared Drying
pH	pH	7.87	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	0.81	04	%	3,993	Contract Lab Dep

Sample: AB14409

Customer #: 1000359

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 210
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00PM
Sample Comment: 30 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	12700000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	472000		ug/kg	3,884	SW 846 6010B

Sample: AB14409

Customer #: 1000359

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 210
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00PM
Sample Comment: 30 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Molybdenum	328	05	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	34200		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.22	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	352	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	1.96		%	3,421	Infrared Drying
pH	pH	7.87	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	0.47	04	%	3,993	Contract Lab Dep

Sample: AB14410

Customer #: 1000360

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 212
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:02:00AM
Sample Comment: 53 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	12600000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Iron	44300000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	585000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	3210		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	31400		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.60	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	469	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	4.02		%	3,421	Infrared Drying
pH	pH	6.61	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.5	04	%	3,993	Contract Lab Dep

Sample: AB14411

Customer #: 1000361

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 213
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:00:00PM
Sample Comment: 44 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	15000000	09	ug/kg	3,884	SW 846 6010B

Sample: AB14411

Customer #: 1000361

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 213
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:00:00PM
Sample Comment: 44 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Iron	34400000	09	ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	358000		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	2310		ug/kg	3,884	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	42200		ug/kg	3,884	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.83	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	407	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	3.95		%	3,421	Infrared Drying
pH	pH	6.62	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	5.5	04	%	3,993	Contract Lab Dep

Sample: AB14412

Customer #: 1000362

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 11:18:00AM
Sample Comment: 25 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13900000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	55400000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	472000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	5310		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	30600	11	ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.61	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	487	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	5.35		%	3,421	Infrared Drying
pH	pH	6.78	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	5.4	04	%	3,993	Contract Lab Dep

Sample: AB14413

Customer #: 1000363

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 215
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 10:46:00AM
Sample Comment: 55 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	16800000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	18300000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	402000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	971		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	50500		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.069	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	420	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	2.67		%	3,421	Infrared Drying
pH	pH	6.45	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	4.4	04	%	3,993	Contract Lab Dep

Sample: AB14414

Customer #: 1000364

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 216
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 3:40:00PM
Sample Comment: 50 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	16400000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	31500000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	462000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	1620		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	40500		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.69	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	422	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	4.06		%	3,422	Infrared Drying
pH	pH	6.81	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	5.1	04	%	3,993	Contract Lab Dep

Sample: AB14415

Customer #: 1000365

Facility ID:
County: (Multiple)

Site: Tannery Sludge Farm Fields
Sample Reference ID: 217

Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:45:00PM

Sample Comment: 103 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	14000000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	40900000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	298000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	3230		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	41900		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.79	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	468	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	3.36		%	3,422	Infrared Drying
pH	pH	5.91	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	6.4	04	%	3,993	Contract Lab Dep

Sample: AB14416

Customer #: 1000366

Facility ID:
County: (Multiple)

Site: Tannery Sludge Farm Fields
Sample Reference ID: 218

Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 9:40:00AM

Sample Comment: 146 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	16100000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	42500000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	493000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	2580		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	39300		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.83	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	444	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	8.60		%	3,422	Infrared Drying
pH	pH	7.59	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	6.3	04	%	3,993	Contract Lab Dep

Sample: AB14417

Customer #: 1000367

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 219
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 9:00:00AM
Sample Comment: 55 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	19100000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	21100000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	517000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	602		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	45300		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.11	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	475	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	3.11		%	3,422	Infrared Drying
pH	pH	6.34	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.3	04	%	3,993	Contract Lab Dep

Sample: AB14418

Customer #: 1000368

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 5:04:00PM
Sample Comment: 150 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	23600000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	21400000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	356000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	514		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	52500		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	3.40	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	434	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	2.53		%	3,422	Infrared Drying
pH	pH	7.25	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.1	04	%	3,993	Contract Lab Dep

Sample: AB14419

Customer #: 1000369

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 222
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 4:58:00PM
Sample Comment: 41 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	25700000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	23100000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	456000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	701		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	59500		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	3.29	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	422	04	mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	2.90		%	3,422	Infrared Drying
pH	pH	7.38	04	pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.2	04	%	3,993	Contract Lab Dep

Sample: AB14420

Customer #: 1000370

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 2:44:00PM
Sample Comment: 29 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.27	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	5.5	04	%	4,083	Infrared Drying

Sample: AB14421

Customer #: 1000371

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 2:15:00PM
Sample Comment: 79 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.13	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.8	04	%	4,083	Infrared Drying

Sample: AB14423
Customer #: 1000373

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 203
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:30:00PM
Sample Comment: 7 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.39	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	4.3	04	%	4,083	Infrared Drying

Sample: AB14424
Customer #: 1000374

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 203
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:30:00PM
Sample Comment: 27 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.28	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.8	04	%	4,083	Infrared Drying

Sample: AB14426
Customer #: 1000376

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 204
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 12:56:00PM
Sample Comment: 99 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.41	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.3	04	%	4,083	Infrared Drying

Sample: AB14427
Customer #: 1000377

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 204
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 1:50:00PM
Sample Comment: 23 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.46	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.0	04	%	4,083	Infrared Drying

Sample: AB14429
Customer #: 1000379

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:20:00AM
Sample Comment: 71 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.27	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.2	04	%	4,083	Infrared Drying

Sample: AB14430
Customer #: 1000380

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:00:00AM
Sample Comment: 34 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.62	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.2	04	%	4,083	Infrared Drying

Sample: AB14431
Customer #: 1000381

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.63	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.5	04	%	4,083	Infrared Drying

Sample: AB14432
Customer #: 1000382

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 209
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 2:00:00PM
Sample Comment: 138 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.69	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.8	04	%	4,083	Infrared Drying

Sample: AB14433
Customer #: 1000383

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 209
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 2:05:00PM
Sample Comment: 144 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.56	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.2	04	%	4,083	Infrared Drying

Sample: AB14435
Customer #: 1000385

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 210
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 3:30:00PM
Sample Comment: 15 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.24	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	4,083	Infrared Drying

Sample: AB14436
Customer #: 1000386

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 210
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:00:00PM
Sample Comment: 62 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.80	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	4,083	Infrared Drying

Sample: AB14438
Customer #: 1000388

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 212
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:48:00AM
Sample Comment: 16 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.47	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.8	04	%	4,083	Infrared Drying

Sample: AB14439
Customer #: 1000389

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 212
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 10:30:00AM
Sample Comment: 86 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.10	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.0	04	%	4,083	Infrared Drying

Sample: AB14440
Customer #: 1000390

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 212
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:02:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.49	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.0	04	%	4,083	Infrared Drying

Sample: AB14441
Customer #: 1000391

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 213
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:00:00PM
Sample Comment: 9 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.54	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.6	04	%	4,083	Infrared Drying

Sample: AB14442
Customer #: 1000392

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 213
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:26:00PM
Sample Comment: 15 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.76	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.2	04	%	4,083	Infrared Drying

Sample: AB14443
Customer #: 1000393

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 213
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:00:00PM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.70	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.2	04	%	4,083	Infrared Drying

Sample: AB14444
Customer #: 1000394

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 11:18:00AM
Sample Comment: 53 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.39	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.8	04	%	4,083	Infrared Drying

Sample: AB14445
Customer #: 1000395

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 12:10:00PM
Sample Comment: 23 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.24	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	4,083	Infrared Drying

Sample: AB14446
Customer #: 1000396

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 11:18:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.36	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.7	04	%	4,083	Infrared Drying

Sample: AB14447
Customer #: 1000397

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 215
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 11:10:00AM
Sample Comment: 82 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.73	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.5	04	%	4,083	Infrared Drying

Sample: AB14448
Customer #: 1000398

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 215
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 10:46:00AM
Sample Comment: 110 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.05	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.8	04	%	4,083	Infrared Drying

Sample: AB14449
Customer #: 1000399

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 215
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 10:46:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.73	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.6	04	%	4,083	Infrared Drying

Sample: AB14450
Customer #: 1000400

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 216
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 3:40:00PM
Sample Comment: 32 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.14	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.7	04	%	4,083	Infrared Drying

Sample: AB14451
Customer #: 1000401

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 216
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 4:03:00PM
Sample Comment: 16 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.58	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.2	04	%	4,083	Infrared Drying

Sample: AB14453
Customer #: 1000403

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 217
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 1:21:00PM
Sample Comment: 22 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.55	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	3.1	04	%	4,083	Infrared Drying

Sample: AB14454
Customer #: 1000404

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 217
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:47:00AM
Sample Comment: 50 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.82	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.5	04	%	4,083	Infrared Drying

Sample: AB14455
Customer #: 1000405

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 217
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:45:00PM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.16	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.2	04	%	4,083	Infrared Drying

Sample: AB14456
Customer #: 1000406

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 218
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 10:55:00AM
Sample Comment: 102 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.19	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.5	04	%	4,083	Infrared Drying

Sample: AB14457
Customer #: 1000407

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 218
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 9:40:00AM
Sample Comment: 87 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.81	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	4,083	Infrared Drying

Sample: AB14459
Customer #: 1000409

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 219
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:55:00PM
Sample Comment: 42 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.04	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.0	04	%	4,083	Infrared Drying

Sample: AB14460
Customer #: 1000410

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 219
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 9:00:00AM
Sample Comment: 15 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.29	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.7	04	%	4,083	Infrared Drying

Sample: AB14462
Customer #: 1000412

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 5:04:00PM
Sample Comment: 164 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	2.45	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.1	04	%	4,083	Infrared Drying

Sample: AB14463
Customer #: 1000413

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 5:30:00PM
Sample Comment: 109 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.49	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.1	04	%	4,083	Infrared Drying

Sample: AB14465
Customer #: 1000415

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 222
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 5:10:00PM
Sample Comment: 10 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	2.52	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.5	04	%	4,083	Infrared Drying

Sample: AB14466
Customer #: 1000416

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 222
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/25/2010 5:30:00PM
Sample Comment: 27 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	2.52	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.4	04	%	4,083	Infrared Drying

Sample: AB14468
Customer #: 1000418

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 224
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:40:00AM
Sample Comment: 19 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.17	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.5	04	%	4,083	Infrared Drying

Sample: AB14469
Customer #: 1000419

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 224
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:00:00AM
Sample Comment: 23 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.30	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.9	04	%	4,083	Infrared Drying

Sample: AB14470
Customer #: 1000420

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 224
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 9:20:00AM
Sample Comment: 74 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.87	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.8	04	%	4,083	Infrared Drying

Sample: AB14472
Customer #: 1000422

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 223
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:10:00PM
Sample Comment: 4 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.23	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	1.1	04	%	4,083	Infrared Drying

Sample: AB14473
Customer #: 1000423

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 223
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:40:00PM
Sample Comment: 28 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.28	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	2.2	04	%	4,083	Infrared Drying

Sample: AB14474
Customer #: 1000424

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 223
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 12:10:00PM
Sample Comment: DUIS
Sample container broken in transit to contract lab. Sample not analyzed.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Sample Cancelled	Sample Cancelled	N/A				NA

Sample: AB14475
Customer #: 1000425

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 225
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 10:50:00AM
Sample Comment: 60 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.52	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.4	04	%	4,083	Infrared Drying

Sample: AB14476
Customer #: 1000426

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 225
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 11:20:00AM
Sample Comment: 8 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	2.27	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.6	04	%	4,083	Infrared Drying

Sample: AB14477

Customer #: 1000427

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 225
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 10:20:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.48	04	mg/Kg	3,996	Contract Lab Dep
Percent Moisture	Percent Moisture	0.7	04	%	4,083	Infrared Drying

Sample: AB14478

Customer #: 1000429

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 223
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 1:22:00PM
Sample Comment: 44 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	23500000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	28700000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	854000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	986		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	51300		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.47	04	mg/Kg	3,996	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	415		mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	2.82		%	3,422	Infrared Drying
pH	pH	7.42		pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.9		%	3,993	Contract Lab Dep

Sample: AB14479

Customer #: 1000430

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 225
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/26/2010 10:20:00AM
Sample Comment: 32 SUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	10800000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Iron	14600000	09	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	433000		ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	409	05	ug/kg	3,886	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	31000		ug/kg	3,886	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.36	04	mg/Kg	3,996	Contract Lab Dep

Sample: **AB14479**

Customer #: 1000430

Facility ID:
County: (Multiple)
Collector: KEN HANNON
Sample Comment: 32 SUIS

Site: Tannery Sludge Farm Fields
Sample Reference ID: 225
Affiliation: ESP
Collect Date: 1/26/2010 10:20:00AM

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Oxidation Reduction Potential	Oxidation Reduction Potential	397		mV	3,991	Contract Lab Dep
Percent Moisture	Percent Moisture	1.61		%	3,422	Infrared Drying
pH	pH	7.66		pH Units	3,992	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.3		%	3,993	Contract Lab Dep

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
23 Contract Lab specific qualifier - see sample comments
24 No result - matrix interference
ND Not detected at reported value

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

100211001

Missouri Department of Natural Resources
Environmental Services Program

Order ID 100203001 **Program, Contact:** HWP Julieann Warren

Report Date: 02/19/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB14350
Customer #: 1000361

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 218
Collector: PAM HACKLER **Affiliation:** ESP **Collect Date:** 1/26/2010 10:57:00AM
Sample Comment: SU 102.02. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.71	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	0.7	04	%		Infrared Drying

Sample: AB14351
Customer #: 1000362

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 218
Collector: PAM HACKLER **Affiliation:** ESP **Collect Date:** 1/26/2010 9:46:00AM
Sample Comment: SU 87.04. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.00	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	0.9	04	%		Infrared Drying

Sample: AB14352
Customer #: 1000363

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: PAM HACKLER **Affiliation:** ESP **Collect Date:** 1/26/2010 12:00:00PM
Sample Comment: SU 59.09. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.76	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	2.7	04	%		Infrared Drying

Sample: AB14353

Customer #: 1000364

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 11:50:00AM
Sample Comment: SU 59.07. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	4.88	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	3.1	04	%		Infrared Drying

Sample: AB14354

Customer #: 1000365

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 202
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 1:10:00PM
Sample Comment: SU 79.03. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	2.08	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	0.5	04	%		Infrared Drying

Sample: AB14355

Customer #: 1000366

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 218
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 1:30:00PM
Sample Comment: SU 146.08. Expedited 48 hour turnaround.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	1.59	04	mg/Kg		Contract Lab Dep
Percent Moisture	Percent Moisture	12.5	04	%		Infrared Drying

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chr- Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Missouri Department of Natural Resources
Environmental Services Program

Order ID 100202002 **Program, Contact:** HWP Julieann Warren

Report Date: 03/09/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB14289
Customer #: 1000300

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/27/2010 2:35:00PM
Sample Comment: Y1. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	< 0.014	ND, 04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	2.6	04	%	3,946	Infrared Drying

Sample: AB14290
Customer #: 1000301

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/27/2010 2:40:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.022	04, 05	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	0.4	04	%	3,946	Infrared Drying

Sample: AB14291
Customer #: 1000302

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/27/2010 2:49:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.019	04, 05	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	4.0	04	%	3,946	Infrared Drying

Sample: AB14292
Customer #: 1000303

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:57:00PM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.069	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	11.6	04	%	3,946	Infrared Drying

Sample: AB14293
Customer #: 1000304

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	< 0.014	ND, 04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	3.7	04	%	3,946	Infrared Drying

Sample: AB14294
Customer #: 1000305

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 305
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 10:26:00AM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.063	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	0.6	04	%	3,946	Infrared Drying

Sample: AB14295
Customer #: 1000306

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 305
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 10:37:00AM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.16	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	0.5	04	%	3,946	Infrared Drying

Sample: AB14296
Customer #: 1000307

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 305
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 10:46:00AM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.061	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	0.4	04	%	3,946	Infrared Drying

Sample: AB14297
Customer #: 1000308

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 305
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.066	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	0.3	04	%	3,946	Infrared Drying

Sample: AB14298
Customer #: 1000309

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 11:50:00AM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.32	04	mg/Kg	3,936	Contract Lab Dep
Percent Moisture	Percent Moisture	2.3	04	%	3,946	Infrared Drying

Sample: AB14299
Customer #: 1000310

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 12:02:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.035	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	1.2	04	%	3,947	Infrared Drying

Sample: AB14300
Customer #: 1000311

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 11:22:00AM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.025	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	0.6	04	%	3,947	Infrared Drying

Sample: AB14301
Customer #: 1000312

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 11:34:00AM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.29	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	0.8	04	%	3,947	Infrared Drying

Sample: AB14302
Customer #: 1000313

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.11	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	3,947	Infrared Drying

Sample: AB14303
Customer #: 1000314

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 9:30:00AM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.11	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	4.8	04	%	3,947	Infrared Drying

Sample: AB14304

Customer #: 1000315

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 9:10:00AM
Sample Comment: Y2. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.053	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	4.5	04	%	3,947	Infrared Drying

Sample: AB14305

Customer #: 1000316

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 9:00:00AM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.069	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	6.3	04	%	3,947	Infrared Drying

Sample: AB14306

Customer #: 1000317

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 9:20:00AM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.052	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	4.9	04	%	3,947	Infrared Drying

Sample: AB14307

Customer #: 1000318

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.068	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	4.9	04	%	3,947	Infrared Drying

Sample: AB14308
Customer #: 1000319

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 9:40:00AM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.12	04	mg/Kg	3,937	Contract Lab Dep
Percent Moisture	Percent Moisture	3.4	04	%	3,947	Infrared Drying

Sample: AB14309
Customer #: 1000320

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 9:50:00AM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.098	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	3.1	04	%	3,948	Infrared Drying

Sample: AB14310
Customer #: 1000321

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 10:00:00AM
Sample Comment: Y3. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.21	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	1.8	04	%	3,948	Infrared Drying

Sample: AB14311
Customer #: 1000322

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 10:10:00AM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.28	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	6.1	04	%	3,948	Infrared Drying

Sample: AB14312
Customer #: 1000323

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.22	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	3.6	04	%	3,948	Infrared Drying

Sample: AB14313
Customer #: 1000324

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 312
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 8:20:00AM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.081	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	1.9	04	%	3,948	Infrared Drying

Sample: AB14314
Customer #: 1000325

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 312
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 8:35:00AM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.094	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	2.1	04	%	3,948	Infrared Drying

Sample: AB14315
Customer #: 1000326

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 312
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 8:50:00AM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.086	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	5.4	04	%	3,948	Infrared Drying

Sample: AB14316
Customer #: 1000327

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 312
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.078	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	2.9	04	%	3,948	Infrared Drying

Sample: AB14317
Customer #: 1000328

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 3:25:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.48	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	5.1	04	%	3,948	Infrared Drying

Sample: AB14318
Customer #: 1000329

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 3:30:00PM
Sample Comment: Y2. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.12	04	mg/Kg	3,938	Contract Lab Dep
Percent Moisture	Percent Moisture	3.3	04	%	3,948	Infrared Drying

Sample: AB14319
Customer #: 1000330

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 3:35:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.76	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	3.9	04	%	3,949	Infrared Drying

Sample: AB14320
Customer #: 1000331

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/26/2010 3:45:00PM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.20	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	5.8	04	%	3,949	Infrared Drying

Sample: AB14321
Customer #: 1000333

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00AM
Sample Comment: DUIS. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.18	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	4.4	04	%	3,949	Infrared Drying

Sample: AB14322
Customer #: 1000334

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:35:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.059	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	1.4	04	%	3,949	Infrared Drying

Sample: AB14323
Customer #: 1000335

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:40:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.11	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	10.3	04	%	3,949	Infrared Drying

Sample: AB14324
Customer #: 1000336

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:49:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.076	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	6.8	04	%	3,949	Infrared Drying

Sample: AB14325
Customer #: 1000337

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:57:00PM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.076	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	6.5	04	%	3,949	Infrared Drying

Sample: AB14326
Customer #: 1000338

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.071	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	5.7	04	%	3,949	Infrared Drying

Sample: AB14327
Customer #: 1000339

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:30:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.057	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	2.0	04	%	3,949	Infrared Drying

Sample: AB14328
Customer #: 1000340

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 2:34:00PM
Sample Comment: Y1, duplicate #1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.054	04	mg/Kg	3,939	Contract Lab Dep
Percent Moisture	Percent Moisture	2.3	04	%	3,949	Infrared Drying

Sample: AB14329
Customer #: 1000341

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 2:38:00PM
Sample Comment: Y1, duplicate #2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.11	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	3.2	04	%	3,950	Infrared Drying

Sample: AB14330
Customer #: 1000342

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 2:40:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.061	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	1.8	04	%	3,950	Infrared Drying

Sample: AB14331
Customer #: 1000343

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 2:50:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.16	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	0.9	04	%	3,950	Infrared Drying

Sample: AB14332
Customer #: 1000344

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:00:00PM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.12	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	6.6	04	%	3,950	Infrared Drying

Sample: AB14333
Customer #: 1000345

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.087	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	2.4	04	%	3,950	Infrared Drying

Sample: AB14334
Customer #: 1000346

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:00:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.049	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	4.9	04	%	3,950	Infrared Drying

Sample: AB14335
Customer #: 1000347

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:10:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.042	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	3.4	04	%	3,950	Infrared Drying

Sample: AB14336
Customer #: 1000348

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 1/27/2010 3:20:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.058	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	4.9	04	%	3,950	Infrared Drying

Sample: AB14337
Customer #: 1000349

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 3:30:00PM
Sample Comment: Y4

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.036	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	2.9	04	%	3,950	Infrared Drying

Sample: AB14338
Customer #: 1000350

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.054	04	mg/Kg	3,940	Contract Lab Dep
Percent Moisture	Percent Moisture	3.9	04	%	3,950	Infrared Drying

Sample: AB14339
Customer #: 1000351

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 306
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 12:54:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.14	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	1.1	04	%	3,951	Infrared Drying

Sample: AB14340
Customer #: 1000352

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 306
Collector: PAM HACKLER
Affiliation: ESP
Collect Date: 1/27/2010 1:02:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.21	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	0.9	04	%	3,951	Infrared Drying

Sample: AB14341
Customer #: 1000353

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 306
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 1:10:00PM
Sample Comment: Y3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.22	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	5.8	04	%	3,951	Infrared Drying

Sample: AB14342
Customer #: 1000354

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 306
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/27/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.19	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	2.5	04	%	3,951	Infrared Drying

Sample: AB14343
Customer #: 1000355

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 4:10:00PM
Sample Comment: Y1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.098	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	1.6	04	%	3,951	Infrared Drying

Sample: AB14344

Customer #: 1000356

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 4:15:00PM
Sample Comment: Y2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.12	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	6.0	04	%	3,951	Infrared Drying

Sample: AB14345

Customer #: 1000357

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 4:25:00PM
Sample Comment: Y3. Run lab Dup on this sample.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.10	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	1.2	04	%	3,951	Infrared Drying

Sample: AB14346

Customer #: 1000358

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 4:47:00PM
Sample Comment: Y3, duplicate #2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.057	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	1.1	04	%	3,951	Infrared Drying

Sample: AB14347

Customer #: 1000359

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 4:50:00PM
Sample Comment: Y3, duplicate #2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.093	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	2.2	04	%	3,951	Infrared Drying

Sample: **AB14348**

Customer #: 1000360

Facility ID:
County: (Multiple)
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: SEAN COUNIHAN
Affiliation: ESP
Collect Date: 1/26/2010 12:00:00AM
Sample Comment: DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.12	04	mg/Kg	3,941	Contract Lab Dep
Percent Moisture	Percent Moisture	2.8	04	%	3,951	Infrared Drying

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Addendum

Missouri Department of Natural Resources
Environmental Services Program

Addendum

Reason: Field results added per Michael Stroh

Order ID 100129004 **Program, Contact:** HWP Julieann Warren

Report Date: 02/17/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB14142

Customer #: 1000501

Facility ID:
County: Buchanan
Site: Tannery Sludge Farm Fields
Sample Reference ID: Parcel 3383
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/26/2010 4:27:00PM
Sample Comment: Sample from well head Loc. 102. Applied Speciation bottle #B02367.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Total Recoverable	Chromium	<0.25	ND	ug/L	3,310	SW 846 6020
Field pH	Field pH	6.82		pH Units		EPA 150.1
Field Specific Conductivity	Field Specific Conductivity	483 uS/cm				SM 2510
Field Temperature	Field Temperature	12.7 C				EPA 170.1
Hexavalent Chromium by Contract Lab	Hexavalent Chromium by Contract Lab	0.269	04	ug/L	3,234	Contract Lab Dep

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

Missouri Department of Natural Resources
Environmental Services Program

Order ID 100129004 **Program, Contact:** HWP Julieann Warren

Report Date: 02/17/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB14142
Customer #: 1000501

Facility ID:
County: Buchanan
Site: Tannery Sludge Farm Fields
Sample Reference ID: Parcel 3383
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/26/2010 4:27:00PM
Sample Comment: Sample from well head Loc. 102. Applied Speciation bottle #B02367.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Total Recoverable	Chromium	<0.25	ND	ug/L	3,310	SW 846 6020
Hexavalent Chromium by Contract Lab	Hexavalent Chromium by Contract Lab	0.269	04	ug/L	3,234	Contract Lab Dep

Sample: AB14143
Customer #: 1000502

Facility ID:
County: Buchanan
Site: Tannery Sludge Farm Fields
Sample Reference ID: Parcel 3383
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/26/2010 4:35:00PM
Sample Comment: Field blank. Applied Speciation bottle #B02363.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Total Recoverable	Chromium	<0.25	ND	ug/L	3,310	SW 846 6020
Hexavalent Chromium by Contract Lab	Hexavalent Chromium by Contract Lab	<0.022	ND, 04	ug/L	3,234	Contract Lab Dep

Sample: AB14144
Customer #: 1000503

Facility ID:
County: Buchanan
Site: Tannery Sludge Farm Fields
Sample Reference ID: Parcel 3383
Collector: SEAN COUNIHAN **Affiliation:** ESP **Collect Date:** 1/26/2010 12:00:00AM
Sample Comment: Duplicate. Applied Speciation bottle #B02391.

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6020 Metals-Total Recoverable	Chromium	<0.25	ND	ug/L	3,310	SW 846 6020
Hexavalent Chromium by Contract Lab	Hexavalent Chromium by Contract Lab	0.263	04	ug/L	3,234	Contract Lab Dep

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
ND Not detected at reported value
23 Contract Lab specific qualifier - see sample comments

APPENDIX B

Field Notes

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

S. Tannery Sludge Farm Fields.
[illegible] Cunningham
Hilary Lakefield [illegible] Cloudy 16°F Wind Chill
Val Wilder light Flurries

17:04
Parcel 4480 Loc id 221 - All terraced land
SU 164
Sloping + low lying areas High Variability

17:35
Parcell 4487 Loc. id 221
SU. 150
Picked for uniformity

1730
Parcel 4482 Loc. ID 221
SU 109
Picked Became filled in Drainage Swale.
took pictures 4 total.

1/26/10 Tannery Sludge Farm Fields
0944 21° Wind Chill 90 @ 10 + 15 mph partly cloudy.
Parcel 18970 Residential Yard
Loc 319
Y1 @ 1001, Y2 @ 1013
Y3 @ 1010 Y4 1025

Parcel 18970 Loc ID 219
SU 15 because the corner was where sludge was piled before spreading. Resident said they were very good @ evenly spreading sludge. - corn field

Parcel 18971 Loc 320
Residential Yard
Y1 @ 1150 Y2 @ 1202
Y3 @ 1120 Y4 @ 1134

Parcel 18970 Loc ID 219
SU 55 was chosen because it is a flat area that is at bottom of two slopes
Started @ 1220 Soybean Field

SU 47 chosen because realtively flat w/ little terracing.
Started @ 1257

Parcel 5833 Loc id 202
SU 79 Started @ 1415
Sludge was dumped near this plot.

1/26/10 Tannery Sludge Farm Field
Parcel # ~~[illegible]~~ Lot id 202
Su. 59 @ 1518
Chosen for High Variability sloped, terraced & along a fence
Parcel 3383
Parcel # ~~[illegible]~~ Loc. 202
Su 29 @ 1541
Chosen because low variability & uniformity

Parcel 3383 Loc ~~202~~ smc 102
Ground Water Samples
pH meter @ 7pH reads 7.06
@ 4pH reads 4.1
Conductivity @ 1413us reads 1420us
ORP meter @ 200mV reads 226

Hydrant on @ 1620
First measurement @ 1623
Temp 11.3°C
pH = ~~[illegible]~~ smc 6.50
Cond 504us
ORP = 192mV
Second measurement @ 1626
Temp 12.7°C ORP 177mV
pH 6.82
Cond. 483

Sample taken @ 1627
Sample # 1000501
Applied speciation bottle # B02367
Field Blank taken 1635
Sample # 1000502
Applied speciation bottle # B02363
Duplicate taken sample # 1000503
Applied speciation bottle # B02391

1/27/10 Tannery Sludge Farm Fields
Mostly Cloudy 27°F Winds ENE @ 5-10

Parcel 6032 loc id 305 Residential yard
Y1 @ 1026 Y2 @ 1037 Y3 @ 1046

Parcel 6032 loc id 205
SU 71 picked because highly variable, where sludge was dumped.

Parcel 6032 loc id 205
SU 34 chosen for low variability solid corn field, on slight slope
Started @ 1100

Parcel 6632 Loc ID 205
SU 96 chosen because pasture land
uniform variability.
Started @ 1210

Parcel unknown at this time
Daughters Residence of 6632 11444 State E.
is Downwind from where Agency MO
Sludge was stock piled + also applied to bean
field - (behind house).
On property of 6632 & were granted
permission
Loc ID 306
y1 @ 1254 y2 @ 1302
y3 @ 1310

Parcel 3627 Loc ID 301
Residential yard only
Farm is a background not needed at this time
y1 @ 1435 y2 @ 1440 y3 @ 1449
y4 @ 1457

Jan 25 2010
Pam Hackler, Shelly Jackson
Ben Frissell, Michael, Paul

Loc ID 209 = Du
Parcel ID 9949
Grid 138 = Su half corn, ½ fallow pasture
1330 Hrs

144 Su
Val, Hillary, Paul
no turns, uniform, slight slope
red rusty material
109 Su
Michael, Pam, Shelly
low area in cornfield
lots of organic matter

camera x15 # B3
Su 138 photo 1 = Bags
photo 2↑
photo 3 - cornfield soil
4 - pasture soil

Loc ID 222 Pam, Ken, Ben
Parcel 4482
1658 hours

Su 41
Low level, terraced

Su 10
Tree, turn around point, low level

Su 27
high ground, least variable

1-26-2010
Parcel 4859
Loc ID 225 Field
325 yard & 326

Su 32
Pam, Ben, Shelly
split between corn and bean fields

SU 60
turning point in corner of field

SU 8
Homogenous, all in corn

Parcel 1676
Loc ID 223

SU 44 - As renumbered
Northwest east corner
very variable, corn, hay, fallow, edge trees

SU 28
mostly homogenous, corn

SU 4
Low land, corn, drainage

Parcel 6488
Loc ID Yard 313, Field 213

SU 9
1600 h, terraced, fairly homogenous, although close to reported storage area

SU 15
gently sloping, hay/pasture homogenous

SU 44
Varied, hay/pasture and row crop and turn in row crop field

1-27-2010
Pam, Ben, Shelly

Parcel 5180
Loc ID 312 - Residence
0800 h

Parcel 5180
LOC 212

SU 53
Terraced, hay field (or fallow)
0910 h
sludge accumulates

SU 16
hilly, hay field, dirt road bisects
0945

86 SU
hilltop, homogenous
1015 h

Parcel 8940
LOC 214

SU 53
heterogeneous, half of plot had
sludge applied, 1/2 did not

SU 23
Sloping, homogenous
not terraced

SU ~~37~~ 25
Low drainage area,
sludge applied

Parcel 2191
LOC ID 303 yard

LOC ID 203
SU 27
~~corner of field~~, turns
not row crop
edge of tree
next to corner of fence row
↑ one over

Prime Tanning Farm Fields Date: 1/26/10
FEPAB/NJ10TSFF

20° clear
Breezy

parcel: 21671
Loc: 218
SU: 87
SU chosen due to soy Bean field, low lying area next to Road

SU: 146
SU chosen due to pasture, uniform upland portion

SU: 102
SU chosen due to include buffered area in low and upland area, cow pasture

Parcel 1671: Loc ID: 217
SU 50: chosen as uniform upland, pasture grassy

SU ~~87~~ 103 ms: chosen as heterogeneous due to nearby buffered creeks, low lying areas and uplands. Heavily used by cows

Prime Tanning FF (cont) 1-26-10

Parcel 1671
Loc ID 218
SU: ~~102~~ 22 MS Chosen due to both uplands and low areas + because it is adjacent to a residential yard.

Parcel: 2247
Loc ID: 216
SU# 16: upland soybean field uniform

SU# 32: adjacent to gate that looks most likely to be where sludge was brought in. Soybean field

SU# 50: near field boundary next to treeline incl. buffered area, non-buffered, upland and low areas pasture land

Stopped for DAY

1-27-10 Prime Tanning Farm Fields
25° cloudy, slight wind

Parcel 2241
Loc ID 224
SU 23: Uniform upland in middle of field. Corn/soy

SU 74: U-shaped turnaround near treeline and small pond. Incl. buffered area. Corn/Soy

SU 19: Area adjacent to road incl. the main gate where sludge was likely to have been brought in
Camera B5 exp# 7, 8

Parcel 2517
Loc ID 215
SU: 110 Area adj. to road incl. access gate. Visible signs of sludge near gate @ surface. Pasture
Camera B5 exp #9, 10

SU 82: uniform area in middle of field. Pasture, dense grass, visible layer of sludge ~½" down ~ reddish.

Tannery Sludge Farm field (cont.)

1-27-10

Parcel 2517
Loc ID 215
SU: 55 Area near treeline and lake low elevation. Turnaround area. Visible sludge layer in a portion of SU, but not in buffered area. Camera BS exp. #11

Parcel 2517
Loc ID 204
SU: 99 Owner indicated this was an area where sludge was stockpiled. Near barn and gate, just SE of house.

SU: 42 Upland uniform area on slight N. slope. Dense grass pasture.

SU: 23 Area near treeline, gate and hay round storage. Probably incl. buffered + non-buffered portions.

Camera BS exp. # 12-17

Parcel 2517
Loc. ID 304 Res. YARD
4 yard units. Collected triplicate
IS in Y1
Camera BS exp. #18
MS

~~END OF DAY~~

1-27-10 (cont)

Parcel 2517 MS
Loc ID ~~304~~ 203
SU 18: uniform east sloping pasture no visible sludge, SU abuts edge of small pond.

END

APPLIED SPECIATION
AND CONSULTING, LLC

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

March 8, 2010

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102
(573) 522-9902

Dear Mr. Stroh,

Attached is the report associated with sixty-five (65) soil samples submitted for hexavalent chromium quantitation and conventionals (TOC, percent moisture, pH, and ORP) analyses on February 11, 2010. The samples were received on February 12, 2010 in sealed containers at ambient temperature. The submitted samples were extracted using EPA Method 3060A and then analyzed for hexavalent chromium via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). All conventionals analyses were performed using established methods as described in this report. Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102

March 8, 2010

1. Sample Reception

Sixty-five (65) soil samples were submitted in wide-mouth glass jars (not provided by Applied Speciation and Consulting) for hexavalent chromium quantitation and conventionals (TOC, percent moisture, pH, and ORP) analyses on February 11, 2010. The samples were received in acceptable condition on February 12, 2010 in sealed containers at ambient temperature.

In accordance with approved EPA methodology, Applied Speciation and Consulting (ASC) recommends that all soils submitted for hexavalent chromium analysis remain at a temperature of ≤6°C prior to preparation and analysis.

All samples were received in a laminar flow clean hood void of trace metals contamination and ultra-violet radiation. Upon reception, all samples were designated discrete sample identifiers and then stored in a secure, monitored refrigerator (maintained at a temperature of ≤4°C) until all preparatory and analytical procedures could be performed. Splits of each sample requesting TOC analysis were distributed to Amtest Inc.

It must be noted that the glass jar containing the sample identified as AB14474 shattered during transit to ASC. Consequently, no sample results could be provided for this particular sample. The client was contacted regarding this issue and instructed ASC to analyze the sample identified as AB14464 in place of the compromised sample.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantification by IC-ICP-DRC-MS Prior to analysis, all samples were extracted using EPA Method 3060A on either February 17th (Batches

C1 and C2) or February 18th (Batches C3 and C4). In summary, each sample was first spread into a thin layer onto a clean surface and a known mass of each sample was then weighed into a polypropylene centrifuge tube by taking approximately fifteen random subsamples of the original sample. A buffered alkaline extraction solution, $MgCl_2$, and a phosphate buffer solution were then applied to each sample. All vials were then heated at 90-95°C in a sonicating bath for a minimum of one (1) hour. The resulting extracts were cooled, filtered, and injected directly into sealed autosampler vials prior to analysis for hexavalent chromium.

pH and ORP Analyses Prior to the analyses, all samples submitted for pH and ORP measurements were prepared in accordance with EPA Method 9045D on February 23, 2010. In summary, a known mass of each sample was placed into a polypropylene centrifuge tube and an equivalent mass of reagent water was also added. The resulting suspensions were shaken for five (5) minutes, after which each was briefly centrifuged and filtered (0.45µm) into a new centrifuge vial. Each sample extract was then analyzed for pH and ORP as described herein.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform. All hexavalent chromium sample results have also been **dry-weight corrected** using the measured total solids (percent moisture) values.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All sample extracts for hexavalent chromium quantitation were analyzed via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by an alkaline (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted

through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

Total Solids (Percent Moisture) Analysis Approximately 1-2 grams of each sample was placed into a pre-weighed pan, and the combined mass of the sample and pan was recorded. All samples were then placed into a convection oven maintained at a temperature of 65-70°C. After drying for a minimum of eight (8) hours, all samples were briefly cooled and reweighed. The total solids percentage of each sample was calculated by dividing the weight of the dried sample by the weight of the original sample. All samples were prepared for total solids on either February 25, 2010 (Batches S1-S4) or on March 1, 2010 (Batch S5)

pH Analysis All sample extracts for pH measurement were analyzed in accordance with EPA Method 9045D on February 23, 2010.

ORP Analysis All sample extracts for ORP measurement were analyzed in accordance with ASTM D 1498-93 on February 23, 2010. All measured ORP values were corrected for the reference electrode in accordance with the guidance provided in EPA Method 3060A.

TOC Analysis All samples submitted for TOC measurements were analyzed via EPA Method 9060 on either February 23, 2010 (Batch T1) or on March 2, 2010 (Batch T2).

4. Analytical Issues

Although the overall analyses went well, significant issues were encountered during the applied hexavalent chromium extraction procedure, as described below:

The RPD associated with the matrix duplicate (MD) performed on the sample identified as AB14426 was above the established control limit of 25% for Batch C2 (25.8%). The concentrations of hexavalent chromium in the parent sample and MD are both significantly greater than ten times the reporting limit (RL). Consequently, all samples associated with this batch were re-extracted and the RPD associated with the MD performed on AB14426 was still elevated (20.3%). Since the re-extraction and re-analysis did not take place until after the method-specified holding time of thirty (30) days had expired, the original results associated with Batch C2 have been reported despite the elevated MD RPD. The fact that the MD RPD for AB14426 was still elevated upon re-extraction suggests this sample matrix may be heterogeneous.

Hexavalent Chromium Quantitation - Laboratory Control Samples Three laboratory control samples were extracted with each batch of samples to identify the extraction efficiency and capacity of the extraction procedure to induce conversion of trivalent

chromium to hexavalent chromium. The laboratory control samples spiked with an aqueous hexavalent chromium and a solid $PbCrO_4$ standard produced acceptable recoveries for each batch (ranging from 95.3% to 111.1%), indicating that the applied method effectively extracts and stabilizes the hexavalent chromium species. The third laboratory control sample spiked with an aqueous trivalent chromium standard solution resulted in a hexavalent chromium recovery of less than 1.0% for each of the sample batches. The quantity of hexavalent chromium detected in these laboratory control samples is near that present in the associated preparation blanks, which is attributed to trace levels of hexavalent chromium in the reagents used for the extraction procedure. The low recoveries for the trivalent chromium spikes demonstrate that the extraction procedure, under ideal conditions, induces minimal conversion of trivalent to hexavalent chromium.

Hexavalent Chromium Quantitation – Matrix Spike / Matrix Spike Duplicates (MS/MSDs) Similar to the laboratory control samples, three discrete sets of matrix spikes were extracted with each batch to identify the interaction of the sample matrix with trivalent and hexavalent chromium. The performance of the matrix spikes can assist in identifying chemical interferences associated with the sample matrix and the applied extraction procedure.

Hexavalent Chromium Quantitation – Cr(III) MS/MSDs The hexavalent chromium recoveries associated with each aqueous trivalent chromium MS and MSD were less than 3%. These low trivalent chromium matrix spike recoveries confirm that the extraction procedure induces minimal oxidation of trivalent chromium to hexavalent chromium in the spiked sample matrices.

The RPD associated with the MSD performed for each of the four sample batches was above the established control limit of 25% (484.7%, 153.8%, 98.7%, and 45.3% respectively). These elevated RPDs are attributable to the fact that a minimal amount of the trivalent chromium spikes was converted to hexavalent chromium during the applied extraction procedure, as expected, resulting in hexavalent chromium concentrations that represented an increase in Cr(VI) less than the ambient sample concentration. Since greater variability is expected as spike concentrations approach the ambient sample concentrations, the elevated RPDs are identified as an inherent limitation of any quantitative method and do not impact the validity of the reported results.

Hexavalent Chromium Quantitation – Aqueous Cr(VI) and Solid $PbCrO_4$ MS/MSDs For Batches C1-C3, the hexavalent chromium recoveries associated with the aqueous Cr(VI) matrix spikes were all less than 2.0%. The recoveries associated with the insoluble Cr(VI) matrix spikes for each of these batches were also biased low (ranging from 63.0-76.7%). As previously mentioned, the recoveries of both the aqueous and insoluble hexavalent chromium LCS were acceptable for each of these batches, demonstrating that the applied procedure both extracts and stabilizes Cr(VI) in solution. Since the low bias observed for these soluble and insoluble Cr(VI) matrix spikes may therefore be attributed to interference from the spiked sample matrices, no

further corrective action was deemed necessary. These MS/MSD results suggest that the spiked sample matrix associated with each of these sample batches strongly favor reduction of hexavalent chromium. For Batch C1 this is further supported by the measured pH and ORP values obtained for the sample identified as AB14407, which indicate a reductive sample matrix, as well as the high TOC value (4.5%) for this sample.

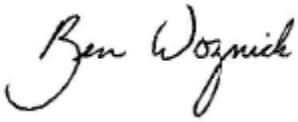
The RPDs associated with the aqueous Cr(VI) MS/MSD sets performed for Batches C1-C3 were above the established control limit of 25% (342.7%, 872.8%, and 206.4%, respectively). As previously mentioned, the spiked sample matrix for each of these batches exhibited strongly reducing conditions (spike recoveries less than 2.0%), resulting in Cr(VI) concentrations for the MS and MSD that were less than twice the ambient sample concentrations. Since greater variability is expected as spike concentrations approach the ambient sample concentrations, the elevated RPDs are identified as an inherent limitation of any quantitative method and do not impact the validity of the reported results.

The hexavalent chromium recoveries associated with the matrix spikes performed on the sample identified as AB14475 for Batch C4 were within acceptance limits for both the aqueous and insoluble hexavalent chromium matrix spikes. These acceptable recoveries suggest that the applied method effectively extracts and stabilizes hexavalent chromium in this particular sample matrix.

The estimated method detection limit (eMDL) for hexavalent chromium for each batch of solids is generated using the standard deviation of the associated preparation blanks, in accordance with Applied Speciation and Consulting's SOP.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,



Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
AB14404	C1, S1, T1	2/17/2010 22:09	0.607	96.1	4.4	449	6.28
AB14405	C1, S1, T1	2/17/2010 22:15	0.418	96.4	4.1	433	6.85
AB14406	C1, S1, T1	2/17/2010 22:22	0.666	96.5	4.9	465	7.86
AB14407	C1, S1, T1	2/17/2010 22:40	1.05	93.8	4.5	477	5.90
AB14408	C1, S1, T1	2/17/2010 23:30	0.657	99.2	0.81	351	7.87
AB14409	C1, S1, T2	2/17/2010 23:37	0.225	98.5	0.47	352	7.87
AB14410	C1, S1, T1	2/17/2010 23:55	0.605	96.3	4.5	469	6.61
AB14411	C1, S1, T1	2/18/2010 0:08	0.833	96.2	5.5	407	6.62
AB14412	C1, S1, T1	2/18/2010 0:20	1.61	96.3	5.4	487	6.78
AB14413	C1, S1, T2	2/18/2010 11:08	0.069	98.7	4.4	420	6.45
AB14414	C1, S1, T2	2/18/2010 0:45	0.692	96.9	5.1	422	6.81
AB14415	C1, S1, T2	2/18/2010 0:52	0.793	97.5	6.4	468	5.91
AB14416	C1, S1, T2	2/18/2010 1:17	1.83	91.8	6.3	444	7.59
AB14417	C1, S1, T2	2/18/2010 1:23	1.11	97.1	1.3	475	6.34
AB14418	C1, S1, T2	2/18/2010 1:29	3.40	97.9	2.1	434	7.25
AB14419	C1, S1, T2	2/18/2010 1:35	3.29	98.3	2.2	422	7.38
AB14420	C1, S1, T1	2/18/2010 1:42	0.269	94.5	NR	NR	NR
AB14421	C1, S1, T1	2/18/2010 1:48	1.13	98.2	NR	NR	NR
AB14423	C1, S1, T1	2/18/2010 10:55	0.386	95.7	NR	NR	NR
AB14424	C1, S1, T1	2/18/2010 11:01	0.278	98.2	NR	NR	NR

dw = dry weight
* Times reported in CST
** ORP measurements corrected for reference electrode as specified in EPA Method 3060A
NR = Not requested
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
AB14426	C2, S2	2/18/2010 12:10	0.406	97.7	NR	NR	NR
AB14427	C2, S2	2/18/2010 13:13	0.462	97.0	NR	NR	NR
AB14429	C2, S2	2/18/2010 13:19	1.27	98.8	NR	NR	NR
AB14430	C2, S2	2/18/2010 13:25	0.624	98.8	NR	NR	NR
AB14431	C2, S2	2/18/2010 13:31	0.626	97.5	NR	NR	NR
AB14432	C2, S2	2/18/2010 13:38	0.694	99.2	NR	NR	NR
AB14433	C2, S5	2/18/2010 13:56	1.56	98.8	NR	NR	NR
AB14435	C2, S2	2/18/2010 14:03	0.242	98.6	NR	NR	NR
AB14436	C2, S2	2/18/2010 14:09	0.803	98.6	NR	NR	NR
AB14438	C2, S2	2/18/2010 14:15	0.468	97.2	NR	NR	NR
AB14439	C2, S2	2/18/2010 14:21	1.10	98.0	NR	NR	NR
AB14440	C2, S2	2/18/2010 14:28	0.490	97.0	NR	NR	NR
AB14441	C2, S2	2/18/2010 14:34	1.54	98.4	NR	NR	NR
AB14442	C2, S2	2/18/2010 15:11	0.760	96.8	NR	NR	NR
AB14443	C2, S2	2/18/2010 15:18	0.703	96.8	NR	NR	NR
AB14444	C2, S2	2/18/2010 15:24	0.387	97.2	NR	NR	NR
AB14445	C2, S2	2/18/2010 15:30	0.240	98.6	NR	NR	NR
AB14446	C2, S2	2/18/2010 15:36	0.359	97.3	NR	NR	NR
AB14447	C2, S2	2/18/2010 15:43	0.728	97.5	NR	NR	NR
AB14448	C2, S2	2/18/2010 15:49	1.05	97.2	NR	NR	NR

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Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
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Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
AB14449	C3, S3	2/22/2010 15:45	1.73	97.4	NR	NR	NR
AB14450	C3, S3	2/22/2010 16:47	1.14	98.3	NR	NR	NR
AB14451	C3, S3	2/22/2010 16:53	1.58	96.8	NR	NR	NR
AB14453	C3, S3	2/22/2010 17:31	1.55	96.9	NR	NR	NR
AB14454	C3, S3	2/22/2010 17:37	0.821	98.5	NR	NR	NR
AB14455	C3, S3	2/22/2010 17:43	1.16	97.8	NR	NR	NR
AB14456	C3, S3	2/22/2010 17:50	1.19	98.5	NR	NR	NR
AB14457	C3, S3	2/22/2010 17:56	0.812	98.6	NR	NR	NR
AB14459	C3, S3	2/22/2010 18:02	1.04	99.0	NR	NR	NR
AB14460	C3, S3	2/22/2010 18:08	1.29	99.3	NR	NR	NR
AB14462	C3, S3	2/22/2010 18:15	2.45	97.9	NR	NR	NR
AB14463	C3, S3	2/22/2010 18:21	0.487	97.9	NR	NR	NR
AB14464	C3, S3	2/22/2010 19:23	1.64	98.2	NR	NR	NR
AB14465	C3, S3	2/22/2010 18:27	2.52	99.5	NR	NR	NR
AB14466	C3, S3	2/22/2010 18:46	2.52	99.6	NR	NR	NR
AB14468	C3, S3	2/22/2010 18:52	0.166	99.5	NR	NR	NR
AB14469	C3, S3	2/22/2010 18:58	0.296	99.1	NR	NR	NR
AB14470	C3, S3	2/22/2010 19:05	0.872	98.2	NR	NR	NR
AB14472	C3, S3	2/22/2010 19:11	0.234	98.9	NR	NR	NR
AB14473	C3, S3	2/22/2010 19:17	0.279	97.8	NR	NR	NR

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Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
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Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
AB14475	C4, S4	2/22/2010 20:26	0.518	99.6	NR	NR	NR
AB14476	C4, S4	2/22/2010 21:28	2.27	99.4	NR	NR	NR
AB14477	C4, S4	2/22/2010 21:35	1.48	99.3	NR	NR	NR
AB14478	C4, S4, T2	2/22/2010 21:41	0.474	98.9	2.9	415	7.42
AB14479	C4, S4, T2	2/22/2010 21:47	1.36	99.6	1.3	397	7.66

dw = dry weight
* Times reported in CST
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Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
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Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte	Units	Batch	PBS1	PBS2	PBS3	PBS4	Mean	StdDev	eMDL	RL
TOC	%	T1	< 0.05	-	-	-	-	-	-	0.05
TOC	%	T2	< 0.05	-	-	-	-	-	-	0.05
Cr(VI)	mg/kg (dw)	C1	0.020	0.021	0.022	0.025	0.022	0.002	0.006	0.025
Cr(VI)	mg/kg (dw)	C2	0.021	0.017	0.016	0.014	0.017	0.003	0.008	0.025
Cr(VI)	mg/kg (dw)	C3	0.021	0.021	0.022	0.023	0.022	0.001	0.002	0.025
Cr(VI)	mg/kg (dw)	C4	0.031	0.024	0.021	0.019	0.024	0.005	0.015	0.025

eMDL = Estimated Method Detection Limit
RL = Reporting Limit

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
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Date: March 8, 2010
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Applied Speciation and Consulting, LLC

Quality Control Summary - Laboratory Control Samples

Analyte	Units	Batch	LCS	True Value	Result	Recovery
TOC	%	T1	LCS	1.3	1.3	100
TOC	%	T2	LCS	1.3	1.4	108
Cr(III)	mg/kg (dw)	C1	LCS	5.000	0.019	0.4
Cr(VI)	mg/kg (dw)	C1	LCS	5.000	5.557	111.1
$PbCrO_4$	mg/kg (dw)	C1	LCS	6692	7332	109.6
Cr(III)	mg/kg (dw)	C2	LCS	5.000	0.021	0.4
Cr(VI)	mg/kg (dw)	C2	LCS	5.000	4.986	99.7
$PbCrO_4$	mg/kg (dw)	C2	LCS	6628	6317	95.3
Cr(III)	mg/kg (dw)	C3	LCS	5.000	0.027	0.5
Cr(VI)	mg/kg (dw)	C3	LCS	5.000	5.474	109.5
$PbCrO_4$	mg/kg (dw)	C3	LCS	6789	7005	103.2
Cr(III)	mg/kg (dw)	C4	LCS	5.000	0.033	0.7
Cr(VI)	mg/kg (dw)	C4	LCS	5.000	5.445	108.9
$PbCrO_4$	mg/kg (dw)	C4	LCS	6049	6343	104.9

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
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Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicate

Analyte	Units	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
TOC	%	T1	AB14410	4.5	4.3	4.4	4.5
TOC	%	T2	AB14419	2.2	2.2	2.2	0.0
% Solids	%	S1	AB14404	96.05	96.10	96.08	0.1
% Solids	%	S2	AB14426	97.67	97.75	97.71	0.1
% Solids	%	S3	AB14449	97.45	97.55	97.50	0.1
% Solids	%	S4	AB14475	99.55	99.51	99.53	0.0
% Solids	%	S5	AB14433	98.82	98.82	98.82	0.0
Cr(VI)	mg/kg (dw)	C1	AB14407	1.051	0.942	0.997	11.0
Cr(VI)	mg/kg (dw)	C1	AB14410	0.605	0.750	0.677	21.4
Cr(VI)	mg/kg (dw)	C1	AB14411	0.833	0.788	0.811	5.6
Cr(VI)	mg/kg (dw)	C1	AB14412	1.613	1.620	1.617	0.4
Cr(VI)	mg/kg (dw)	C1	AB14413	0.069	0.080	0.075	15.0
Cr(VI)	mg/kg (dw)	C1	AB14415	0.793	0.775	0.784	2.3
Cr(VI)	mg/kg (dw)	C2	AB14426	0.406	0.526	0.466	25.8*
Cr(VI)	mg/kg (dw)	C3	AB14449	1.729	1.408	1.568	20.5
Cr(VI)	mg/kg (dw)	C4	AB14475	0.518	0.434	0.476	17.6

NC = Value was not calculated due to one or more concentrations below the eMDL
* The RPD is above the established control limit of 25%; please see narrative.

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	C1	AB14407	5.247	1.078	1.5	5.253	0.963	-0.6	484.7**
Cr(VI)	mg/kg (dw)	C1	AB14407	5.310	0.758	-4.5*	5.319	1.060	1.2*	342.7**
$PbCrO_4$	mg/kg (dw)	C1	AB14407	7770	5962	76.7	7752	5644	72.8*	5.3
Cr(III)	mg/kg (dw)	C2	AB14426	5.052	0.464	0.0	5.150	0.451	-0.3	153.8**
Cr(VI)	mg/kg (dw)	C2	AB14426	5.064	0.427	-0.8*	5.068	0.528	1.2*	872.8**
$PbCrO_4$	mg/kg (dw)	C2	AB14426	6915	4630	66.9*	6961	4666	67.0*	0.1
Cr(III)	mg/kg (dw)	C3	AB14449	4.909	1.709	2.9	4.971	1.617	1.0	98.7**
Cr(VI)	mg/kg (dw)	C3	AB14449	5.151	1.153	-8.1*	5.133	1.575	0.1*	206.4**
$PbCrO_4$	mg/kg (dw)	C3	AB14449	5866	3694	63.0*	6003	3832	63.8*	1.3
Cr(III)	mg/kg (dw)	C4	AB14475	4.934	0.503	0.6	4.996	0.520	0.9	45.3**
Cr(VI)	mg/kg (dw)	C4	AB14475	4.838	5.336	100.5	4.953	5.520	101.8	1.4
$PbCrO_4$	mg/kg (dw)	C4	AB14475	6088	6104	100.3	6391	6436	100.7	0.4

* The recovery is below the established control limit of 75%; please see narrative.
** The RPD is above the established control limit of 25%; please see narrative.
NC = Value was not calculated due to one or more concentrations below the eMDL

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.079	158.8
0.050	0.072	143.1
0.050	0.082	163.6
0.050	0.073	146.2
0.500	0.550	110.0
5.000	5.174	103.5
50.00	49.98	100.0
0.050	0.057	114.7
0.050	0.056	112.0
0.050	0.060	120.6
0.050	0.064	127.8
0.500	0.499	99.7
5.000	5.055	101.1
25.00	24.98	99.9
0.050	0.047	93.7
0.050	0.050	100.9
0.050	0.041	81.4
0.050	0.043	85.8
0.500	0.484	96.7
5.000	4.891	97.8
25.00	23.51	94.0

All results are reported in µg/L

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	5.585	111.7
5.000	5.470	109.4
5.000	5.353	107.1
5.000	5.516	110.3
5.000	5.358	107.2
5.000	5.072	101.4
5.000	4.978	99.6
5.000	4.932	98.6
5.000	4.861	97.2
5.000	4.888	97.8
5.000	4.882	97.6
5.000	4.815	96.3
5.000	5.348	107.0
5.000	5.274	105.5
5.000	5.229	104.6
5.000	5.338	106.8
5.000	5.418	108.4
5.000	5.485	109.7
5.000	5.444	108.9
5.000	5.437	108.7

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
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Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
4.000	3.795	94.9
200.0	218.7	109.4
202.0	214.0	105.9
10.00	12.09	120.9
5.000	5.495	109.9
5.000	5.107	102.1
100.0	95.38	95.4
5.000	4.932	98.6
5.000	4.706	94.1
20.00	20.30	101.5
5.000	5.029	100.6
100.0	107.2	107.2
5.000	5.369	107.4
5.000	5.557	111.1
5.000	4.986	99.7
5.000	5.474	109.5
5.000	5.445	108.9
5.000	4.546	90.9

Second source standard = Cr(VI) Blank Spike (from 3060A Extraction)
All results are reported in mg/kg

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 8, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
3.647	4.009	6.202	63.7	4.061	6.469	69.5	8.7
2.961	221.2	257.4	115.0	209.2	216.7	102.1	11.9
2.853	150.2	167.7	109.8	226.2	243.7	106.4	3.1
0.118	43.67	44.23	101.0	54.70	53.27	97.2	3.9
0.077	4.976	3.343	65.6	5.124	3.790	72.5	9.9
126.8	867.7	947.6	94.6	765.2	834.1	92.4	2.3
0.187	4.046	3.095	71.9	3.775	2.961	73.5	2.2
0.160	4.017	4.214	100.9	4.078	4.038	95.1	5.9
0.080	3.906	3.657	91.6	3.959	3.600	88.9	2.9
0.101	5.052	3.646	70.2	4.694	3.300	68.2	2.9
0.224	4.910	2.551	47.4	4.893	2.361	43.7	8.2
0.342	4.885	3.534	65.4	4.820	3.424	63.9	2.2
< 0.014 U	5.243	< 0.014 U	0.0	5.147	0.039	0.8	200.0
1.816	20.46	6.685	23.8	20.39	5.832	19.7	18.8
0.088	5.064	3.253	62.5	5.134	3.254	61.7	1.3
0.997	5.310	0.758	-4.5	5.319	1.060	1.2	342.7
0.466	5.064	0.427	-0.8	5.068	0.528	1.2	872.8
0.184	5.007	4.098	78.1	4.779	4.272	85.5	9.0
1.568	5.151	1.153	-8.1	5.133	1.575	0.1	206.4
0.476	4.838	5.336	100.5	4.953	5.520	101.8	1.4

All results are reported in mg/kg

APPLIED SPECIATION
AND CONSULTING, LLC

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Tel: (425) 483-3300 Fax: (425) 483-9818
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March 4, 2010

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102
(573) 522-9902

Dear Mr. Stroh,

Attached is the report associated with sixty (60) soil samples submitted for hexavalent chromium quantitation on February 3, 2010. The samples were received on February 4, 2010 in sealed coolers at 1.7°C and 2.9°C, respectively. The submitted samples were extracted using EPA Method 3060A and then analyzed for hexavalent chromium via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102

March 4, 2010

1. Sample Reception

Sixty (60) soil samples were submitted in wide-mouth glass jars (not provided by Applied Speciation and Consulting) for hexavalent chromium quantitation on February 3, 2010. The samples were received in acceptable condition on February 4, 2010 in sealed coolers at 1.7°C and 2.9°C, respectively.

All samples were received in a laminar flow clean hood void of trace metals contamination and ultra-violet radiation. Upon reception, all samples were designated discrete sample identifiers and then stored in a secure, monitored refrigerator (maintained at a temperature of $\leq 4^{o}C$) until all preparatory and analytical procedures could be performed.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantification by IC-ICP-DRC-MS Prior to analysis, all samples were extracted using EPA Method 3060A on February 8th (Batch 1), February 16th (Batch 2), and February 9th (Batch 3). In summary, each sample was first spread into a thin layer onto a clean surface and a known mass of each sample was then weighed into a polypropylene centrifuge tube by taking approximately fifteen random subsamples of the original sample. A buffered alkaline extraction solution, $MgCl_2$, and a phosphate buffer solution were then applied to each sample. All vials were then heated at 90-95°C in a sonicating bath for a minimum of one (1) hour. The resulting extracts were cooled, filtered, and injected directly into sealed autosampler vials prior to analysis for hexavalent chromium.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform. All sample results have also been **dry-weight corrected** using the measured total solids (percent moisture) values.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All sample extracts for hexavalent chromium quantitation were analyzed via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by an alkaline (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

Total Solids Analysis Approximately 1-2 grams of each sample was placed into a pre-weighed pan, and the combined mass of the sample and pan was recorded. All samples were then placed into a convection oven maintained at a temperature of 65-70°C. After drying for a minimum of eight (8) hours, all samples were briefly cooled and reweighed. The total solids percentage of each sample was calculated by dividing the weight of the dried sample by the weight of the original sample.

4. Analytical Issues

Although the overall analyses went well, significant issues were encountered during the applied extraction procedure, as described below:

The RPD associated with the matrix duplicate (MD) performed on the sample identified as AB14310 was above the established control limit of 25% for batch 2 (28.7%). The concentrations of hexavalent chromium in the parent sample and MD are both less than ten times the reporting limit (RL), with the absolute difference between the two values being approximately twice the RL. Since greater variability is expected as sample concentrations approach the RL, the elevated RPD is identified as an inherent limitation of any quantitative method and does not impact the validity of the reported results.

It must be noted that although the client requested an additional matrix duplicate (MD) be performed on the sample identified as AB14321, this duplicate set was mistakenly not included in the digestion batch associated with this sample, *i.e.* batch 2. Batch 2 did include three other MD sets, however, so the variability associated with the extractions and analyses are demonstrated via these MDs. By the time Applied Speciation and Consulting (ASC) was able to re-extract AB14321 with the additional MD set that was requested, the sample had exceeded the recommended holding time of thirty (30) days specified in EPA Method 3060A; rather than report data generated outside the holding time, ASC has reported the initial result obtained for this sample.

Hexavalent Chromium Quantitation - Laboratory Control Samples Three laboratory control samples were extracted with each batch of samples to identify the extraction efficiency and capacity of the extraction procedure to induce conversion of trivalent chromium to hexavalent chromium. The laboratory control samples spiked with an aqueous hexavalent chromium and a solid $PbCrO_4$ standard produced acceptable recoveries for each batch (ranging from 93.4% to 107.4%), indicating that the applied method effectively extracts and stabilizes the hexavalent chromium species. The third laboratory control sample spiked with an aqueous trivalent chromium standard solution resulted in a hexavalent chromium recovery of less than 1.0% for each of the sample batches. The quantity of hexavalent chromium detected in these laboratory control samples is near that present in the associated preparation blanks, which is attributed to trace levels of hexavalent chromium in the reagents used for the extraction procedure. The low recoveries for the trivalent chromium spikes demonstrate that the extraction procedure, under ideal conditions, induces minimal conversion of trivalent to hexavalent chromium.

Hexavalent Chromium Quantitation – Matrix Spike / Matrix Spike Duplicates (MS/MSDs) Similar to the laboratory control samples, three discrete sets of matrix spikes were extracted with each batch to identify the interaction of the sample matrix with trivalent and hexavalent chromium. The performance of the matrix spikes can assist in identifying chemical interferences associated with the sample matrix and the applied extraction procedure.

Hexavalent Chromium Quantitation – Cr(III) MS/MSDs The hexavalent chromium recoveries associated with each aqueous trivalent chromium MS and MSD were less than 3%. These low trivalent chromium matrix spike recoveries confirm that the

extraction procedure induces minimal oxidation of trivalent chromium to hexavalent chromium in the spiked sample matrices.

The RPD associated with the MSD performed for each of the three sample batches was above the established control limit of 25% (71.4%, 93.1%, and 87.3%, respectively). These elevated RPDs are attributable to the fact that a minimal amount of the trivalent chromium spikes was converted to hexavalent chromium during the applied extraction procedure, as expected, resulting in hexavalent chromium concentrations that either were either less than ten times the RL (as is the case for batch 1) or represented an increase in Cr(VI) that was less than two times the ambient sample concentration (as is the case for batches 2 and 3). Since greater variability is expected as sample concentrations approach the RL and as spike concentrations approach the ambient sample concentrations, the elevated RPDs are identified as an inherent limitation of any quantitative method and do not impact the validity of the reported results.

Hexavalent Chromium Quantitation – Aqueous Cr(VI) and Solid $PbCrO_4$ MS/MSDs
The hexavalent chromium recoveries associated with the matrix spikes performed on the sample identified as AB14310 for batch 2 were within acceptance limits for both the aqueous (78.1% and 85.5%) and insoluble (90.6% and 91.2%) hexavalent chromium matrix spikes. These acceptable recoveries suggest that the applied method effectively extracts and stabilizes hexavalent chromium in this particular sample matrix.

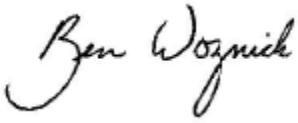
The hexavalent chromium recoveries associated with the insoluble Cr(VI) matrix spikes performed on the sample identified as AB14333 for batch 3 were within established control limits (85.0% and 81.6%), whereas the recoveries of the aqueous Cr(VI) matrix spikes performed on this sample were biased low (62.5% and 61.7%). As previously mentioned, the recoveries of both the aqueous and insoluble hexavalent chromium LCS were within acceptance limits for this batch (100.6% and 95.7%, respectively), demonstrating that the applied procedure both extracts and stabilizes Cr(VI) in solution. Since the low bias observed for these aqueous Cr(VI) matrix spikes may therefore be attributed to interference from the sample matrix, no further corrective action was deemed necessary. These MS/MSD results suggest that the matrix of AB14333 favors reduction of hexavalent chromium.

The hexavalent chromium recoveries associated with the matrix spikes performed on the sample identified as AB14289 for batch 1 were biased low for both the aqueous (0.0% and 0.8%) and the insoluble (67.4% and 68.4%) spikes. The recoveries of the aqueous and insoluble hexavalent chromium LCS were within acceptance limits for this batch (94.1% and 93.4%, respectively), again demonstrating that the method extracts and stabilizes Cr(VI) in solution. The low recoveries observed are therefore attributed to interference from the matrix of AB14289 and indicate that this sample strongly favors reduction of Cr(VI). Since all other quality control parameters associated with this batch were within control, no corrective action was deemed necessary.

The estimated method detection limit (eMDL) for hexavalent chromium for each batch of solids is generated using the standard deviation of the associated preparation blanks, in accordance with Applied Speciation and Consulting's SOP.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,



Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifier	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids
AB14289	1	2/8/2010 18:34	< 0.014 U	97.4
AB14290	1	2/8/2010 19:26	0.022 J	99.6
AB14291	1	2/8/2010 19:32	0.019 J	96.0
AB14292	1	2/8/2010 20:03	0.069	88.4
AB14293	1	2/8/2010 20:09	< 0.014 U	96.3
AB14294	1	2/8/2010 20:19	0.063	99.4
AB14295	1	2/8/2010 20:24	0.163	99.5
AB14296	1	2/8/2010 20:30	0.061	99.6
AB14297	1	2/8/2010 20:35	0.066	99.7
AB14298	1	2/8/2010 20:40	0.319	97.7
AB14299	1	2/8/2010 20:46	0.035	98.8
AB14300	1	2/8/2010 20:51	0.025	99.4
AB14301	1	2/8/2010 21:07	0.293	99.2
AB14302	1	2/8/2010 21:12	0.106	98.6
AB14303	1	2/8/2010 21:17	0.111	95.2
AB14304	1	2/8/2010 21:23	0.053	95.5
AB14305	1	2/8/2010 21:33	0.069	93.7
AB14306	1	2/8/2010 21:38	0.052	95.1
AB14307	1	2/8/2010 21:44	0.068	95.1
AB14308	1	2/8/2010 21:49	0.116	96.6

dw = dry weight
* Times reported in CST

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
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Sample Results

Sample ID	Batch Identifier	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids
AB14309	2	2/17/2010 14:14	0.098	96.9
AB14310	2	2/17/2010 14:20	0.211	98.2
AB14311	2	2/17/2010 15:23	0.277	93.9
AB14312	2	2/17/2010 16:00	0.217	96.4
AB14313	2	2/17/2010 16:07	0.081	98.1
AB14314	2	2/17/2010 16:13	0.094	97.9
AB14315	2	2/17/2010 16:19	0.086	94.6
AB14316	2	2/17/2010 16:25	0.078	97.1
AB14317	2	2/17/2010 16:32	0.484	94.9
AB14318	2	2/17/2010 16:38	0.118	96.7
AB14319	2	2/17/2010 16:50	0.763	96.1
AB14320	2	2/17/2010 16:57	0.195	94.2
AB14321	2	2/17/2010 17:15	0.180	95.6
AB14322	2	2/17/2010 17:22	0.059	98.6
AB14323	2	2/17/2010 17:28	0.108	89.7
AB14324	2	2/17/2010 17:34	0.076	93.2
AB14325	2	2/17/2010 17:40	0.076	93.5
AB14326	2	2/17/2010 17:47	0.071	94.3
AB14327	2	2/17/2010 17:59	0.057	98.0
AB14328	2	2/17/2010 18:05	0.054	97.7

dw = dry weight
* Times reported in CST

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifier	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids
AB14329	3	2/9/2010 20:14	0.106	96.8
AB14330	3	2/9/2010 20:19	0.061	98.2
AB14331	3	2/9/2010 20:24	0.156	99.1
AB14332	3	2/9/2010 20:40	0.117	93.4
AB14333	3	2/9/2010 20:45	0.087	97.6
AB14334	3	2/9/2010 21:27	0.049	95.1
AB14335	3	2/9/2010 21:43	0.042	96.6
AB14336	3	2/9/2010 21:49	0.058	95.1
AB14337	3	2/9/2010 21:54	0.036	97.1
AB14338	3	2/9/2010 21:59	0.054	96.1
AB14339	3	2/9/2010 22:04	0.139	98.9
AB14340	3	2/9/2010 22:10	0.206	99.1
AB14341	3	2/9/2010 22:15	0.220	94.2
AB14342	3	2/9/2010 22:20	0.192	97.5
AB14343	3	2/9/2010 22:26	0.098	98.4
AB14344	3	2/9/2010 22:31	0.115	94.0
AB14345	3	2/9/2010 22:47	0.100	98.8
AB14346	3	2/9/2010 22:57	0.057	98.9
AB14347	3	2/9/2010 23:03	0.093	97.8
AB14348	3	2/9/2010 23:08	0.116	97.2

dw = dry weight
* Times reported in CST

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte	Units	Batch	PBS1	PBS2	PBS3	PBS4	Mean	StdDev	eMDL	RL
Cr(VI)	mg/kg (dw)	1	0.010	0.020	0.012	0.016	0.015	0.004	0.013	0.025
Cr(VI)	mg/kg (dw)	2	0.021	0.023	0.022	0.020	0.022	0.001	0.004	0.025
Cr(VI)	mg/kg (dw)	3	0.015	0.019	0.015	0.015	0.016	0.002	0.006	0.025

eMDL = Estimated Method Detection Limit
RL = Reporting Limit

Quality Control Summary - Laboratory Control Samples

Analyte	Units	Batch	LCS	True Value	Result	Recovery
Cr(VI)	mg/kg (dw)	1	LCS	5.000	4.706	94.1
Cr(III)	mg/kg (dw)	1	LCS	5.000	0.020	0.4
$PbCrO_4$	mg/kg (dw)	1	LCS	6886	6430	93.4
Cr(VI)	mg/kg (dw)	2	LCS	5.000	5.369	107.4
Cr(III)	mg/kg (dw)	2	LCS	5.000	0.045	0.9
$PbCrO_4$	mg/kg (dw)	2	LCS	6532	6791	104.0
Cr(VI)	mg/kg (dw)	3	LCS	5.000	5.029	100.6
Cr(III)	mg/kg (dw)	3	LCS	5.000	0.023	0.5
$PbCrO_4$	mg/kg (dw)	3	LCS	6113	5851	95.7

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicate

Analyte	Units	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
% Solids	%	1	AB14289	97.38	97.55	97.46	0.2
% Solids	%	1	AB14307	95.13	95.19	95.16	0.1
Cr(VI)	mg/kg (dw)	1	AB14293	< 0.014 U	< 0.014 U	NC	NC
Cr(VI)	mg/kg (dw)	1	AB14304	0.053	0.043	0.048	20.4
Cr(VI)	mg/kg (dw)	1	AB14289	< 0.014 U	< 0.014 U	NC	NC
% Solids	%	2	AB14327	98.05	98.20	98.13	0.2
Cr(VI)	mg/kg (dw)	2	AB14318	0.118	0.144	0.131	20.2
Cr(VI)	mg/kg (dw)	2	AB14326	0.071	0.066	0.068	8.1
Cr(VI)	mg/kg (dw)	2	AB14310	0.211	0.158	0.184	28.7*
Cr(VI)	mg/kg (dw)	3	AB14345	0.100	0.081	0.090	21.6
% Solids	%	3	AB14347	97.84	97.87	97.86	0.0
Cr(VI)	mg/kg (dw)	3	AB14333	0.087	0.088	0.088	1.3

NC = Value was not calculated due to one or more concentrations below the eMDL
* The RPD is above the established control limit of 25%; please see narrative.

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	1	AB14289	5.192	0.032	0.6	5.234	0.015	0.3	71.4**
Cr(VI)	mg/kg (dw)	1	AB14289	5.243	< 0.014 U	0.0*	5.147	0.039	0.8*	NC
$PbCrO_4$	mg/kg (dw)	1	AB14289	6810	4589	67.4*	7578	5181	68.4*	1.4
Cr(III)	mg/kg (dw)	2	AB14310	4.923	0.212	0.6	5.058	0.262	1.5	93.1**
Cr(VI)	mg/kg (dw)	2	AB14310	5.007	4.098	78.1	4.779	4.272	85.5	9.0
$PbCrO_4$	mg/kg (dw)	2	AB14310	6683	6058	90.6	6280	5725	91.2	0.6
Cr(III)	mg/kg (dw)	3	AB14333	5.105	0.144	1.1	5.117	0.231	2.8	87.3**
Cr(VI)	mg/kg (dw)	3	AB14333	5.064	3.253	62.5*	5.134	3.254	61.7*	1.3
$PbCrO_4$	mg/kg (dw)	3	AB14333	7865	6689	85.0	7675	6265	81.6	4.1

* The recovery is below the established control limit of 75%; please see narrative.
** The RPD is above the established control limit of 25%; please see narrative.
NC = Value was not calculated due to one or more concentrations below the eMDL

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.053	106.7
0.050	0.056	112.3
0.050	0.067	134.5
0.050	0.052	103.6
0.500	0.501	100.2
5.000	4.929	98.6
25.00	24.24	96.9
0.050	0.057	114.7
0.050	0.056	112.0
0.050	0.060	120.6
0.050	0.064	127.8
0.500	0.499	99.7
5.000	5.055	101.1
25.00	24.98	99.9
0.050	0.068	135.5
0.050	0.066	132.2
0.050	0.060	119.9
0.050	0.069	137.7
0.500	0.537	107.4
5.000	4.935	98.7
25.00	24.89	99.6

All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	5.179	103.6
5.000	5.177	103.5
5.000	5.458	109.2
5.000	5.673	113.5
5.000	5.220	104.4
5.000	5.560	111.2
5.000	4.301	86.0
5.000	5.018	100.4
5.000	4.981	99.6
5.000	5.127	102.5
5.000	4.998	100.0
5.000	5.089	101.8
5.000	5.384	107.7
5.000	5.417	108.3
5.000	5.479	109.6
5.000	5.533	110.7
5.000	4.322	86.4
5.000	4.973	99.5
5.000	5.084	101.7
5.000	5.144	102.9

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
20.00	19.73	98.7
20.00	20.04	100.2
200.0	204.6	102.3
4.000	3.795	94.9
200.0	218.7	109.4
202.0	214.0	105.9
10.00	12.09	120.9
5.000	5.495	109.9
5.000	5.107	102.1
100.0	95.38	95.4
5.000	4.932	98.6
5.000	4.706	94.1
20.00	20.30	101.5
5.000	5.029	100.6
100.0	107.2	107.2
5.000	5.369	107.4
5.000	5.557	111.1
5.000	4.986	99.7

Second source standard = Cr(VI) Blank Spike (from 3060A Extraction)
All results are reported in mg/kg

Hexavalent Chromium Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: March 4, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
0.003	18.72	0.126	0.7	19.48	0.125	0.6	5.1
131.4	40.07	179.8	120.9	38.99	164.2	84.1	35.9
0.070	18.83	0.214	0.8	18.42	1.851	9.7	170.7
1.351	163.9	162.5	98.3	266.7	282.0	105.2	6.8
3.647	4.009	6.202	63.7	4.061	6.469	69.5	8.7
2.961	221.2	257.4	115.0	209.2	216.7	102.1	11.9
2.853	150.2	167.7	109.8	226.2	243.7	106.4	3.1
0.118	43.67	44.23	101.0	54.70	53.27	97.2	3.9
0.077	4.976	3.343	65.6	5.124	3.790	72.5	9.9
126.8	867.7	947.6	94.6	765.2	834.1	92.4	2.3
0.187	4.046	3.095	71.9	3.775	2.961	73.5	2.2
0.160	4.017	4.214	100.9	4.078	4.038	95.1	5.9
0.080	3.906	3.657	91.6	3.959	3.600	88.9	2.9
0.101	5.052	3.646	70.2	4.694	3.300	68.2	2.9
0.224	4.910	2.551	47.4	4.893	2.361	43.7	8.2
0.342	4.885	3.534	65.4	4.820	3.424	63.9	2.2
< 0.014 U	5.243	< 0.014 U	0.0	5.147	0.039	0.8	200.0
1.816	20.46	6.685	23.8	20.39	5.832	19.7	18.8
0.088	5.064	3.253	62.5	5.134	3.254	61.7	1.3
0.184	5.007	4.098	78.1	4.779	4.272	85.5	9.0

All results are reported in mg/kg

MDNR DEQ/HWP/SUPERFUND

XRF LOG BOOK

TANNERY SLUDGE FIELDS PROJECT

MISSOURI
NATURAL RESOURCES

Innov X
Serial Number 5444
Start Date: _____
End Date: _____

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mn ~~Mean~~	+/- ~~95% UCL~~
10/6/09	5444	01	205	Tan. Sludge Yard Pilot						
		02		~~RCRA~~ Blank - Short	-7	4	NO (Short)		-7	6
		03		BLANK	-11	3	yes			
		04		~~3212~~ 4315	35	5	yes		690	11
		05		2709	90	8	yes			
		06		3212	280	8	~~yes~~			
		07		RTC 408	545	14	yes			
		08		4315					567	10
		09		4315					734	12
		10		4315				10.7	692	11
		11		SU2.1					565	12
		12		|					548	11
		13		|					555	12
		14		|			1.3	557	12
		15		SU 2.2					636	12
		16		|					607	12
		17		— Error | occured — ~~unit came unplugged~~						
		18		|					

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5444	1	203							
		2		2709	89	8	Y			
		3		Blank	0	3	N			
		4		4315	37	5	Y			
		5		3212	272	8	Y			
		6		408	507	13	Y			
		7		5861	717	13	Y			
		8		218 146.03 (sludge visible)	345	13				
		9		"	378	13				
		10		"	354	14				
		11		"	367	12				
		12		218 146.08 (sludge visible)	405	14				
		13		"	445	14				
		14		" 100 sec	421	17				
		15		"	426	17				
		16		218 146.06	172	10				
		17		"	153	10				
		18		"	154	10				
		19		"	144	10				
		20		218 146.10	303	14				
		21		"	272	14				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

322 490
308 300
80

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5444	22		218 146.10	277	14				
		23		"	311	14				
		24		218 146.05	191	11				
		25		"	191	11				
		26		"	209	11				
		27		"	200	11				
		28		218 87.06	154	10				
		29		"	178	11				
		30		"	185	11				
		31		"	169	11				
		32		218 87.01	174	11				
		33		"	169	11				
		34		"	171	11				
		35		"	191	11				
		36		218 87.04	81	8				
		37		" 180sec	63	6				
		38		" ↓	56	6				
		39		" ↓	73	6				
		40		218 87.07	202	10				
		41		"	223	11				
		42		"	186	11				
		43		"	211	12				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	544	44		218 87.10	70	8				
		45		"	71	6				
		46		"	73	6				
		47		"	74	6				
		48		SRM 3212	247	7				
		49		SRM 3212	244	7				
		50		~~202~~ 218 102.02	202	7				
		51		"	207	7				
		52		"	217	8				
		53		USER ERROR (5-8/20 Wrong)	(153)					
		54		~~202~~ 218 102.02	197	7				
		55		USER ERROR						
		56		~~202~~ 218 102.03 #1	101	6				
		57		218 102.03 #2	109	7				
		58		218 102.03 #3	102	7				
		59		218 102.03 #4	97	6				
		60		STANDARDIZE						
		61		218 102.08 #1	241	9				
		62		218 102.08 #2	240	11				
		63		218 102.08 #3	224	10				
		64		218 102.08 #4	237	11				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-2010	5444	65		102.08 #5	179	10				
		66		" #6	215	11				
		67		" #7	204	11				
		68		#8	194	11				
		—		2 EXTRA RUNS BY PREV. OPERATOR						
		—		CHANGED RESULT COUNT						
		71		" #9	200	11				
		72		" #10	197	11				
		73		218 102.06 #1 (DATA PRECISION)	275	9				
		74		#2 (PREC)	261	11				
		75		#3 (PREC)	277	12				
		76		#4 (PREC)	278	12				
		77		#5 (PREC)	254	11				
		78		#6 (PREC)	273	11				
		79		#7 (PREC)	271	11				
		80		218 102.10 #1	197	8				
		81		218 102.10 #2	183	8				
		82		218 102.10 #3	192	8				
		83		218 102.10 #4	181	8				
		84		218 102.06 #2 (DATA)	289	12				
		85		218 102.06 #3	264	11				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-2010	5444	~~86~~		#4	294	12				
		~~87~~		#5	271	12				
		~~88~~		3212	246	7				
89 ← 10 seconds		~~89~~ 90		4315	33	4				
		91		2709	74	8				
		92		408	529	13				
		93		5861	723	12				
↓	↓	94		Blank	4	3				
2310	5444	1	201							
		2		Blank	-13	3	N			
		3		4315	27	4	Y			
		4		2709	86	8	Y			
		5		3212	270	7	Y			
		6		408	497	16	N Low			
		7		5861	701	16	N Low			
		8		5861 ~~408~~ reshoot } adj. control chart.	695 ~~514~~	~~16~~ 15	Y			
		9		408	514	16	Y			
		10		209 109.01	36	8				
		11		"	32	7				
↓	↓	12		"	37	8				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5944	13		209	109.01			37	8				
		14		209	109.01			37	6				
		15		209	109.08	#1		20	6				
		16		"	"	#2		35	6				
		17		"	"	#3	(ND)	17	6				
		18		"	"	#4		22	6				
		19		209	109.10	#1		24	6				
		20		"		#2		22	6				
		21		"		#3		30	6				
		22		"		#4		32	6				
		23		209	109.05	#1		35	6				
		24		"	"	#2		43	6				
		25		"	"	#3		41	6				
		26		"	"	#4		22	6				
		27		209	4315			42	4	Y (high)			
		28		"	109.06	#1		46	6				
		29		"	"	#2		38	7				
		30		"	"	#3		30	6				
		31		"	"	#4		27	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5444	32		209	144.03	#1	97	6				
		33		"	"	#2	87	7				
		34		"	"	#3	77	7				
		35		"	"	#4	96	6				
		36		209	144.06	#1	89	6				
		37		"	"	#2	58	6				
		38		"	"	#3	62	6				
		39		"	"	#4	69	8				
		40			4315		40	4				
		41		209	144.05	#1	49	6				
		42		"	"	#2	69	6				
		43		"	"	#3	55	7				
		44		"	"	#4	63	6				
		45				#5	63	7				
		46				#6	60	6				
		47				#7	70	6				
		48				#8	62	6				
		49				#9	63	6				
		50		209	144.10	#1	129	7				
		51		"	"	#2	161	7				
		52		"	"	#3	111	8				
		53		"	"	#4	104	7				

Precision Runs

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	544	54		209	144.07	#1	71	6				
		55		"	"	#2	66	6				
		56		"	"	#3	49	6				
		57		"	"	#4	72	6				
		58		209	138.01	#1	76	6				
		59		"	"	#2	60	6				
		60		"	"	#3	64	11				
		61		"	"	#4	64	7				
* fix sample site name		62			138.03	#1	57	6				
		63			"	#2	48	6				
		64			"	#3	60	6				
		65			"	#4	61	6				
		66	205	Standardization								
		67		4315			40	4	Y			
		68		209	138.05	#1	28	6				
		69		"	"	#2	45	6				
		70		"	"	#3	27	6				
		71		"	"	#4	48	6				
		72		209	138.06	#1	26	6	Failed to change loc ID			
		73		"	"	#2	37	6	"	"	"	"
		74		"	"	#3	46	6	"	"	"	"
		75		"	"	#4	23	6	"	"	"	"

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5444	76		209	138.09	#1	30	6	Failed to change loc			ID
		77		"	"	#2	27	6	"	"	"	
		78		"	"	#3	39	6	"	"	"	
		79		"	"	#4	33	6	"	"	"	
		80		212	16.01	#1	254	9	"	"	"	
		81		"	"	#2	243	12	"	"	"	
		82		"	"	#3	238	12	"	"	"	
		83		"	"	#4	215	12	"	"	"	
		84		212	16.02	#1	run aborted - had to change back to 180 secs					
		85		212	16.02	#1	214	9	Failed to change loc			ID
		86		"	"	#2	206	9				
		87		"	"	#3	219	9				
		88		"	"	#4	198	9				
		89		212	16.05	#1	207	9				
		90		"	"	#2	215	9				
		91		"	"	#3	213	9				
		92		"	"	#4	201	9				
		93		3212		#1	287	8	just outside acceptable range			
		94		3212		#2	279	7	Y			

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5444	95		212	16.06	#1	223	9				
		96		"	"	#2	192	9				
		97		"	"	#3	220	9				
		98		"	"	#4	185	9				
		99		212	16.09	#1	263	10				
		100				#2	259	10				
		101				#3	259	10				
		102				#4	270	10				
		103		212	86.02	#1	85	6				
		104		"	"	#2	89	6				
		105		"	"	#3	86	6				
		106		"	"	#4	83	6				
		107		212	86.03	#1	141	7				
		108		"	"	#2	134	7				
		109		"	"	#3	129	7				
		110		"	"	#4	101	6				
		111		212	86.05	#1	89	7				
		112		"		#2	89	7				
		113		"		#3	88	6				
		114		"		#4	81	6				
		115		212	86.03	#5	124	7	SD out of range			
		116		212	86.03	#6	122	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5444	117		212 86.03 #7	113	7				
		118		212 86.07 #1	212	9				
		119		" " #2	198	12				
		120	202	Standardization	Failed to change test info to standard					
		121		212 86.07 ~~#1~~ #3	178	8				
		122		" " #4	175	8				
		123		3212	264	7	Y			
		124		212 86.10 #1	209	8				
		125		" " #2	241	8				
		126		" " #3	227	8				
		127		" " #4	203	8				
		128		4108	537		Y			
		129		3212	277		Y			
		130		4315	39		Y			
		131		2709	95		Y			
		132		5861	720		Y			
		133		blank	-6		Y			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	1	202	Standardization						
		2		4315	37	4	~~N~~ Y			
		3		BLANK	-1	3	N			
		4		~~3212~~ 2709	90	8	Y			
		5		408	543	17	Y			
		6		5861	752	16	Y			
		7		3212	286	10	Y			
		8		212 53.03 #1	600	23	Y			
		9		" " #2	636	25	|			
		10		" " #3	647	~~28~~ 26	|			
		11		212 ~~53.04~~ " #4 617	~~647~~	~~26~~ 24	|			
		12		212 53.04 #1	111	9	Y			
		13		" " ~~#2~~	121	7	|			
		14		" " ~~#3~~	126	7	|			
		15		" " ~~#4~~	125	7	|			
		16		212 53.06 #1	165	8	5 runs passed			
		17		" " #2 165	~~170~~	~~11~~ 8				
		18		" " #3 170	~~156~~	~~11~~ 11				
		19		" " 53.06 #4 156	~~159~~	~~11~~ 11				
		20		212 ~~53.08~~ 53.06 #5 159	~~885~~	~~27~~ 11				
		21		" 53.08 ~~#7~~ #1 885	~~927~~	~~28~~ 27	passed			
		22		" " ~~#3~~ #2 927	~~862~~	~~28~~ 28				
		23		" " ~~#4~~ #3 862	~~901~~	~~27~~ 27				

data screwed up due to Michael's mind being occupied training us

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID 53.08			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	24		212	~~53.10~~	~~#1~~ 901	~~95~~	~~27~~				
		25		"	53.10	~~#1~~ #1	257	12	only 3 runs ~~run #15 XRF run #~~			
		26		"	"	~~#3~~ #2	251	11				
		27		"	"	~~#4~~ #3	250	2				
		28		205	34.02	#1	95	9				
		29		"	"	#2	131	10	~~didn't pass~~			
		30		"	"	#3	98	9	see XRF runs # 60-63			
		31		"	"	#4	123	10				
		32		205	34.09	#1	95	9	barely passed			
		33		"	"	#2	113	10				
		34		"	"	#3	120	10				
		35		"	"	#4	126	10				
		36		205	34.06	#1	108	10	Y			
		37		"	"	#2	123	8				
		38		"	"	#3	119	8				
		39		"	MS "	#4	129	8				
		40		~~205~~	~~34.05~~ ~~2709~~	~~#1~~ 2709	86	7	Y			
		41		205	34.05 "	#2 1	114	7	Y			
		42		↓	↓ "	#3 2	115	7				
		43		↓	↓ "	~~#4~~ 3	100	7				
		44		↓	↓ "	#4	110	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	1	202	Standardization									
		2		4315				37	4	~~N~~ Y			
		3		BLANK				-1	3	N			
		4		~~3212~~ 2709				90	8	Y			
		5		408				543	17	Y			
		6		5861				752	16	Y			
		7		3212				286	10	Y			
		8		212	53.03	#1		600	23	Y			
		9		"	"	#2		630	25	|			
		10		"	"	#3		647	~~28~~ 20	|			
		11		212	~~53.04~~ "	#4	617	~~647~~	26 24	|			
		12		212	53.04	#1		111	9	Y			
		13		"	"	~~#2~~		121	7	|			
		14		"	"	~~#3~~		126	7	|			
		15		"	"	~~#4~~		125	7	|			
		16		212	53.06	#1		165	8				
		17		"	"	#2	165	~~170~~	~~11~~ 8				
		18		"	"	#3	170	~~156~~	~~11~~ 11				
		19		"	"	53.06 #4	156	~~159~~	~~11~~ 11				
		20		212	~~53.08~~ 53.06	#5	159	~~885~~	~~27~~ 11				
		21		"	53.08	~~#7~~ #1	885	~~927~~	~~28~~ 27				
		22		"	"	#3 #2	927	~~967~~	~~29~~ 28				
		23		"	"	#4 #3	862	~~984~~	~~27~~ 27				

5 runs passed

passed

data screwed up due to Michael's mind being occupied training us

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID 53.08	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	24		212 ~~53.10~~ ~~#1~~ 901	~~95~~	~~9~~ 27				
		25		" 53.10 ~~#1~~ #1	257	12	only 3 runs ~~run #1 is XRF run #~~			
		26		" " ~~#3~~ #2	251	11				
		27		" " ~~#4~~ #3	250	2				
		28		205 34.02 #1	95	9	~~didn't pass~~ see XRF runs # 60-63			
		29		" " #2	131	10				
		30		" " #3	98	9				
		31		" " #4	123	10				
		32		205 34.09 #1	95	9	barely passed			
		33		" " #2	113	10				
		34		" " #3	120	10				
		35		" " #4	126	10				
		36		205 34.06 #1	108	10	Y			
		37		" " #2	123	8				
		38		" " #3	119	8				
		39		" MS " #4	129	8				
		40		~~205~~ ~~34.05~~ ~~2709~~ ~~#1~~ 2709	86	7	Y			
		41		205 34.05 " #K1	114	7	Y			
		42		" #32	115	7				
		43		" ~~#4~~ 3	100	7				
		44		" #4	110	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	1	202	Standardization									
		2		4315				37	4	~~N~~ Y			
		3		BLANK				-1	3	N			
		4		~~3212~~ 2709				90	8	Y			
		5		408				543	12	Y			
		6		5861				752	16	Y			
		7		3212				286	10	Y			
		8		212	53.03	#1		600	23	Y			
		9		"	"	#2		636	25	|			
		10		"	"	#3		647	~~28~~ 20	|			
		11		212	~~53.04~~ "	#4	617	~~647~~	~~26~~ 24	|			
		12		212	53.04	#1		111	9	Y			
		13		"	"	~~#2~~		121	7	|			
		14		"	"	~~#3~~		126	7	|			
		15		"	"	~~#4~~		125	7	|			
		16		212	53.06	#1		165	8	5 runs passed			
		17		"	"	#2	165	~~170~~	~~11~~ 8				
		18		"	"	#3	170	~~156~~	~~11~~ 11				
		19		"	"	53.06 #4	156	~~159~~	~~11~~ 11				
		20		212	~~53.08~~ 53.06	#5	159	~~885~~	~~27~~ 11				
		21		"	53.08	~~#7~~ #1	885	~~927~~	~~28~~ 27	passed			
		22		"	"	~~#7~~ #2	927	~~862~~	~~25~~ 28				
		23		"	"	~~#4~~ #3	862	~~901~~	~~27~~ 27				

data screwed up due to Michael's mind being occupied training us

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID 53.08	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	24		212 ~~53.10~~ ~~#4~~ 901	~~95~~	~~9~~ 27				
		25		" 53.10 ~~#1~~ #1	257	12	only 3 runs ~~run #1-5 XRF run #~~			
		26		" " ~~#3~~ #2	251	11				
		27		" " ~~#4~~ #3	250	2				
		28		205 34.02 #1	95	9				
		29		" " #2	131	10	~~didn't pass~~			
		30		" " #3	98	9	see XRF runs # 60-63			
		31		" " #4	123	10				
		32		205 34.09 #1	95	9	barely passed			
		33		" " #2	113	10				
		34		" " #3	120	10				
		35		" " #4	126	10				
		36		205 34.06 #1	108	10	Y			
		37		" " #2	123	8				
		38		" " #3	119	8				
		39		" MS " #4	129	8				
		40		~~205~~ ~~34.05~~ ~~2709~~ ~~#1~~ 2709	86	7	Y			
		41		205 34.05 " #K1	114	7	Y			
		42		" " #32	115	7				
		43		↓ ↓ " ~~#4~~ 3	100	7				
		44		↓ ↓ " #4	110	7				

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- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	5444	45		205	34.07	#1	164	8				
		46				#2	154	11				
		47				#3	122	11				
		48				#4	162	11				
		49				#~~4~~5	175	11	high SD will run several times again XRF Run #68			
		50				#~~5~~6 Prec.	141	11				
		51				#~~6~~7 Check	131	11				
		52				#~~7~~8	172	11				
		53				#9	161	11				
		54				#10	139	11				
		55		205	71.01	#1	80	7				
		56				#2	76	7				
		57				#3	95	7				
		58				#4	62	6				
		59				~~#5~~	68	7	~~pass~~			
		60		205	34.02	#~~1~~ continued #5	106	7				
		61				#~~2~~ #6	110	7				
		62				#~~3~~ #7	96	7				
		63				#~~4~~ #8	115	7				
		64		205	71.03	#1	103	7				
		65				#2	95	7				
		66				#3	114	7				
		67				#4	108	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	5444	68		205 34.07 #11	141	8				
		69		" " #12	134	8				
		70		Standardization	—	passed 202				
		71		205 34.07 #13	141	8				
		72		" " #14	135	8				
		73		205 71.04 #1	99	7				
		74		" " #2	100	7				
		75		" " #3	102	7				
		76		" " #4	118	7				
		77		205 71.07 #1	75	6				
		78		" " #2	86	7				
		79		" " #3	84	7				
		80		" " #4	88	8	Y			
		81		NIST 2709	86	8	Y			
		82		205 71.10 #1	81	7				
		83		" " #2	80	7				
		84		" " #3	64	7				
		85		" " #4	84	8				
		86		205 96.01 #1	300	9				
		87		" " #2	249	13				
		88		" " #3	293	13				
		89		" " #4	345	13				

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5444	90		205 96.03 #1	127	9				
		91		#2	145	7				
		92		#3	136	7				
		93		#4	134	7				
		94		~~#3~~ #5	137	7				
		95		205 96.05 #1	223	8				
		96		205 96.05 #2	244	11				
		97		205 96.05 #3	236	11				
		98		205 96.05 #4	245	12				
		99		3212 >+2SD(254)	305	10				
		100		3212 @+2SD(254)	284	7				
		101		205 96.07 #1	241	9				
		102		205 96.07 #2	295	12				
		103		205 96.07 #3	224	11				
		104		205 96.07 #4	232	11				
		105		205 96.07 #5	245	11				
		106		205 96.07 #6	238	11				
		107		205 96.07 #7	223	11				
		108		205 96.07 #8	257	12				
		109		205 96.07 #9	239	11				
		110		205 96.07 #10	238	11				

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- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
03/04/10	5444	111		205 96.09 #1	311	16				
		112		205 96.09 #2	316	13				
		113		205 96.09 #3	291	13				
		114		205 96.09 #4	322	13				
		115		215 110.05 #1	237	9				
		116		215 110.05 #2	267	12				
		117		215 110.05 #3	310	13				
		118		215 110.05 #4	291	12				
		119		RUN ABORTED						
		120		215 110.02 #1	630	19				
		121		215 110.02 #2	593	19				
		122		215 110.02 #3	605	19				
		123		215 110.02 #4	582	19				
		124		215 110.01 #1	328	13				
		125		215 110.01 #2	331	13				
		126		215 110.01 #3	354	13				
		127		215 110.01 #4	368	13				
		128		215 110.07 #1	519	19				
		129		215 110.07 #2	527	19				
		130		215 110.07 #3	578	19				
		131		215 110.07 #4	530	19				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	5444	132		215 110.02 #5	526	19				
		133		215 110.09 #1	144	9				
		134		215 110.09 #2	144	7				
		135		215 110.09 #3	140	7				
		136		215 110.09 #4	144	7				
		137		5861 >-2SD (679)	671	12	N			
		138		5861	692	12	Y			
		139		408	519	12	Y			
		140	204	STANDARDIZE						
		141		3212 >+2SD (284)	296	8	N			
		142		3212	277	7	Y			
		143		2709	78	8	Y			
		144		4315	32	4	Y			
		145		BLANK	-2	3	Y			
2/5/10	5444	1		Standardize (Stainless steel)			201-Pass			
		2		Standard 4315	35	5	Pass			
		3		Standard 3212	281	10	Pass			
		4		Standard 2709	93	10	Pass			
		5		Standard RTC 408	540	17	Pass			

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5444	6		Standard 5861	688	15	Fail			
		7		Standard 5861	704	15	Pass			
		8		Blank	-9	4	Pass			
		9		215 82.06 #1	391	14				
		10		" " #2	389	14				
		11		" " #3	396	15				
		12		" " #4	434	15				
		13		215 82.03 ~~#5~~ #1	497	15				
		14		" #2 368	~~430~~	17				
		15		" ~~#3~~ 430	~~390~~	16				
		16		" ~~#4~~ 390	~~433~~	18				
		17		215 82.03 ~~#5~~ 433	~~120~~	9		poor sys on these 2 samples		
		18		82.07 ~~#1~~ 120	~~117~~	9				
		19		" ~~#2~~ 117	~~153~~	9				
		20		" ~~#3~~ 153						
		21		82.07 ~~#4~~ (~~run more~~ ~~double high~~ ~~20~~)	91	9				
		22		~~#5~~	137	9				
		23			122	9				
		24			116	9				
		25		82.03 #6	422	16				
		26		" #7	409	16				
		27		" #8	461	17				

this - named as .07

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-~~5~~10	5444	28		215 82.09 #1	284	12				
		29		" " #2	282	12				
		30		" " #3	298	12				
		31		" " #4	298	12				
		32		215 82.10 #1	224	10				
		33		" " #2	206	10				
		34		" " #3	222	10				
		35		" " #4	249	10				
		36		215 ~~3212~~ ~~52~~55.01 #1	77	8				
		37		" 55.01 #2	69	6				
		38		" " #3	78	7				
		39		" " #4	83	7				
		40		~~3212~~ 55.0~~1~~5 #5	72	7				
		41		55.0~~1~~5 #1	34	6				
		42		" #2	31	6				
		43		" #3	45	6				
		44		" #4	43	6				
		45		3212	284	10	125			
		46		55.07 #1	36	6				
		47		" #2	35	9				
		48		" #3	41	8				
		49		" #4	36	7				

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-5-10	5444	50		215 55.09 #1	34	7				
		51		" " #2	34	7				
		52		" " #3	29	5				
		53		" " #4	36	8				
		54		215 55.10 #1	145	8				
		55		" " #2	138	8				
		56		" " #3	162	9				
		57		" " #4	156	8				
		58		2709	87	8	PASS			
		59		219 15.01 #1	134	7				
		60		" " #2	136	8				
		61		" " #3	123	7				
		62		" " #4	120	7				
		63		219 15.03 #1	72	6				
		64		" " #2	56	7				
		65		" " #3	62	7				
		66		" " #4	64	8				
		67		219 15.04 #1	58	8				
		68		" " #2	62	7				
		69		" " #3	62	6				
		70		" " #4	53	7				

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-5-10	5444	71		219 15.07 #1	91	7				
		72		" " #2	72	8				
		74	205	" STANDARDIZE ~~#3~~	~~59~~	~~6~~				
		73		" " ~~#4~~ 3	59	6				
		75		219 15.~~10~~07 ~~#1~~ 4	62	6				
		76		15.~~1~~07 ~~#1~~ 5	53	6				
		77		" 15.10 ~~#2~~ 1	63	7				
		78		" " ~~#3~~ 2	65	8.7				
		79		" " ~~#4~~ 3	75	8				
		80		" " # 4	60	8				
		81		219 42.02 #1	62	6				
		82		" " #2	51	6				
		83		" " #3	62	8				
		64		" " #4	65	9				
		85		219 42.04 #1	104	7				
		86		" " #2	119	9				
		67		" " #3	108	9				
		68		" " #4	109	8				
		89		219 42.06 #1	54	6				
		90		" " #2	70	7				
		91		" " #3	72	7				
		92		" " #4	69	7				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

		96	"									
		97	219	42.08	#1	78	6					
		98	"	"	#2	57	6					
		99	"	"	#3	49	9					
		100	"	"	#4	55	8					
		101	219	55.01	#1	57	8					
		102	"	"	#2	50	7					
		103	"	"	#3	50	6					
		104	"	"	#4	44	6					
		105	219	55.03	#1	60	6					
		106	"	"	#2	48	6					
		107	"	"	#3	49	6					
		108	"	"	#4	41	6					
		109	2709			97	8	Y				
		110	219	55.05	#1	44	6					
		111	219	55.05	#2	47	6					
		112	219	55.05	#3	40	6					
		113	219	55.05	#4	39	6					

- *Only record resolution each time unit is calibrated.*
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5444	114		219 55.07 #1	44	6				
		115		219 55.07 #2	48	6				
		116		219 55.07 #3	44	6				
		117		219 55.07 #4	47	6				
		118		219 55.09 #1	42	6				
		119		219 55.09 #2	49	6				
		120		219 55.09 #3	45	6				
		121		219 55.09 #4	50	6				
		122		218 102 SUIS #1	151	7				
		123		218 102 SUIS #2	152	9				
		124		218 102 SUIS #3	163	10				
		125		218 102 SUIS #4	143	9				
		126		218 146 SUIS #1	256	9				
		127		218 146 SUIS #2	318	13				
		128		218 146 SUIS #3	286	13				
		129		218 146 SUIS #4	282	13				
		130		218 87 SUIS #1	148	8				
		131		218 87 SUIS #2	146	8				
		132		218 87 SUIS #3	169	8				
		133		218 87 SUIS #4	151	8				
		134		3212	267	7	Y			

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- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5444	135		216 32.10 #1	59	6				
		136		216 32.10 #2	56	6				
		137		216 32.10 #3	63	6				
		138		216 32.10 #4	63	6				
		139		216 32.09 #1	91	6				
		140		216 32.09 #2	91	6				
		141		216 32.09 #3	67	6				
		142		216 32.09 #4	83	6				
		143		216 32.05 #1	130	8				
		144	205	~~216~~ STANDARDIZE						
		145		216 32.05 #2	118	7				
		146		216 32.05 #3	122	7				
		147		216 32.05 #4	128	7				
		148		216 32.01 #1	161	8				
		149		216 32.01 #2	195	11				
		150		216 32.01 #3	182	11				
		151		216 32.01 #4	189	11				
		152		216 32.03 #1	109	7				
		153		216 32.03 #2	87	6				
		154		216 32.03 #3	98	7				
		155		216 32.03 #4	96	6				

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5444	156		3212	283	7	Y			
		157		2709	99	8	Y			
		~~158~~ 158		4315	30	4	Y			
		159		5861	705	12	Y			
		160		408	516	12	Y			
		161		BLANK	-12	3	Y			
		PA								
2-8-10	5444	1	20A							
		2		2709	80	8	Y			
		3		BLANK	-11	3				
		4		4315	33	4	Y			
		5		3212	281	10	Y			
		~~6~~		~~408~~	~~568~~	~~15~~	—			
		6		5861	738	16	Y			
		7		408	554	17	Y			
		8		LOC 216 50.~~10~~ 08 #1	114	7				
		9		#2	99	7				
		10		#3	113	7				
		11		#4	~~108~~	7				
		12			102		ran 1x over			

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5444	12 13		LOC 216 SU 50.10 #1	82	6				
		13 14		#2	56	6				
		14 15		#3	80	6				
		15 16		#4	71	6				
		17		50.02 #1	116	7				
		18		#2	99	7				
		19		#3	100	7				
		20		#4	94	7				
		21		50.08 #1	118	7				
		22		#2	125	7				
		23		#3	116	7				
		24		#4	128	7				
		25		50.01 #1	276	10				
		26		#2	264	14				
		27		#3	300	14				
		28		#4	304	14				
		29		#5 Prec. Check	267	14				
		30		#6	267	14				
		31		#7	285	14				
		32		#8	300	14				
		33		#9	298	14				
		34		#10	294	14				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5444	35		~~LOC 216 SU 116.03 #1~~ cancelled						
		36		LOC 212 SU1S816 #1	115	7				
		37		#2	143	7				
		38		#3	111	7				
		39		#4	130	18				
		40		LOC 212 SU1S 116 #1	268	10				
		41		#2	250	10				
		42		#3	279	13				
		43		#4	260	13				
		44		3212	301	8	Y			
		45		LOC 212 SU1S 53 #1	271	10				
		46		#2	308	14				
		47		#3	285	14				
		48		#4	305	14				
		49		216 SU 116.03 #1	120	7				
		50		#2	120	7				
		51		#3	123	7				
		52		#4	122	7				
		53		216 116.01 #1	108	7				
		54		#2	96	7				
		55		#3	99	7				
		56		#4	117	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5944	57		2709	85	8	Y			
		58		LOC 216 SU 16.04 #1	85	6				
		59		| | #2	83	6				
		60		| | #3	77	6				
		61		| | #4	71	6				
		62		LOC 216 SU 16.05 #1	97	6				
		63		| | #2	82	6				
		64		| | #3	98	6				
		65		| | #4	95	6				
		66	20	Standardization						
		67		LOC 216 SU 16.09 #1	111	7				
		68		| | #2	98	6				
		69		| | #3	114	7				
		70		| | #4	116	6				
		71		LOC 209 SU/S 109 #1	28	6	→ Didn't put SU/S" in Comment			
		72		| | #2	34	6				
		73		| | #3	33	6				
		74		| | #4	26	6				
		75		209 SU/S 144 #1	121	7				
		76		" " #2	78	6				
		77		" " #3	98	6				
		78		" " #4	65	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5444	79		209 138 SUIS #1	34	6				
		80		" " #2	46	8				
		81		" " #3	43	6				
		82		" " #4	44	6				
		83		" SRM 4315	32	4	yes			
		84		219 15 SUIS #1	62	6				
		85		" " #2	66	6				
		86		" " #3	78	6				
		87		" " #4	67	7				
		88		210 30 SUIS #1	20	6				
		89		" " #2	30	6				
		90		" " #3	34	6				
		91		" " #4	27	6				
		92		219 42 SUIS #1	60	6				
		93		" " #2	68	7				
		94		" " #3	83	7				
		95		" " #4	70	7				
		96		219 55 SUIS #1	48	6				
		97		" " #2	41	6				
		98		" " #3	42	6				
		99		" " #4	41	6				

mis ident 219

Recalibrate on 5420

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5444	100		205 34 SUIS #1	113	8				
		101		" " #2	122	8				
		102		" " #3	98	8				
		103		" " #4	110	7				
		104		205 71 SUIS #1	93	7				
		105		" " #2	91	7				
		106		" " #3	92	7				
		107		" " #4	97	7				
		108		205 96 SUIS #1	244	9				
		109		" " #2	236	11				
		110		" " #3	235	12				
		111		" " #4	252	12				
		112		SRM 3212	281	7	Y			
		113		215 55 SUIS #1	50	6				
		114		215 55 SUIS #2	41	6				
		115		215 55 SUIS #3	48	6				
		116		215 55 SUIS #4	47	6				
		117		216 16 SUIS #1	89	6				
		118		" "	99	7				
		119		" "	103	7				
		120		" "	94	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5144	121		216	32 SUIS	#1	98	7				
		122		"	"	#2	115	7				
		123		"	"	#3	98	7				
		124		"	"	#4	107	7				
		125		216	50 SUIS	#1	130	7				
		126		"	"	#2	127	7				
		127		"	"	#3	133	8				
		128		"	STANDARDIZE	~~#4~~	ABORTED					
		129	207		STANDARDIZE							
		130		216	50 SUIS	#4	117	7				
		131		222	10.04	#1	128	7				
		132		"	"	#2	135	7				
		133		"	"	#3	126	6				
		134		"	"	#4	128	7				
		135		222	10.02	#1	131	7				
		136		"	"	#2	169	7				
		137		"	"	#3	136	7				
		138		"	"	#4	145	7				
		139		"	"	#5	135	7				
		140		"	"	#6	133	7				
		141		"	"	#7	144	7				
		142		"	"	#8	135	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5444	143		4315	33	4	Y			
		144		2709	93	8	Y			
		145		3212	276	7	Y			
		146		408	516	12	Y			
		147		5861	714	12	Y			
		148		BLANK	-4	3	Y			
			PA							
2/9/10	5444	1	204	STANDARDIZE						
		2		BLANK	0	3				
		3		4315	35	4	yes			
		4		2709	96	8	yes			
		5		3212	274	10	yes			
		6		RTC 408	539	12	yes			
		7		5861	725	16	yes			
		8		222 10.06 #1	85	8				
		9		" " #2	76	86				
		10		" -1 #3	76	6				
		11		" " #4	84	6				
		12		222 10.08 #1	114	7				
		13		" " #2	112	7				

not named

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-9-10	544	14		222 10.08 #3	112	7				
		15		" " #4	125	7				
		16		222 10.10 #1	109	7				
		17		" " #2	118	7				
		18		" " #3	116	7				
		19		" " #4	126	7				
*6 to 2		20		222 41.062 #1	128	7				
*		21		222 41.062 #2	114	7				
*		22		222 41.062 #3	115	7				
*		23		222 41.062 #4	119	7				
		24		222 41.03 #1	74	6				
		25		222 41.03 #2	91	6				
		26		222 41.03 #3	81	6				
		27		222 41.03 #4	80	6				
		28		222 41.07 #1	121	7				
		29		222 41.07 #2	113	7				
		30		222 41.07 #3	109	7				
		31		222 41.07 #4	122	7				
		32		222 41.05 #1	123	7				
		33		222 41.05 #2	98	6				
		34		222 41.05 #3	109	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5444	35		222	41.05	#4	97	6				
		36		222	41.09	#1	156	7				
		37		222	41.09	#2	154	9				
		38		222	41.09	#3	129	9				
		39		222	41.09	#4	145	9				
		40		222	27.02	#1	133	9				
		41		222	27.02	#2	134	7				
		42		222	27.02	#3	147	7				
		43		222	27.02	#4	129	7				
		44		222	27.04	#1	116	7				
		45		222	27.04	#2	95	7				
		46		222	27.04	#3	109	7				
		47		222	27.04	#4	104	7				
		48		222	27.06	#1	117	6				
		49		222	27.06	#2	117	6				
		50		222	27.06	#3	117	6				
		51		222	27.06	#4	119	6				
		52		222	27.07	#1	163	7				
		53		222	27.07	#2	156	9				
		54		222	27.07	#3	154	9				
		55		222	27.07	#4	153	9				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5444	56		222 27.08 #1	98	6				
		57		222 27.08 #2	100	7				
		58		222 27.08 #3	111	7				
		59		222 27.08 #4	104	7				
		60		2709	97	8	Y			
		61		215 82 SUES #1	312	10				
		62		215 82 SUES #2	318	13				
		63		215 82 SUES #3	318	13				
		64		215 82 SUES #4	324	13				
		65		215 82 SUES #5	303	13				
		66	205	STANDARDIZE						
		67		215 82 SUES #6	301	13				
		68		" " " 7	299	13				
		69		" " " 8 PRECIS	296	13				
		70		" " " 9	301	13				
		71		" " " 10	284	13				
		72		" " " 11	298	13				
		73		" " " 12	298	13				
		74		" " " 13	259	12				
		75		215 110 SUES #1	422	15				
		76		215 110 SUES #2	440	15				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

113.5
3.6

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5444	77		215	110	SUIS #3	419	15				
		78		215	110	SUIS #4	409	14				
		79		215	55	SUIS #1	41	6				
		80		215	55	SUIS #2	47	5				
		81		215	55	SUIS #3	54	6				
		82		215	55	SUIS #4	53	6				
		83		222	10	SUIS #1	120	6				
		84		222	10	SUIS #2	110	7				
		85		222	10	SUIS #3	103	6				
		86		222	10	SUIS #4	121	7				
		87		222	41	SUIS #1	100	7				
		88		222	41	SUIS#2	123	7				
		89		222	41	SUIS#3	113	7				
		90		222	41	SUIS#4	115	7				
		91		222	27	SUIS#1	111	7				
		92		222	27	SUIS#2	134	7				
		93		222	27	SUIS#3	132	7				
		94		222	27	SUIS#4	134	7				
		95		2.24	74.01	#1	29	5				
		96		224	74.01	#2	43	5				
		97		224	74.01	#3	29	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5444	98		224	74.01	#4	40	5				
		99		224	74.02	#1	37	5				
		100		224	74.02	#2	42	5				
		101		224	74.02	#3	38	5				
		102		224	74.02	#4	36	5				
		103		224	74.04	#1	47	5				
		104		224	74.04	#2	54	5				
		105		224	74.04	#3	43	5				
		106		224	74.04	#4	41	5				
		107		224	74.07	#1	74	5				
		108		224	74.07	#2	51	5				
		109		224	74.07	#3	46	5				
		110		224	74.07	#4	60	5				
		111		224	74.07	#5	42	5				
		112		224	74.07	#6	55	5				
		113		224	74.07	#7	51	5				
		114		224	74.07	#8	54	5				
		115		224	74.10	#1	41	5				
		116		224	74.10	#2	49	5				
		117		224	74.10	#3	42	~~7~~ 5				
		118		224	74.10	#4	41	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5144	119		224	23.01	#1	40	6				
		120		224	23.01	#2	32	6				
		121		224	23.01	#3	41	6				
		122		224	23.01	#4	44	6				
		123		4315			34	4	Y			
		124		224	23.06	#1	37	6				
		125		224	23.06	#2	41	6				
		126		224	23.06	#3	43	6				
		127		224	23.06	#4	37	6				
		128		224	23.07	#1	39	6				
		129		224	23.07	#2	28	6				
		130		224	23.07	#3	46	6				
		131		224	23.07	#4	36	6				
		132		224	23.08	#1	36	5				
		133		224	23.08	#2	34	5				
		134	203	STANDARDIZE								
		135		224	23.08	#3	32	5				
		136		224	23.08	#4	40	5				
		137		224	23.10	#1	45	6				
		138		224	23.10	#2	40	6				
		139		224	23.10	#3	54	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5444	140		224 23.10 #4	39	6				
		141		224 19.01 #1	39	5				
		142		224 19.01 #2	34	5				
		143		224 19.01 #3	39	5				
		144		224 19.01 #4	39	5				
		145		4315	37	4	Y			
		146		2709	94	8	Y			
		147		3212	284	7	Y			
		148		408	504	12	Y			
		149		5861	713	12	Y			
		150		BLANK	1	3	Y			
2/10/10	5444	1	207	Standarization - Successful 207 Resolution						
		2		Blank	ND					
		3		4315	35	4	Y			
		4		2709	84	8	Y			
		5		3212	295	8	Y			
		6		RTC 408	525	12	Y			
		7		5861	733	16				
		8		224 19.02 #1	31	5				
		9		224 19.02 #2	44	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-10-10	9144	10		224 19.02 #3	40	5				
		11		224 19.02 #4	30	5				
		12		224 19.05 #1	35	6				
		13		224 19.05 #2	40	6				
		14		224 19.05 #3	44	6				
		15		224 19.05 #4	38	6				
		16		224 19.08 #1	36	6				
		17		224 19.08 #2	48	6				
		18		224 19.08 #3	41	6				
		19		224 19.08 #4	34	6				
		20		224 19.10 #1	32	6				
		21		224 19.10 #2	44	6				
		22		224 19.10 #3	42	6				
		23		224 19.10 #4	35	6				
		24		224 19 SUIS #1	44	6				
		25		224 19 SUIS #2	35	6				
		26		224 19 SUIS #3	44	6				
		27		224 19 SUIS #4	53	6				
		28		224 23 SUIS #1	41	6				
		29		224 23 SUIS #2	42	6				
		30		224 23 SUIS #3	37	6				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-10-10	5444	31		224 23 SUIS #4	41	6				
		32		224 74 SUIS #1	50	5				
		33		224 74 SUIS #2	43	5				
		34		224 74 SUIS #3	47	5				
		35		224 74 SUIS #4	49	5				
		36		#5	56	5				
		37		#6 precision	46	5				
		38		#7	46	5				
		39		#8	46	5				
		40		#9	48	5				
		41		#10	50	5				
		42		Blank	ND					
		43		~~4315~~ Blank	ND					
		44		~~2709~~ 4315	34	4				
		45		60 sec. run ~~3212~~ Greg's Samples RCRA 408	Pb Results 476	13				
		46		45 sec Runs ~~RTC 408~~ 2586	41/Pb	12				
		47		~~5861~~ HD602673	24	4				
		48		" "	23	4				
		49		" "	22	4				
		50		" "	19	4				
		51		N.S.T. 2709 (Low)	23	4				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5444	52		CRUSHER FINES HOCO2674	24 Pn	4				
		53		" "	20	4				
		54		" "	12	3				
		55		" "	18	3				
		56		HOCO2675	30	4				
		57	200	STANDARDIZATION						
		58		HOCO2675	27	4				
		59		" "	18	4				
		60		" "	26	4				
		61		NIST 2709 (LOW)	20	4				
		62		NIST 2586	429	13				
		63		NIST ~~2675~~ 408 (RCRA)	460	15				
		64		4315	35	4				
		65		219 DUIS #1	59	6				
		66		219 DUIS #2	55	6				
		67		219 DUIS #3	62	6				
		68		219 DUIS #4	75	6				
		69		205 DUIS #1	146	8				
		70		205 DUIS #2	131	8				
		71		205 DUIS #3	146	8				
		72		205 DUIS #4	140	8				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-10-10	5444	73		209 DUIS #1	48	6				
		74		#2	43	6				
		75		#3	46	6				
		76		#4	56	6				
		77		212 DUIS #1	255	10				
		78		#2	285	10				
		79		#3	229	9				
		80		#4	234	9				
		81		215 DUIS #1	303	10				
		82		#2	274	9				
		83		#3	280	9				
		84		#4	272	9				
		85		216 DUIS #1	123	7				
		86		#2	120	7				
		87		#3	117	7				
		88		#4	104	7				
		89		218 DUIS #1	194	8				
		~~89~~ 90		#2	194	11				
		91		#3	250	11				
		92		#4	198	11				
		93		#5	200	11				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5444	94		218 DUIS #6	185	11				
		95		222 DUIS #1	101	6				
		96		222 DUIS #2	117	7				
		97		222 DUIS #3	96	6				
		98		222 DUIS #4	118	7				
		99		224 DUIS #1	37	5				
		100		224 DUIS #2	43	6				
		101		224 DUIS #3	33	5				
		102		224 DUIS #4	44	6				
		103		ABORTED						
		104		4315	31	4	✓			
		105		2709	82	8	✓			
		106		3212	293	8	✓			
		107		408	534	12	✓			
		108		5861	717	12	✓			
		109		BLANK	-5	3	✓			
		PA								

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5420	1	202							
		2		3212	239	7	Y			
		3		2709	151	7	Y			
		4		4313	37	4	Y			
		5		BLANK	-16	3	Y			
		6		RTC Right @ +2 SD	567	12	Y			
		7		5861	664	13	Y			
		8		202-59.10 #1	327	8				
		9		202-59.10 #2	360	12				
		10		202-59.10 #3	298	10				
		11		202-59.10 #4 - SD out of range	342	11				
		12		202-59.10 #5	317	11				
		13		202-59.10 #6	344	11				
		14		202-59.10 #7	326	11				
		15		202-59.10 #8	328	11				
		16		202-59.07 #1	635	12				
		17		202-59.07 #2	657	16				
		18		202-59.07 #3	624	16				
		19		202-59.07 #4 - SD out of range	581	15				
		20		202-59.07 #5	632	16				
		21		202-59.07 #6	626	16				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Tannery Sludge Farm Fields

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
		22		202 59.07 #7	652	16				
		23		202 59.07 #8	572	15				
		24		STANDARDIZATION						
		25		3212 STANDARD	235	9				
		26		408	556	15				
		27		202 59.07 #9	631	16				
		28		202 59.07 #10	552	15				
Pam		29		202 59.09 #1	324	11				
2/2/2010		30		202 59.09 #2	297	11				
	5420	31		202 59.09 #3	312	11				
		32		202 59.09 #4	276	10				
		33		202 59.05 #1	100	7				
		34		202 59.05 #2	111	6				
		35		202 59.05 #3	106	6				
		36		202 59.05 #4	100	6				
		37		202 59.02 #1	160	6				
		38		202 59.02 #2	195	6				
		39		202 59.02 #3	213	7				
		3940		202 59.02 #4	204	7				
		41		202 59.02 #5	165	6				
		42		202 79.01 #1	99	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.2.

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID Loc ID	SU	Run	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/2		43		202	79.01	#2	95	6				
2010	0	44		202	79.01	#3	94	6				
	2	45		202	79.01	#4	94	6				
	4	46		202	59.02	#6	185	6				
	5	47		202	59.02	#7	163	6				
		48		202	59.02	#8	168	6				
		49		202	59.02	#9	176	6				
*		50		202	79.03	#1	130	6	~~Comp. test info incorrect~~			
		51		202	79.03	#2	121	6				
		52		202	79.03	#3	137	6				
		53		202	79.03	#4	140	6				
		54		202	79.07	#1	113	6				
		55		202	79.07	#2	122	6				
		56		202	79.07	#3	116	6				
		57		202	79.07	#4	116	6				
		58		202	79.08	#1	145	6				
		59		202	79.08	#2	136	6				
		60		202	79.08	#3	134	6				
		61		202	79.08	#4	130	6				
		62		202	79.08	#5	129	6				
		63		202	79.08	#6	136	6				

Precision RUNS

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5420	64		202	79.08	#7	Precision Runs	130	6				
		65		202	79.08	#8		134	6				
		66		202	79.08	#9		140	6				
		67		202	79.08	#10		109	6				
		68		202	79.10	#1		97	6				
		69		202	79.10	#2		100	6				
		70		202	79.10	#3		106	6				
		71		202	79.10	#4		100	6				
		72		202	29.02	#1		121	5				
		73		202	29.02	#2		133	5				
		74		202	29.02	#3		123	5				
		75		202	29.02	#4		114	5				
		76		202	29.03	#1		67	5				
		77		202	29.03	#2		73	5				
		78		202	29.03	#3		77	5				
		79		202	29.03	#4		81	5				
		80		202	29.04	#1		78	5				
		81		202	29.04	#2		78	5				
		82		202	29.04	#3		83	5				
		83		202	29.04	#4		84	5				
		84		202	29.05	#1		53	4				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
				LOC ID						
2/2/2010	5420	86		202 29.05 #2	46	4				
		85		Standardization			200			
		87		202 29.05 #3	54	4				
		88		202 29.05 #4	39	4				
		89		202 29.10 #1	67	5				
		90		202 29.10 #2	63	5				
		91		202 29.10 #3	68	5				
		92		202 29.10 #4	60	5				
		93		214 23.01 #1	87	5				
		94		214 23.01 #2	84	5				
		95		214 23.01 #3	88	5				
		96		214 23.01 #4	89	5				
		97		214 23.05 #1	74	5				
		98		214 23.05 #2	71	5				
		99		214 23.05 #3	71	5				
		100		214 23.05 #4	77	5				
		101		214 23.06 #1	136	6				
		102		214 23.06 #2	123	5				
		103		214 23.06 #3	122	5				
		104		214 23.06 #4	114	5				
		105		4315 Standard	29	4	Pass			

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser. No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/2/2010	5420	106		Standard 2709	133	7	Pass			
		107		Standard 3212	236	8	Pass			
		108		Standard RTC 408	515	12	Pass			
		109		Standard 5861	651	11	Pass			
		110		Blank Standard	-4	3	Pass			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

R6.

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5420	1	205	STANDARDIZE						
		2		3212	252	7				
		3	201	~~4315~~ POWER FAIL - STANDARDIZATION						
		4		3212 - -3SD	222	7				
		5		3212 - ALT CUP	237	7	Y			
		6		BLANK	-9	3	Y			
		7		4315	27	4	Y			
		8		5861	637	11	Y			
		9		2709	141	7	Y			
		10		408 RCRA @-2 SD (511)	513	11	Y			
		11		214 23.08 #1	89	5				
		12		214 23.08 #2	81	5				
		13		214 23.08 #3	88	5				
		14		214 23.08 #4	80	5				
		15		214 23.10 #1	64	5				
		16		214 23.10 #2	69	5				
		17		214 23.10 #3	75	5				
		18		214 23.10 #4	75	5				
		19		214 25.02 #1	87	5				
		20		" " #2	84	5				
		21		#3	82	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	3420	22		214	25.02	#4	80	5				
		23		214	25.06	#1	600	12				
		24		214	25.06	#2	577	16				
		25		214	25.06	#3	588	16				
		26		214	25.06	#4	592	16				
		27		214	25.07	#1	876	16				
		28		214	25.07	#2	887	22				
		29		214	25.07	#3	923	23				
		30		214	25.07	#4	960	23				
		31		214	25.08	#1	1250	24				
		32		214	25.08	#2	1291	32				
		33		214	25.08	#3	1286	32				
		34		214	25.08	#4	1292	32				
		35		SRM 5861		>+2SD	714	15				
		36		SRM 5861			655	11				
		37		214	25.10	#1	90	6				
		38		214	25.10	#2	85	5				
		39		214	25.10	#3	89	6				
		40		214	25.10	#4	88	6				
		41		214	53.01	#1	122	6				
		42		214	53.01	#2	137	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	43		214 53.01 #3	150	6				
		44		214 53.01 #4	135	6				
		45		214 53.03 #1	102	5				
		46		214 53.03 #2	112	6				
		47		214 53.03 #3	96	5				
		48		214 53.03 #4	101	5				
		49		" " 5	96	5				
		50		" " 6	97	6				
		51		" " 7 PRECISION	111	6				
		52		" " 8	115	6				
		53		" " 9	117	6				
		54		" " 10	104	6				
		55		214 53.05 #1	84	6				
		56		" " #2	82	5				
		57		" " #3	89	6				
		58		" " #4	83	5				
		59		2 SRM 2709	145	7	Y			
		60		214 53.06 #1	208	7				
		61		" " #2	203	9				
		62		" " #3	217	9				
		63		" " #4	232	10				
		64		" " #5	213	9				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5420	65		214	53.09	#1	71	7				
		66		"	"	#2	78	5				
				"	"	#3						
				"	"	#4						
		67	201	STANDARDIZE								
		68		214	53.09	#3	67	5				
		69		214	53.09	#4	73	5				
		70		203	7.01	#1	73	5				
		71		205	7.01	#2	83	5				
		72		203	7.01	#3	63	5				
		73		203	7.01	#4	67	5				
		74		4315		@+250 (39)	37	4	Y			
		75		203	7.05	#1	71	5				
		76		203	7.05	#2	78	5				
		77		203	7.05	#3	68	5				
		78		203	7.05	#4	76	5				
		79		203	7.05	#5	72	5				
		80		203	7.06	#1	67	5				
		81		203	7.06	#2	64	5				
		82		203	7.06	#3	71	5				
		83		203	7.06	#4	62	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	~~54~~ 5420	84		203	7.08	#1	58	5				
		85		203	7.08	#2	65	5				
		86		203	7.08	#3	56	5				
		87		203	7.08	#4	54	5				
		88		203	7.10	#1	72	5				
		89		203	7.10	#2	67	5				
		90		203	7.10	#3	65	5				
		91		203	7.10	#4	64	5				
		92		203	18.07	#1	50	5				
		93		203	18.07	#2	49	5				
		94		203	18.07	#3	56	5				
		95		203	18.07	#4	41	4				
		96		203	18.04	#1	57	5				
		97		203	18.04	#2	58	5				
		98		203	18.04	#3	60	5				
		99		203	18.04	#4	62	5				
		100		4315		@ -2SD(22)	24	4	Y			
		101		203	18.01	#1	50	5				
		102		203	18.01	#2	47	5				
		103		203	18.01	#3	55	5				
		104		203	18.01	#4	54	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	105		203 18.03 #1	52	5				
		106		203 18.03 #2	53	5				
		107		203 18.03 #3	47	4				
		108		203 18.03 #4	47	4				
		109		203 18.06 #1	50	4				
		110		203 18.06 #2	46	4				
		111		203 18.06 #3	51	4				
		112		203 18.06 #4	53	4				
		113		4315	32	4	Y			
		114		203 27.04 #1	64	5				
		115		203 27.04 #2	63	5				
		116		203 27.04 #3	64	5				
		117		203 27.04 #4	68	5				
		118		203 27.07 #1	77	5				
		119		203 27.07 #2	73	5				
		120		203 27.07 #3	78	5				
		121		203 27.07 #4	76	5				
		122	202	STANDARDIZE						
		123		4315	32	4	Y			
		124		203 27.09 #1	71	5				
		125		203 27.09 #2	71	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	126		203 27.09 #3	69	5				
		127		203 27.09 #4	71	5				
		128		203 27.01 #1	81	5				
		129		203 27.01 #2	83	5				
		130		203 27.01 #3	104	5				
		131		203 27.01 #4	82	5				
		132		203 27.06 #1	81	5				
		133		203 27.06 #2	76	5				
		134		203 27.06 #3	80	5				
		135		203 27.06 #4	67	5				
		136		5861	663	11				
		137		408	553	11				
		138		3212	251	7				
		139		2709	138	7				
		140		4315	34	4				
		141		BLANK	-9	3				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	5420	1	203	STANDARDIZE – FAIL – USER ERROR								
		2	203	STANDARDIZE								
		3		BLANK			-14	3	Y			
		4		4315		> -2SD (22)	18	4				
		5		4315		@ -2SD	23	4	Y			
		6		3212			255	7	Y			
		7		408			520	11	Y			
		8		2709			136	7	Y			
		9		5561			645	11	Y			
		10		204	99.03	#1	80	5				
		11		204	99.03	#2	79	5				
		12		204	99.03	#3	84	5				
		13		204	99.03	#4	82	5				
		14		204	99.04	#1	92	5				
		15		204	99.04	#2	83	5				
		16		204	99.04	#3	91	5				
		17		204	99.04	#4	79	5				
		18		204	99.01	#1	133	6				
		19		204	99.01	#2	129	6				
		20		204	99.01	#3	131	6				
		21		204	99.01	#4	138	6				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	542	22		204	99.05	#1	130	6				
		23		204	99.05	#2	125	5				
		24		204	99.05	#3	108	5				
		25		204	99.05	#4	111	5				
		26			~~99.07~~	2709 7+250	156	7				
		27			2709		131	7				
		28		204	99.07	#1	163	6				
		29		204	99.07	#2	158	8				
		30		204	99.07	#3	149	8				
		31		204	99.07	#4	171	8				
		32		204	42.02	#1	123	8				
		33		204	42.02	#2	128	6				
		34		204	42.02	#3	117	6				
		35		204	42.02	#4	125	6				
		36		204	23.03	#1	137	6				
		37		204	23.03	#2	123	6				
		38		204	23.03	#3	136	6				
		39		204	23.03	#4	134	6				
		40		204	42.03	#1	331	9				
		41		204	42.03	#2	327	9				
		42		204	42.03	#3	372	13				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	520	43		204	42.03	#4	348	12				
		44		204		#5	332	12				
		45				#6	323	12				
		46				#7 PRECISION	344	12				
		47				#8	350	12				
		48				#9	359	12				
		49				#10	347	12				
		50		204	42.04	#1	105	5				
		51		204	42.04	#2	98	6				
		52		204	42.04	#3	94	6				
		53		204	42.04	#4	106	6				
		54		204	42.03	# 50 OUT OF RANGE	370	13				
		55		204	42.03		371	13				
		56		204	42.04	~~#4~~ 5	101	7				
		57		204	42.09	#1	107	5				
		58		204	42.09	#2	112	5				
		59		204	42.09	#3	99	5				
		60		204	42.09	#4	114	5				
		61		204	42.10	#1	91	5				
		62	203	STANDARDIZE								
		63		204	42.10	#2	90	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID		Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-4-10	5420	64		204	42.10 #3	101	5				
		65		204	42.10 #4	85	5				
		66		204	23.04 #1	96	5				
		67		"	" #2	81	5				
		68		"	" #3	91	5				
		69		"	" #4	92	5				
		70		204	23.03 #1 (already Run)	129	7				
		71		"	23.06 #1	66	5				
		72		"	" #2	84	5				
		73		"	" #3	73	5				
		74		"	#4	62	5				
		75			NIST 2709	149	7	Y			
		76		204	23.08 #1	64	4				
		77		"	" #2	71	5				
		78		"	" #3	67	5				
		79		"	" #4	62	4				
		80		204	23.10 #1	244	7				
		81		204	23.10 #2	255	7				
		82		204	23.10 #3	223	9				
		83		204	23.10 #4	254	10				
		84		204	23.10 #5 ←	42.10	- GRABBED		WRONG	BAG	

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	8420	85		204 23.10 #5	245	10				
		86		210 15.10 #1	71	6				
		87		210 15.10 #2	79	6				
		88		210 15.10 #3	72	5				
		89		210 15.10 #4	60	5				
		90		210 15.10 #5	60	5				
		91		210 15.10 #6	80	6				
		92		210 15.10 #7	65	5				
		93		210 15.10 #8	68	6				
		94		4315	29	4	Y			
		95		210 15.02 #1	76	6				
		96		210 15.02 #2	87	6				
		97		210 15.02 #3	79	6				
		98		210 15.02 #4	72	6				
		99		210 15.03 #1	70	6				
		100		210 15.03 #2	70	6				
		101		210 15.03 #3	73	6				
		102		210 15.03 #4	79	6				
		103		210 15.06 #1	32	5				
		104		210 15.06 #2	48	6				
		105		210 15.06 #3	48	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
02/4/10	5420	106		210 15.06 #4	41	5				
		107		210 15.08 #1	65	6				
		108		210 15.08 #2	71	6				
		109		210 15.08 #3	72	6				
		110		210 15.08 #4	~~69~~ 69	6				
		111		210 62.08 #1	45	5				
		112		210 62.08 #2	45	5				
		113		210 62.08 #3	49	5				
		114		210 62.08 #4	43	5				
		115		210 62.02 #1	35	6				
		116		210 62.02 #2	56	6				
		117		210 62.02 #3	55	6				
		118		210 62.02 #4	49	6				
		119		210 62.02 #5	41	6				
		120		210 62.02 #6	43	6				
		121	204	~~5861~~ STANDARDIZE						
		122		5861	659	11	Y			
		123		408	554	11	Y			
		124		3212	255	7	Y			
		125		2709 >-250(126)	125	7	N			
		126		2709 >+250(151)	152	7	N			

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
02/4/10	5420	127		2709	155	7	~			
		128		4315	34	4	Y			
		129		BLANK	-10	5	Y			

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	1		Standard (Stainless steel)			203-Pass			
		2		Standard 4315	27	5	Pass			
		3		Standard 2709	128	9	Pass			
		4		Standard 3212	220	8	Fail			
		5		Standard 3212	229	9	Fail			
		6		Standard 3212	248	9	Pass			
		7		Standard RTC 408	562	15	Pass			
		8		Standard 5861	617	14	Fail			
		9		Standard 5861	1069	15	Pass	(no specific chart)		
		10		Blank	-18	3	Pass			
		11		210 62.06 #1	63	5				
		12		210 62.06 #2	73	5				
		13		210 62.06 #3	57	5				
		14		210 62.06 #4	72	5				
		15		210 62.01 #1	88	6				
		16		210 62.01 #2	105	6				
		17		210 62.01 #3	103	6				
		18		210 62.01 #4	133	6				
		19		210 62.09 #1	53	5				
		20		210 62.09 #2	52	5				
		21		210 62.09 #3	59	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

2/5/10 P.1/7

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	22		210 62.09 #4	58	5				
		23		210 30.08 #1	52	5				
		24		210 30.08 #2	47	5				
		25		210 30.08 #3	53	5				
		26		210 30.08 #4	38	5				
		27		210 30.04 #1	65	5				
		28		210 30.04 #2	72	5				
		29		210 30.04 #3	62	5				
		30		210 30.04 #4	73	5				
		31		210 30.09 #1	42	5				
		32		210 30.09 #2	42	5				
		33		210 30.09 #3	42	5				
		34		210 30.09 #4	41	5				
		35		2709	141	7	~~N~~ YES IT DID			
		36		2709	135	7	Y			
		37		210 30.01 #1	82	5				
		38		210 30.01 #2	77	5				
		39		210 30.01 #3	82	6				
		40		210 30.01 #4	70	5				
		41		210 30.03 #1	82	5				
		42		210 30.03 #2	73	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	43		210 30.03 #3	78	6				
		44		210 30.03 #4	70	5				
		45		217 103.08 #1	117	6				
		46		217 103.08 #2	106	6				
		47		217 103.08 #3	106	6				
		48		217 103.08 #4	113	6				
		49		217 103.09 #1	337	10				
		50		217 103.09 #2	334	12				
		51		217 103.09 #3	318	12				
		52		217 103.09 #4	303	12				
		53		217 103.06 #1	80	5				
		54		217 103.06 #2	78	5				
		55		217 103.06 #3	87	5				
		56		217 103.06 #4	82	5				
		57	202	STANDARDIZE						
		58		217 103.01 #1	330	9				
		59		217 103.01 #2	293	12				
		60		217 103.01 #3	331	13				
		61		217 103.01 #4	321	12				
		62		217 103.05 #1	1181	24				
		63		217 103.05 #2	1213	32				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	64		217	103.05	#3	1144	30				
		65		217	103.05	#4	1219	33				
		66		"	"	#5	1168	31				
		67		"	"	#6	1240	32				
		68		"	"	#7 Precision	1246	33				
		69		"	"	#8	1165	31				
		70		"	"	#9	1224	33				
		71		"	"	#10	1147					
		72		217	103.01	#1	~~wrong~~ redid a sample					
		73		217	22.016	#1	576	12				
		74				#2	572	12				
		75				#3	584	12				
		76				#4	579	12				
		77		217	22.~~00~~016	#~~4~~ #5	566	16				
		78		217	22.~~00~~009	#~~2~~ #1	277	8				
		79				#~~3~~ #2	273	11				
		80				#3	280	11				
		81				#4	250	10				
		82		217	22.01	#1	200	7				
		83				#2	200	7				
		84				#3	217	7				
		85				#4	203	9				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	86		217	22.10	#1	229	7				
		87				#2	229	7				
		88				#3	223	10				
		89				#4	226	10				
		90		217	22.04	#1	220	7				
		91				#2	202	9				
		92				#3	227	10				
		93				#4	211	10				
		94		217	50.09	#1	167	6				
		95				#2	169	9				
		96				#3	166	8				
		97				#4	176	8				
		98		217	50.03	#1	250	9				
		99				#2	219	9				
		100				#3	246	10				
		101				#4	222	9				
		102		217	50.04	#1	177	7				
		103				#2	188	9				
		104				#3	198	9				
		105				#4	186	9				
		next page										

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	106		217 50.10 #1	181	7				
		107		| | #2	183	9				
		108		| | #3	175	8				
		109		| | #4	176	9				
		110		217 ~~Nist 2709~~ 50.07 #1	248	7				
		111		Nist ~~2709~~ 3212	232	6	no			
		112		Nist 3212	235	6	no			
		113		Nist 3212	252	7	yes			
		114		217 50.07 #2	275	8				
		115		| | #3	243	10				
		116		| | #4	249	10				
		117		203 7 SUIS #1	61	5				
		118		| | #2	66	5				
		119		| | #3	59	5				
		120		| | #4	62	5				
		121		203 27 SUIS #1	86	5				
		122		| | #2	72	5				
		123		| | #3	80	5				
		124		| | #4	92	5				
		125		203 18 SUIS #1	65	5				
		126		#2	57	5				
		127		~~Standardize~~ #3	56	5				
		128		203 standardize #4						

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	129		203 18 SU 15 #4	54	4				
		130		204 23 SU 15 #1	127	6				
		131	202	standardize ~~#2~~						
		132		204 23 SU 15 ~~#3~~ #2	134	6				
		133		#3	117	5				
		134		#4	113	5				
		135		204 99 SU 15 #1	136	6				
		136		#2	123	6				
		137		#3	136	6				
		138		#4	117	6				
		139		204 42 SU 15 #1	149	6				
		140		#2	157	8				
		141		#3	143	8				
		142		#4	139	8				
		143		4315	24	5				
		144		58ul	671	14				
		145		58ul	639	14				
		146		408	555	11				
		147		2709	138	7				
		148		3212	243	7				
		149		blank	-12	3				

PA

7/7

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

②

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5920	1	205							
		2		BLANK	-23	3				
		3		4315	25	4	y			
		4		2709	132	7	y			
		5		408	568	15	n			
		6		3212	247	9	n-by 1			
		7		5861	649	15	n			
		8		408	543	15	y			
		9		3212	259	9	y			
		10		5861	641	15	y			
		11		202 59 SU IS	173	8				
		12		"	198	9				
		13		"	172	8				
		14		"	211	9				
		15		202 29 SUIS	97	7				
		16		"	104	7				
		17		"	105	7				
		18		"	105	7				
		19		202 5~~4~~9 SUIS (reshot)	162	8				
		20		" XY	165	8				
		21		"	172	8				
		22		"	181	8				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	23		202 79 SUIS	125	8				
		24		" "	131	8				
		25		" "	119	8				
		26		" "	122	8				
		27		221 109.01 #1	54	6				
		28		" " #2	60	6				
		29		" " #3	80	6				
		30		" " #4	66	6				
		31		221 109.03 #1	62	6				
		32		" " #2	57	6				
		33		" " #3	50	6				
		34		" " #4	63	6				
		35		221 109.05 #1	54	6				
		36		" " #2	54	6				
		37		" " #3	57	5				
		38		" " #4						
		40		SRM 4315	24	4	yes			
		39		221 109.06 #1	70	6				
		41		" " #2	66	6				
		42		" " #3	55	6				
		44		" " #4	26	5				

* → CHANGE TITLE IN LOG (RUN #3 + ID)

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID		Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	45		221	164.02 #1	93	5				
		46		221	164.02 #2	114	5				
		47		221	164.02 #3	89	5				
		48		221	164.02 #4	96	5				
		43		221	109.06 #5	58	6				
		49		221	109.09 #1	72	5				
		50		221	109.09 #2	67	5				
		51		221	109.09 #3	70	5				
		52		221	109.09 #4	65	5				
		53		221	164.05 #1	116	5				
		54		221	164.05 #2	117	5				
		55		221	164.05 #3	106	5				
		56		221	164.05 #4	101	5				
		57			2709	159	7	N			
		58			2709	146	7	Y			
		59		221	164.06 #1	89	5				
		60		221	164.06 #2	90	5				
		61		221	164.06 #3	85	5				
		62		221	164.06 #4	93	5				
		63		221	164.08 #1	108	5				
		64		221	164.08 #2	102	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5420	65		221	~~106~~ 164.08	#3	113	5				
		66		221	164.08	#4	102	5				
		67		221	164.10	#1	108	5				
		68		221	164.10	#2	95	5				
		69		221	164.10	#3	91	5				
		70		221	164.10	#4	85	5				
		71		214	25.03	#1	530	15				
		72		214	25.03	#2	537	15				
		73		214	25.03	#3	548	15				
		74		214	25.03	#4	535	15				
		75		214	25.05	#1	475	14				
		76		214	25.05	#2	492	14				
		78	201	STANDARDIZE								
		79		214	25.05	#3	468	14				
		77		214	25.05	#4	468	14				
		80		214	25.05	#5	481	14				
		81		214	25.04	#1	1512	36				
		82		214	25.04	#2	1442	34				
		83		214	25.03	#3	1433	34				
		84		214	25.03	#4	1552	37				
		85		214	25.01	#1	325	10				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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78
108.5 11
29.3 6.3
3.3

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	86		214	25.01	#2	352	12				
		87		214	25.01	#3	338	11				
		88		214	25.01	#4	292	11				
		89		214	25.01	#5	346	12				
		90		214	25.01	#6	306	11				
		91		214	25.01	#7	317	11				
		92		214	25.01	#8	330	11				
		93		214	25.01	#9	296	11				
		94		214	25.09	#1	285	11				
		95		214	25.09	#2	268	11				
		96		214	25.09	#3	258	10				
		97		214	25.09	#4	265	10				
		98		214	25.09	#5	254	10				
		99		"	"	6	248	10				
		100		"	"	7	261	11				
		101		"	"	8	280	11				
		102		"	"	9	280	11				
		103		"	"	10	272	11				
		104		3212			243	9	yes			
		105		221	164.10	#1	80	7				
		106		"	"	#2	90	7				

Precision

oops, already ran it

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	107		221	164.10	#3	107	8				
		108		221	150.01	#1	187	9				
		109		221	~~164.08~~	#2	222	9				
		110		"	"	#3	211	9				
		111		"	"	#4	191	9				
		112		221	150.03	#1	134	8				
		113		"	"	#2	157	8				
		114		"	"	#3	149	8				
		115		"	"	#4	138	8				
		116		221	150.05	#1	130	8				
		117		"	"	#2	115	7				
		118		"	"	#3	122	8				
		119		"	"	#4	110	7				
		120		221	150.07	#1	112	7				
		121		"	"	#2	98	7				
		122		"	"	#3	117	7				
		123		"	"	#4	163	7				
		124			SRM 2709		146	7	yes			
		125		221	150.09	#1	113	5				
		126		"	"	#2	98	5				
		127		"	"	#3	103	5				
		128		"	"	#4	98	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	129		210 30 SUIS #1	52	5				
		130		" " #2	60	5				
		131		" " #3	55	5				
		132		" " #4	63	5				
		133		210 60 SUIS #1	59	5				
		134		" " #2	51	5				
		135		" " #3	66	5				
		136		" " #4	63	5				
		137		213 9.08 #1	129	6				
		138		213 9.08 #2	126	6				
		139		213 9.08 #3	128	6				
		140		213 9.08 #4	130	6				
		141		213 9.08 #5	130	6				
		142		213 9.02 #1	118	6				
		143		213 9.02 #2	116	6				
		144		213 9.02 #3	119	6				
		145		213 9.02 #4	128	6				
		146		2709	135	7				
		147		213 9.01 #1	126	6				
		148		213 9.01 #2	121	6				
		149		213 9.01 #3	122	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	150		213	9.01	#4	124	6				
		151		213	9.05	#1	124	6				
		152		213	9.05	#2	127	6				
		153		213	9.05	#3	131	6				
		154	203	STANDARDIZE								
		155		213	9.05	#4	151	6				
*		156		213	9.09	#1	129	6				
		157		213	9.09	#2	128	6				
		158		213	9.09	#3	133	6				
		159		213	9.09	#4	127	6				
		160		213	44.02	#1	231	7				
		161		213	44.02	#2	237	9				
		162		213	44.02	#3	228	10				
		163		213	44.02	#4	199	9				
*		164		213	44.08	#1	258	10				
*		165		213	44.08	#2	266	10				
*		166		213	44.08	#3	262	10				
*		167		213	44.08	#4	261	10				
		168		213	44.06	#1	91	5				
		169		213	44.06	#2	104	5				
		170		213	44.06	#3	106	5				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	171		213 44.06 #4	93	5				
		172		2709	148	7	Y			
		173		213 44.10 #1	699	13				
		174		213 44.10 #2	657	17				
		175		213 44.10 #3	699	18				
		176		213 44.10 #4	753	18				
		177		213 44.04 #1	671	18				
		178		213 44.04 #2	764	19				
		179		213 44.04 #3	849	21				
		180		213 44.04 #4	757	19				
		181		213 44.04 #5	807	20				
		182		" " #6	839	20				
		183		" #7	832	20				
		184		4315	30	4	Y			
		185		2709	138	7	Y			
		186		3212	221	6	Y			
		187		3212	262	7	Y			
		188		408	531	11	Y			
		189		5861	645	11	Y			
		190		BLANK	-10	3	Y			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/2010	5420	1		Stainless Steel Standard			201 Pass			
9		2		Standard 4315	40	Fail	4			
		3		Standard 4315	21	4	Fail			
		4		Standard 4315	26	4	Pass			
		5		Standard 2709	152	7	Pass			
		6		Standard 3212	264	7	Pass			
		7		Standard RTC 408	546	14	Pass			
		8		Standard 5861	690	14	Pass			
		9		Blank Standard	-9	3	Pass			
		10		Loc 213 SU 15.02 #1	222	9				
		11		Loc 213 SU 15.02 #2	229	9				
		12		Loc 213 SU 15.02 #3	220	9				
		13		Loc 213 SU 15.02 #4	229	8				
		14		Loc 213 SU 15.05 #1	385	10				
		15		Loc 213 SU 15.05 #2	382	11				
		16		Loc 213 SU 15.05 #3	413	11				
		17		Loc 213 SU 15.05 #4	382	11				
		18		Loc 213 SU 15.06 #1	291	10				
		19		Loc 213 SU 15.06 #2	298	10				
		20		Loc 213 SU 15.06 #3	281	10				
		21		Loc 213 SU 15.06 #4 Rpl	277	10				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.1 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		22		LOC 213 SU 15.06 #5 Rep#2	268	10				
	5420	23		LOC 213 SU 15.06 #6 Rep#3	270	10				
		24		LOC 213 SU 15.06 #7 Rep#4	269	10				
		25		LOC 213 SU 15.06 #8 Rep#5	285	10				
		26		LOC 213 SU 15.06 #9 Rep#6	275	10				
		27		LOC 213 SU 15.06 #10 Rep#7	273	10				
		28		LOC 213 SU 15.08 #1	309	11				
		29		LOC 213 SU 15.08 #2	321	11				
		30		LOC 213 SU 15.08 #3	274	10				
		31		LOC 213 SU 15.08 #4	301	11				
		32		LOC 210 SUIS 15 (5 increments) #1	69	6				
		33		LOC 210 SUIS 15 #2	72	6				
		34		LOC 210 SUIS 15 #3	63	6				
		35		LOC 210 SUIS 15 #4	58	6				
		36		LOC 213 SU 15.10 #1	452	13				
		37		LOC 213 SU 15.10 #2	459	13				
		38		LOC 213 SU 15.10 #3	420	13				
		39		LOC 213 SU 15.10 #4	454	13				
		40		LOC ID 214 SUIS 53 #1	127	6				
		41		LOC ID 214 SUIS 53 #2	139	6				
		42		LOC ID 214 SUIS 53 #3	138	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.2. 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		43		LOC ID 214 SUIS 53 #4	127	6				
5420		44		LOC ID 214 SUIS 23 #1	126	6				
		45		LOC ID 214 SUIS 23 #2	111	5				
		46		LOC ID 214 SUIS 23 #3	103	5				
		47		LOC ID 214 SUIS 23 #4	101	5				
		48		LOC ID 214 SUIS 25 #1	594	12				
		49		LOC ID 214 SUIS 25 #2	627	17				
		50		LOC ID 214 SUIS 25 #3	568	16				
		51		LOC ID 214 SUIS 25 #4	607	16				
		52		LOC ID 217 SUIS 22 #1	340	11				
		53		LOC ID 217 SUIS 22 #2	333	12				
		54		LOC ID 217 SUIS 22 #3	315	12				
		55		LOC ID 217 SUIS 22 #4	318	12				
		56		LOC ID 217 SUIS 50 #1	172	6				
		57		LOC ID 217 SUIS 50 #2	179	7				
		58		LOC ID 217 SUIS 50 #3	200	7				
		59		LOC ID 217 SUIS 50 #4	168	6				
		60		LOC ID 217 SUIS 103 #1	318	12				
		61		LOC ID 217 SUIS 103 #2	310	12				
		62		LOC ID 217 SUIS 103 #3	280	11				
		63		LOC ID 217 SUIS 103 #4	287	11				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		64		LOC 221 SUIS 109 #1	68	5				
5420		65		LOC 221 SUIS 109 #2	64	5				
		66		LOC 221 SUIS 109 #3	66	5				
		67		LOC 221 SUIS 109 #4	59	5				
		68		LOC 221 SUIS 150 #1	151	6				
		69		LOC 221 SUIS 150 #2	145	6				
		70		LOC 221 SUIS 150 #3	147	6				
		71		Stainless Steel Standard			203 Pass			
		72		LOC 221 SUIS 150 #4	140	6				
		73		LOC 221 SUIS 164 #1	101	5				
		74		LOC 221 SUIS 164 #2	98	5				
		75		LOC 221 SUIS 164 #3	106	5				
		76		LOC 221 SUIS 164 #4	93	5				
		77		LOC 213 SUIS 9 #1	117	6				
		78		" " #2	123	6				
		79		" " #3	115	6				
		80		" " #4	121	6				
		81		LOC 213 SUIS 44 #1	322	9				
		82		LOC 213 SUIS 44 #2	324	11				
		83		LOC 213 SUIS 44 #3	314	11				
		84		LOC 213 SUIS 41 #4	317	11				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.4 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9	5420	85		LOC 213	SUIS 15	#1	289	8				
		86		LOC 213	SUIS 15	#2	298	10				
		87		LOC 213	SUIS 15	#3	299	11				
		88		LOC 213	SUIS 15	#4	293	10				
				~~LOC~~	~~#02~~							
		89		3212			256	9	Yes			
		90		LOC 223	SU 4.02	#1	47	5				
		91		LOC 223	SU 4.02	#2	55	5				
		92		LOC 223	SU 4.02	#3	56	5				
		93		LOC 223	SU 4.02	#4	51	5				
		94		223	4.04	#1	56	5				
		95		"	"	#2	49	5				
		96		"	"	#3	53	5				
		97		"	"	#4	64	5				
		98		223	4.06	#1	55	5				
		99				#2	72	5				
		100				#3	57	5				
		101				#4	53	6				
		102		223	4.08	#1	49	5				
		103				#2	44	5				
		104				#3	55	5				
		105				#4	51	5				
		106		VOID - EXTRA RUN Cause Michael Distracted me.								

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser. No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	9420	107		LOC	223	SU ~~44.03~~ 4.10	#1	58	5				
		108			223	4.10	#2	48	5				
		109			223	4.10	#3	53	5				
		110			223	4.10	#4	58	5				
		111		LOC	223	44.03	#1	123	6				
		112					#2	135	7				
		113					#3	121	6				
		114					#4	118	6				
		115		LOC	223	44.05	#1	90	6				
		116					#2	84	6				
		117					#3	87	6				
		118					#4	94	6				
		119		LOC	223	44.06	#1	101	6				
		120					#2	90	6				
		121					#3	124	6				
		122					#4	107	6				
		123		LOC	223	44.08	#1	130	6				
		124		LOC	223	44.06	#5	109	6				
		125		LOC	223	44.08	#2	138	6				
		126					#3	132	7				
		127					#4	133	15				
		128		8	2709			135	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID		Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5420	150		LOC 223 SU 28.07	2	68	5				
		151			3	69	5				
		152			4	58	5				
		153		LOC 223 SU 28.09	1	63	5				
		154			2	67	5				
		155			3	68	5				
		156			4	77	5				
		157		4315		32	4	OK			
		158		5861		695	11	OK			
		159		2709		136	7	OK			
		160		408 (RCRA)		550	11	OK			
		161		3212		265	7	OK			
2/9/10	5420	162		Blank		ND		OK			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5420	129		LOC 223 SU 44.09 #1	107	6				
		130		#2	109	6				
		131		#3	106	6				
		132		#4	114	6				
		133		LOC 223 SU 28.01 #1	60	5				
		134		2	58	5				
		135		3	55	5				
		136		4	69	5				
		137		LOC 223 SU 28.03 1	76	6				
		138	201	2	81	6				
		139	~~206~~	Standarized ~~3~~			PASS			
		140		LOC 223 SU 28.03 3 ~~4~~	78	6				
		141		SU 28.03 4	88	6				
		142		LOC 223 SU 28.~~05~~ 03 5	73	6				
		143		~~2~~6	88	6				
		144		LOC 223 SU 28.05 ~~3~~ 1	63	5				
		145		~~4~~ 2	62	5				
		146		3	59	5				
		147		4	70	5				
		148		2709 ~~2~~						
		149		LOC 223 SU 28.07 ~~2~~1	65	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

Error to draw 2709 from reading 25 AVed

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-18-10	5420	1	201	STANDARDIZATION						
		2	205	"						
		3		BLANK	-12	3				
		4		4315	28	4	yes			
		5		2709	142	7	yes			
		6		3212	249	7	yes			
		7		408	582	13	No			
		8		5861	675	15	Yes			
		9		408	535	15	Yes			
		10		225 8.03 #1	255	8				
		11		225 8.03 #2	253	9				
		12		225 8.03 #3	262	9				
		13		225 8.03 #4	239	9				
		14		225 8.09 #1	136	8				
		15		225 8.09 #2	137	6				
		16		225 8.09 #3	146	6				
		17		225 8.09 #4	149	6				
		18		225 8.07 #1	103	6				
		19		225 8.07 #2	108	6				
		20		225 8.07 #3	102	6				
		21		225 8.07 #4	102	[illegible]				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/16	5420	22		225	8.05	#1	105	6				
		23		225	8.05	#2	138	6				
		24		225	8.05	#3	106	6				
		25		225	8.05	#4	116	6				
		26		225	8.05	#5	109	6				
		27		225	8.05	#6	98	6				
		28		225	8.05	#7	104	6				
		29		225	8.05	#8	99	6				
		30		225	8.05	#9	120	6				
		31		225	8.05	#10	111	6				
		32		225	8.01	#1	136	6				
		33		225	8.01	#2	143	6				
		34		225	8.01	#3	135	6				
		35		225	8.01	#4	125	6				
		36		225	32.02	#1	100	5				
		37		225	32.02	#2	111	5				
		38		225	32.02	#3	114	5				
		39		225	32.02	#4	106	5				
		40		225	32.04	#1	79	5				
		41		225	32.04	#2	90	5				
		42		225	32.04	#3	75	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	43		225	32.04	#4	78	5				
		44		225	32.10	#1	77	5				
		45		225	32.10	#2	82	5				
		46		225	32.10	#3	~~78~~ 76	5				
		47		225	32.10	#4	~~16~~ 95	5				
		48		225	32.06	#1	~~114~~ 66	6				
		49		225	32.06	#2	~~106~~ 114	6				
		50		225	32.06	#3	~~110~~ 106	6				
		51		225	32.06	#4	~~124~~ 110	6				
		52				5	124	6				
		53				6 PREC.	115	6				
		54				7	121	6				
		55				8	116	6				
		56				9	117	6				
		57				10	114	6				
		58		225	32.08	#1	98	5				
		59		225	32.08	#2	86	5				
		60		225	32.08	#3	95	5				
		61		225	32.08	#4	81	5				
		62		225	60.08	#1	60	5				
		63		225	60.08	#2	63	5				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	64		225	60.08	#3	66	5				
		65		225	60.08	#4	58	5				
		66		225	60.09	#1	69	5				
		67	203	STANDARDIZE			~~70~~	~~5~~				
		68		225	60.09	#2	70	5				
		69		"	"	#3	65	5				
		70		"	"	#4	62	5				
		71		225	60.03	#1	56	5				
		72		225	"	#2	54	5				
		73		"	"	#3	63	5				
		74				#4	62	5				
		75		225	60.01	#1	63	5				
		76		"	"	#2	57	5				
		77		"	"	#3	53	5				
		~~78~~		"	"	#4	50	5				
		79		225	60.05	#1	68	5				
		80		225	60.05	#2	58	5				
		81		225	60.05	#3	56	5				
		82		225	60.05	#4	70	5				
		83		223	44 SUTS	#1	98	6				
		84				#2	116	6				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	85		223 44 SUTS #3	108	6				
		86		223 44 SUTS #4	109	6				
		87		223 28 SUTS #1	69	5				
		88		223 28 SUTS #2	77	5				
		89		223 28 SUTS #3	73	5				
		90		223 28 SUTS #4	65	5				
		91		223 4 SUTS #1	53	5				
		92		223 4 SUTS #2	52	5				
		93		223 4 SUTS #3	55	5				
		94		223 4 SUTS #4	54	5				
		95		202 DUTS #1	139	6				
		96		202 DUTS #2	130	6				
		97		202 DUTS #3	125	6				
		98		202 DUTS #4	131	6				
		99		203 DUTS #1	59	5				
		100		203 DUTS #2	70	5				
		101		203 DUTS #3	68	5				
		102		203 DUTS #4	70	5				
		103		204 DUTS #1	125	6				
		104		204 DUTS #2	129	6				
		105		204 DUTS #3	126	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	106		204 DUIS #4	124	6				
		107		210 DUIS #1	59	5				
		108		210 DUIS #2	59	5				
		109		210 DUIS #3	61	5				
		110		210 DUIS #4	63	5				
		111		213 DUIS #1	239	7				
		112		213 DUIS #2	279	10				
		113		213 DUIS #3	237	10				
		114		213 DUIS #4	278	10				
		115		213 DUIS #5	252	10				
		116		213 DUIS #6	249	10				
		117		213 DUIS #7	250	10				
		118		213 DUIS #8	245	10				
		119		214 DUIS #1	218	10				
		120		214 DUIS #2	225	10				
		121		214 DUIS #3	237	10				
		122		214 DUIS #4	219	9				
		123		3212	263	9	Y			
		124		217 DUIS #1	262	10				
		125		217 DUIS #2	261	10				
		126		217 DUIS #3	262	10				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	127		217 DUIS #4	$270	11				
		128		221 DUIS #1	96	5				
		129		221 DUIS #2	93	5				
		130		221 DUIS #3	100	5				
		131		221 DUIS #4	95	5				
		132		4315	26	4	Y			
		133		2709	135	7	Y			
		134	205	~~3210~~ STANDARDIZE						
		135		3212	269	7	Y			
		136		408	568	15	No			
		137		408	549	15	Y			
		138		5861	660	14	Y			
		139		BLANK	-6	4	Y			
			PA							

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/11/10	5420	1		STANDARDIZE - ACQUISITION ERROR						
		2	203	STANDARDIZE						
		3		BLANK	-8	3	YES			
		4		4315	24	4	Yes			
		5		2709	138	7	YES			
		6		3212 (245)(±16)	236	9	YES			
		7		408	565	15	NO			
		8		408	573	16	No			
		9		408 ABORTED TO CLEAN WINDOW	~~532~~	~~15~~	~~Yes~~			
		10		408	532	15	Yes			
		11		5861	701	15	Yes			
		12		223 DUIS #1	88	5				
		13		223 DUIS #2	77	5				
		14		223 DUIS #3	78	5				
		15		223 DUIS #4	76	5				
		16		225 8 SUIS #1	129	6				
		17		225 8 SUIS #2	135	6				
		18		225 8 SUIS #3	162	6				
		19		225 8 SUIS #4	133	6				
		20		225 32 SUIS #1	104	5				
		21		225 32 SUIS #2	94	5				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/11/10	5420	22		225 32 SUIS #3	106	5				
		23		225 32 SUIS #4	94	5				
		24		225 60 SUIS #1	63	5				
		25		225 60 SUIS #2	64	5				
		26		225 60 SUIS #3	82	5				
		27		225 60 SUIS #4	70	5				
		28		225 60 SUIS #5	69	5				
		29		225 DUIS #1	86	5				
		30		225 DUIS #2	94	6				
		31		225 DUIS #3	105	6				
		32		~~222~~ 225 DUIS #4	100	5				
		33		225 DUIS #5	100	6				
		34		4315	33	4	YES			
		35		2709	142	7	YES			
		36		3212	251	9	YES			
		37		408	547	15	YES			
		38		5861	677	15	YES			
		39		BLANK	-5	4	YES			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5420	1	202							
		2		3212	239	7	Y			
		3		2709	151	7	Y			
		4		4313	37	4	Y			
		5		BLANK	-16	3	Y			
		6		RTC Right @ +2 SD	567	12	Y			
		7		5861	464	13	Y			
		8		202-59.10 #1	327	8				
		9		202-59.10 #2	360	12				
		10		202-59.10 #3	298	10				
		11		202-59.10 #4 - SD out of range	342	11				
		12		202-59.10 #5	317	11				
		13		202-59.10 #6	344	11				
		14		202-59.10 #7	326	11				
		15		202-59.10 #8	328	11				
		16		202-59.07 #1	635	12				
		17		202-59.07 #2	657	16				
		18		202-59.07 #3	624	16				
		19		202-59.07 #4 - SD out of range	581	15				
		20		202-59.07 #5	632	16				
		21		202-59.07 #6	626	16				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Tannery Sludge Farm Fields

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
		22		202 59.07 #7	652	16				
		23		202 59.07 #8	572	15				
		24		STANDARDIZATION						
		25		3212 STANDARD	235	9				
		26		408	556	15				
		27		202 59.07 #9	631	16				
		28		202 59.07 #10	552	15				
Pam		29		202 59.09 #1	324	11				
2/2/2010		30		202 59.09 #2	297	11				
	5420	31		202 59.09 #3	312	11				
		32		202 59.09 #4	276	10				
		33		202 59.05 #1	100	7				
		34		202 59.05 #2	111	6				
		35		202 59.05 #3	106	6				
		36		202 59.05 #4	100	6				
		37		202 59.02 #1	160	6				
		38		202 59.02 #2	195	6				
		39		202 59.02 #3	213	7				
		~~39~~40		202 59.02 #4	204	7				
		41		202 59.02 #5	165	6				
		42		202 79.01 #1	99	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID: Loc ID	SU	Run	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/2		43		202	79.01	#2	95	6				
2010	0	44		202	79.01	#3	94	6				
	N	45		202	79.01	#4	94	6				
	4	46		202	59.02	#6	185	6				
	5	47		202	59.02	#7	163	6				
		48		202	59.02	#8	168	6				
		49		202	59.02	#9	176	6				
*		50		202	79.03	#1	130	6	~~Computer test info incorrect~~			
		51		202	79.03	#2	121	6				
		52		202	79.03	#3	137	6				
		53		202	79.03	#4	140	6				
		54		202	79.07	#1	113	6				
		55		202	79.07	#2	122	6				
		56		202	79.07	#3	116	6				
		57		202	79.07	#4	116	6				
		58		202	79.08	#1	145	6				
		59		202	79.08	#2	136	6				
		60		202	79.08	#3	134	6				
		61		202	79.08	#4	130	6				
		62		202	79.08	#5	129	6				
		63		202	79.08	#6	136	6				

Precision Runs

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-2-10	5420	64		202	79.08	#7	Precision Runs	130	6				
		65		202	79.08	#8		134	6				
		66		202	79.08	#9		140	6				
		67		202	79.08	#10		109	6				
		68		202	79.10	#1		97	6				
		69		202	79.10	#2		100	6				
		70		202	79.10	#3		106	6				
		71		202	79.10	#4		100	6				
		72		202	29.02	#1		121	5				
		73		202	29.02	#2		133	5				
		74		202	29.02	#3		123	5				
		75		202	29.02	#4		114	5				
		76		202	29.03	#1		167	5				
		77		202	29.03	#2		73	5				
		78		202	29.03	#3		77	5				
		79		202	29.03	#4		81	5				
		80		202	29.04	#1		78	5				
		81		202	29.04	#2		78	5				
		82		202	29.04	#3		83	5				
		83		202	29.04	#4		84	5				
		84		202	29.05	#1		53	4				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	LOC ID	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/2/2010	5120	86		202	29.05 #2	46	4				
		85		Standardization				200			
		87		202	29.05 #3	54	4				
		88		202	29.05 #4	39	4				
		89		202	29.10 #1	67	5				
		90		202	29.10 #2	63	5				
		91		202	29.10 #3	68	5				
		92		202	29.10 #4	60	5				
		93		214	23.01 #1	87	5				
		94		214	23.01 #2	84	5				
		95		214	23.01 #3	88	5				
		96		214	23.01 #4	89	5				
		97		214	23.05 #1	74	5				
		98		214	23.05 #2	71	5				
		99		214	23.05 #3	71	5				
		100		214	23.05 #4	78	5				
		101		214	23.06 #1	136	6				
		102		214	23.06 #2	123	5				
		103		214	23.06 #3	122	5				
		104		214	23.06 #4	114	5				
		105		4315	Standard	29	4	Pass			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/2/2010	5420	106		Standard 2709	133	7	Pass			
		107		Standard 3212	236	8	Pass			
		108		Standard RTC 408	515	12	Pass			
		109		Standard 5861	651	11	Pass			
		110		Blank Standard	-4	3	Pass			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

R6.

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5420	1	205	STANDARDIZE						
		2		3212	252	7				
		3	201	~~1315~~ POWER FAIL - STANDARDIZATION						
		4		3212 - -3 SD	222	7				
		5		3212 - ALT CUP	237	7	Y			
		6		BLANK	-9	3	Y			
		7		4315	27	4	Y			
		8		5861	637	11	Y			
		9		2709	141	7	Y			
		10		408 RCRA @-2 SD (511)	513	11	Y			
		11		214 23.08 #1	89	5				
		12		214 23.08 #2	81	5				
		13		214 23.08 #3	88	5				
		14		214 23.08 #4	80	5				
		15		214 23.10 #1	64	5				
		16		214 23.10 #2	69	5				
		17		214 23.10 #3	75	5				
		18		214 23.10 #4	75	5				
		19		214 25.02 #1	87	5				
		20		" " #2	84	5				
		21		#3	82	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	3420	22		214	25.02	#4	80	5				
		23		214	25.06	#1	600	12				
		24		214	25.06	#2	577	16				
		25		214	25.06	#3	588	16				
		26		214	25.06	#4	592	16				
		27		214	25.07	#1	876	16				
		28		214	25.07	#2	887	22				
		29		214	25.07	#3	923	23				
		30		214	25.07	#4	960	23				
		31		214	25.08	#1	1250	24				
		32		214	25.08	#2	1291	32				
		33		214	25.08	#3	1286	32				
		34		214	25.08	#4	1292	32				
		35		SRM 5861		>+2SD	714	15				
		36		SRM 5861			655	11				
		37		214	25.10	#1	90	6				
		38		214	25.10	#2	85	5				
		39		214	25.10	#3	89	6				
		40		214	25.10	#4	88	6				
		41		214	53.01	#1	122	6				
		42		214	53.01	#2	137	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	43		214 53.01 #3	150	6				
		44		214 53.01 #4	135	6				
		45		214 53.03 #1	102	5				
		46		214 53.03 #2	112	6				
		47		214 53.03 #3	96	5				
		48		214 53.03 #4	101	5				
		49		" " 5	96	5				
		50		" " 6	97	6				
		51		" " 7 PRECISION	111	6				
		52		" " 8	115	6				
		53		" " 9	117	6				
		54		" " 10	104	6				
		55		214 53.05 #1	84	6				
		56		" " #2	82	5				
		57		" " #3	89	6				
		58		" " #4	83	5				
		59		2 SRM 2709	145	7	Y			
		60		214 53.06 #1	208	7				
		61		" " #2	203	9				
		62		" " #3	217	9				
		63		" " #4	232	10				
		64		" " #5	213	9				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-3-10	5420	65		214 53.09 #1	71	7				
		66		" " #2	78	5				
				~~" " #3~~						
				~~" " #4~~						
		67	201	STANDARDIZE						
		68		214 53.09 #3	67	5				
		69		214 53.09 #4	73	5				
		70		203 7.01 #1	73	5				
		71		203 7.01 #2	83	5				
		72		203 7.01 #3	63	5				
		73		203 7.01 #4	67	5				
		74		4315 @+2SD (39)	37	4	Y			
		75		203 7.05 #1	71	5				
		76		203 7.05 #2	78	5				
		77		203 7.05 #3	68	5				
		78		203 7.05 #4	76	5				
		79		203 7.05 #5	72	5				
		80		203 7.06 #1	67	5				
		81		203 7.06 #2	64	5				
		82		203 7.06 #3	71	5				
		83		203 7.06 #4	62	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	~~54~~ 5420	84		203	7.08	#1	58	5				
		85		203	7.08	#2	65	5				
		86		203	7.08	#3	56	5				
		87		203	7.08	#4	54	5				
		88		203	7.10	#1	72	5				
		89		203	7.10	#2	67	5				
		90		203	7.10	#3	65	5				
		91		203	7.10	#4	64	5				
		92		203	18.07	#1	50	5				
		93		203	18.07	#2	49	5				
		94		203	18.07	#3	56	5				
		95		203	18.07	#4	41	4				
		96		203	18.04	#1	57	5				
		97		203	18.04	#2	58	5				
		98		203	18.04	#3	60	5				
		99		203	18.04	#4	62	5				
		100		4315		@-250(22)	24	4	Y			
		101		203	18.01	#1	50	5				
		102		203	18.01	#2	47	5				
		103		203	18.01	#3	55	5				
		104		203	18.01	#4	54	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	105		203 18.03 #1	52	5				
		106		203 18.03 #2	53	5				
		107		203 18.03 #3	47	4				
		108		203 18.03 #4	47	4				
		109		203 18.06 #1	50	4				
		110		203 18.06 #2	46	4				
		111		203 18.06 #3	51	4				
		112		203 18.06 #4	53	4				
		113		4315	32	4	Y			
		114		203 27.04 #1	64	5				
		115		203 27.04 #2	63	5				
		116		203 27.04 #3	64	5				
		117		203 27.04 #4	68	5				
		118		203 27.07 #1	77	5				
		119		203 27.07 #2	73	5				
		120		203 27.07 #3	78	5				
		121		203 27.07 #4	76	5				
		122	202	STANDARDIZE						
		123		4315	32	4	Y			
		124		203 27.09 #1	71	5				
		125		203 27.09 #2	71	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	126		203 27.09 #3	69	5				
		127		203 27.09 #4	71	5				
		128		203 27.01 #1	81	5				
		129		203 27.01 #2	83	5				
		130		203 27.01 #3	104	5				
		131		203 27.01 #4	82	5				
		132		203 27.06 #1	81	5				
		133		203 27.06 #2	76	5				
		134		203 27.06 #3	80	5				
		135		203 27.06 #4	67	5				
		136		5861	663	11				
		137		408	553	11				
		138		3212	251	7				
		139		2709	138	7				
		140		4315	34	4				
		141		BLANK	-9	3				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	5420	1	203	STANDARDIZE – FAIL – USER ERROR								
		2	203	STANDARDIZE								
		3		BLANK			-14	3	Y			
		4		4315		> -2SD(22)	18	4				
		5		4315		@ -2SD	23	4	Y			
		6		3212			255	7	Y			
		7		4108			520	11	Y			
		8		2709			136	7	Y			
		9		5861			645	11	Y			
		10		204	99.03	#1	80	5				
		11		204	99.03	#2	79	5				
		12		204	99.03	#3	84	5				
		13		204	99.03	#4	82	5				
		14		204	99.04	#1	92	5				
		15		204	99.04	#2	83	5				
		16		204	99.04	#3	91	5				
		17		204	99.04	#4	79	5				
		18		204	99.01	#1	133	6				
		19		204	99.01	#2	129	6				
		20		204	99.01	#3	131	6				
		21		204	99.01	#4	138	6				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	542	22		204	99.05	#1	130	6				
		23		204	99.05	#2	125	5				
		24		204	99.05	#3	108	5				
		25		204	99.05	#4	111	5				
		26			~~99.07~~	2709 7+250	156	7				
		27			2709		131	7				
		28		204	99.07	#1	163	6				
		29		204	99.07	#2	158	8				
		30		204	99.07	#3	149	8				
		31		204	99.07	#4	171	8				
		32		204	42.02	#1	123	8				
		33		204	42.02	#2	128	6				
		34		204	42.02	#3	117	6				
		35		204	42.02	#4	125	6				
		36		204	23.03	#1	137	6				
		37		204	23.03	#2	123	6				
		38		204	23.03	#3	136	6				
		39		204	23.03	#4	134	6				
		40		204	42.03	#1	331	9				
		41		204	42.03	#2	327	9				
		42		204	42.03	#3	372	13				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	520	43		204 42.03 #4	348	12				
		44		204 #5	332	12				
		45		#6	323	12				
		46		#7 PRECISION	344	12				
		47		#8	350	12				
		48		#9	359	12				
		49		#10	347	12				
		50		204 42.04 #1	105	5				
		51		204 42.04 #2	98	6				
		52		204 42.04 #3	94	6				
		53		204 42.04 #4	106	6				
		54		204 42.03 # 50 OUT OF RANGE	370	13				
		55		204 42.03	371	13				
		56		204 42.04 ~~#7~~ 5	101	7				
		57		204 42.09 #1	107	5				
		58		204 42.09 #2	112	5				
		59		204 42.09 #3	99	5				
		60		204 42.09 #4	114	5				
		61		204 42.10 #1	91	5				
		62	203	STANDARDIZE						
		63		204 42.10 #2	90	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
24-10	5420	64		204	42.10	#3	101	5				
		65		204	42.10	#4	85	5				
		66		204	23.04	#1	96	5				
		67		"	"	#2	81	5				
		68		"	"	#3	91	5				
		69		"	"	#4	92	5				
		70		204	23.03	#1 (already run)	129	7				
		71		"	23.06	#1	66	5				
		72		"	"	#2	84	5				
		73		"	"	#3	73	5				
		74		"		#4	62	5				
		75			NIST 2709		149	7	Y			
		76		204	23.08	#1	64	4				
		77		"	"	#2	71	5				
		78		"	"	#3	67	5				
		79		"	"	#4	62	4				
		80		204	23.10	#1	244	7				
		81		204	23.10	#2	255	7				
		82		204	23.10	#3	223	9				
		83		204	23.10	#4	254	10				
		84		204	23.10	#5 ←	42.10		– GRABBED	WRONG	BAS	

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/4/10	342	85		204 23.10 #5	245	10				
		86		210 15.10 #1	71	6				
		87		210 15.10 #2	79	6				
		88		210 15.10 #3	72	5				
		89		210 15.10 #4	60	5				
		90		210 15.10 #5	60	5				
		91		210 15.10 #6	80	6				
		92		210 15.10 #7	65	5				
		93		210 15.10 #8	68	6				
		94		4315	29	4	Y			
		95		210 15.02 #1	76	6				
		96		210 15.02 #2	87	6				
		97		210 15.02 #3	79	6				
		98		210 15.02 #4	72	6				
		99		210 15.03 #1	70	6				
		100		210 15.03 #2	70	6				
		101		210 15.03 #3	73	6				
		102		210 15.03 #4	79	6				
		103		210 15.06 #1	32	5				
		104		210 15.06 #2	48	6				
		105		210 15.06 #3	48	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser. No.	XRF Run #	Res. eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
02/4/10	5420	106		210 15.06 #4	41	5				
		107		210 15.08 #1	65	6				
		108		210 15.08 #2	71	6				
		109		210 15.08 #3	72	6				
		110		210 15.08 #4	~~69~~ 68	6				
		111		210 62.08 #1	45	5				
		112		210 62.08 #2	45	5				
		113		210 62.08 #3	49	5				
		114		210 62.08 #4	43	5				
		115		210 62.02 #1	35	6				
		116		210 62.02 #2	56	6				
		117		210 62.02 #3	55	6				
		118		210 62.02 #4	49	6				
		119		210 62.02 #5	41	6				
		120		210 62.02 #6	43	6				
		121	204	~~5861~~ STANDARDIZE						
		122		5861	659	11	Y			
		123		408	554	11	Y			
		124		3212	255	7	Y			
		125		2709 >-250(126)	125	7	N			
		126		2709 >+250(151)	152	7	N			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
02/4/10	5420	127		2709	155	7	~			
		128		4315	34	4	Y			
		129		BLANK	-10	5	Y			

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	1		Standard (Stainless steel)			203-Pass			
		2		Standard 4315	27	5	Pass			
		3		Standard 2709	128	9	Pass			
		4		Standard 3212	220	8	Fail			
		5		Standard 3212	229	9	Fail			
		6		Standard 3212	248	9	Pass			
		7		Standard RTC 408	562	15	Pass			
		8		Standard 5861	1617	14	Fail			
		9		Standard 5861	1069	15	Pass	(no specific chart)		
		10		Blank	-18	3	Pass			
		11		210 62.06 #1	63	5				
		12		210 62.06 #2	73	5				
		13		210 62.06 #3	57	5				
		14		210 62.06 #4	72	5				
		15		210 62.01 #1	88	6				
		16		210 62.01 #2	105	6				
		17		210 62.01 #3	103	6				
		18		210 62.01 #4	133	6				
		19		210 62.09 #1	53	5				
		20		210 62.09 #2	52	5				
		21		210 62.09 #3	59	5				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	22		210 62.09 #4	58	5				
		23		210 30.08 #1	52	5				
		24		210 30.08 #2	47	5				
		25		210 30.08 #3	53	5				
		26		210 30.08 #4	38	5				
		27		210 30.04 #1	65	5				
		28		210 30.04 #2	72	5				
		29		210 30.04 #3	62	5				
		30		210 30.04 #4	73	5				
		31		210 30.09 #1	42	5				
		32		210 30.09 #2	42	5				
		33		210 30.09 #3	42	5				
		34		210 30.09 #4	41	5				
		35		2709	141	7	~~N~~ YES IT DID			
		36		2709	135	7	Y			
		37		210 30.01 #1	82	5				
		38		210 30.01 #2	77	5				
		39		210 30.01 #3	82	5				
		40		210 30.01 #4	70	5				
		41		210 30.03 #1	82	5				
		42		210 30.03 #2	73	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	43		210 30.03 #3	78	6				
		44		210 30.03 #4	70	5				
		45		217 103.08 #1	117	6				
		46		217 103.08 #2	106	6				
		47		217 103.08 #3	106	6				
		48		217 103.08 #4	113	6				
		49		217 103.09 #1	337	10				
		50		217 103.09 #2	334	12				
		51		217 103.09 #3	318	12				
		52		217 103.09 #4	303	12				
		53		217 103.06 #1	80	5				
		54		217 103.06 #2	78	5				
		55		217 103.06 #3	87	5				
		56		217 103.06 #4	82	5				
		57	202	STANDARDIZE						
		58		217 103.01 #1	330	9				
		59		217 103.01 #2	293	12				
		60		217 103.01 #3	331	13				
		61		217 103.01 #4	321	12				
		62		217 103.05 #1	1181	24				
		63		217 103.05 #2	1213	32				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	64		217	103.05	#3	1144	30				
		65		217	103.05	#4	1219	33				
		66		"	"	#5	1168	31				
		67		"	"	#6	1240	32				
		68		"	"	#7 PRECISION	1246	33				
		69		"	"	#8	1165	31				
		70		"	"	#9	1224	33				
		71		"	"	#10	1147					
		72		217	103.01	#1	~~wrong~~ redid a sample					
		73		217	22.016	#1	576	12				
		74				#2	572	12				
		75				#3	584	12				
		76				#4	579	12				
		77		217	22.~~08~~016	#~~6~~ #5	566	16				
		78		217	22.~~06~~009	#~~2~~ #1	277	8				
		79		|	|	#~~3~~ #2	273	11				
		80		|	|	#3	280	11				
		81		|	|	#4	250	10				
		82		217	22.01	#1	200	7				
		83		|	|	#2	200	7				
		84		|	|	#3	217	7				
		85		|	|	#4	203	9				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	86		217	22.10	#1	229	7				
		87				#2	229	7				
		88				#3	223	10				
		89				#4	226	10				
		90		217	22.04	#1	220	7				
		91				#2	202	9				
		92				#3	227	10				
		93				#4	211	10				
		94		217	50.09	#1	167	6				
		95				#2	169	9				
		96				#3	166	8				
		97				#4	176	8				
		98		217	50.03	#1	250	9				
		99				#2	219	9				
		100				#3	246	10				
		101				#4	222	9				
		102		217	50.04	#1	177	7				
		103				#2	188	9				
		104				#3	198	9				
		105				#4	186	9				
		next page										

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	106		217 50.10 #1	181	7				
		107		| | #2	183	9				
		108		| | #3	175	8				
		109		| | #4	176	9				
		110		217 ~~Nist 2709~~ 50.07 #1	248	7				
		111		Nist ~~2709~~ 3212	232	6	no			
		112		Nist 3212	235	6	no			
		113		Nist 3212	252	7	yes			
		114		217 50.07 #2	275	8				
		115		| | #3	243	10				
		116		| | #4	249	10				
		117		203 7 SUIS #1	61	5				
		118		| | #2	66	5				
		119		| | #3	59	5				
		120		| | #4	62	5				
		121		203 27 SUIS #1	86	5				
		122		| | #2	72	5				
		123		| | #3	80	5				
		124		| | #4	92	5				
		125		203 18 SUIS #1	65	5				
		126		#2	57	5				
		127		~~Standardize~~ #3	56	5				
		128		203 standardize #4						

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/5/10	5420	129		203 18 SU 15 #4	54	4				
		130		204 23 SU 15 #1	127	6				
		131	202	standardize ~~#2~~						
		132		204 23 SU 15 ~~#3~~ #2	134	6				
		133		#3	117	5				
		134		#4	113	5				
		135		204 99 SU 15 #1	131	6				
		136		#2	123	6				
		137		#3	136	6				
		138		#4	117	6				
		139		204 42 SU 15 #1	149	6				
		140		#2	157	8				
		141		#3	143	8				
		142		#4	139	8				
		143		4315	24	5				
		144		58 ul	671	14				
		145		58 ul	639	14				
		146		408	555	11				
		147		2709	138	7				
		148		3212	243	7				
		149		blank	-12	3				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	1	205							
		2		BLANK	-23	3				
		3		4315	25	4	y			
		4		2709	132	7	y			
		5		408	568	15	n			
		6		3212	247	9	n-by 1			
		7		5861	649	15	n			
		8		408	543	15	y			
		9		3212	259	9	y			
		10		5861	641	15	y			
		11		202 59 SU IS	173	8				
		12		"	198	9				
		13		"	172	8				
		14		"	211	9				
		15		202 29 SUIS	97	7				
		16		"	104	7				
		17		"	105	7				
		18		"	105	7				
		19		202 5~~4~~9 SUIS (reshot)	162	8				
		20		" x4	165	8				
		21		"	172	8				
		22		"	181	8				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	23		202 79 SUIS	125	8				
		24		" "	131	8				
		25		" "	119	8				
		26		" "	122	8				
		27		221 109.01 #1	54	6				
		28		" " #2	60	6				
		29		" " #3	80	6				
		30		" " #4	66	6				
		31		221 109.03 #1	62	6				
		32		" " #2	57	6				
		33		" " #3	50	6				
		34		" " #4	63	6				
		35		221 109.05 #1	54	6				
		36		" " #2	54	6				
		37		" " #3	57	5				
		38		" " #4						
		B40		SRM 4315	24	4	yes			
		39		221 109.06 #1	70	6				
		41		" " #2	66	6				
		42		" " #3	55	6				
		44		" " #4	66	5				

* ↳ CHANGE TITLE IN LOG (RUN #3 + ID)

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	45		221 164.02 #1	43	5				
		46		221 164.02 #2	114	5				
		47		221 164.02 #3	89	5				
		48		221 164.02 #4	96	5				
		43		221 109.06 #5	58	6				
		49		221 109.09 #1	72	5				
		50		221 109.09 #2	67	5				
		51		221 109.09 #3	70	5				
		52		221 109.09 #4	65	5				
		53		221 164.05 #1	110	5				
		54		221 164.05 #2	117	5				
		55		221 164.05 #3	106	5				
		56		221 164.05 #4	101	5				
		57		2709	159	7	N			
		58		2709	146	7	Y			
		59		221 164.06 #1	89	5				
		60		221 164.06 #2	90	5				
		61		221 164.06 #3	85	5				
		62		221 164.06 #4	93	5				
		63		221 164.08 #1	108	5				
		64		221 164.08 #2	102	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5420	65		221 ~~106~~ 164.08 ~~#~~3	113	5				
		66		~~8~~ 221 164.08 ~~#2~~ 4	102	5				
		67		221 164.10 #1	108	5				
		68		221 164.10 #2	95	5				
		69		221 164.10 #3	91	5				
		70		221 164.10 #4	85	5				
		71		214 25.03 #1	530	15				
		72		214 25.03 #2	537	15				
		73		214 25.03 #3	548	15				
		74		214 25.03 #4	535	15				
		75		214 25.05 #1	475	14				
		76		214 25.05 #2	492	14				
		78	201	STANDARDIZE						
		79		214 25.05 #3	468	14				
		77		214 25.05 #4	468	14				
		80		214 25.05 #5	481	14				
		81		214 25.04 #1	1512	36				
		82		214 25.04 #2	1442	34				
		83		214 25.03 #3	1433	~~34~~ 34				
		84		214 25.03 #4	1552	37				
↓	↓	85		214 25.01 #1	325	10				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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78
168.5 11
27.3 6.8
3.3

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	86		214	25.01	#2	352	12				
		87		214	25.01	#3	338	11				
		88		214	25.01	#4	292	11				
		89		214	25.01	#5	346	12				
		90		214	25.01	#6	306	11				
		91		214	25.01	#7	317	11				
		92		214	25.01	#8	330	11				
		93		214	25.01	#9	296	11				
		94		214	25.09	#1	285	11				
		95		214	25.09	#2	268	11				
		96		214	25.09	#3	258	10				
		97		214	25.09	#4	265	10				
		98		214	25.09	#5	254	10				
		99		"	"	6	248	10				
		100		"	"	7	261	11				
		101		"	"	8	280	11				
		102		"	"	9	280	11				
		103		"	"	10	272	11				
		104		3212			243	9	yes			
		105		221	164.10	#1	80	7				
		106		"	"	#2	90	7				

Precision

oops already ran it

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	107		221	164.10	#3	107	8				
		108		221	150.01	#1	187	9				
		109		221	~~164.08~~	#2	222	9				
		110		"	"	#3	211	9				
		111		"	"	#4	191	9				
		112		221	150.03	#1	134	8				
		113		"	"	#2	157	8				
		114		"	"	#3	149	8				
		115		"	"	#4	138	8				
		116		221	150.05	#1	130	8				
		117		"	"	#2	115	7				
		118		"	"	#3	122	8				
		119		"	"	#4	110	7				
		120		221	150.07	#1	112	7				
		121		"	"	#2	98	7				
		122		"	"	#3	117	7				
		123		"	"	#4	163	7				
		124			SRM 2709		146	7	yes			
		125		221	150.09	#1	113	5				
		126		"	"	#2	98	5				
		127		"	"	#3	103	5				
		128		"	"	#4	98	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

6/9

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-8-10	5420	129		210	30	SUIS #1	52	5				
		130		"		" #2	60	5				
		131		"		" #3	55	5				
		132		"		" #4	63	5				
		133		210	102	SUIS #1	59	5				
		134		"		" #2	51	5				
		135		"		" #3	66	5				
		136		"		" #4	63	5				
		137		213	9.08	#1	129	6				
		138		213	9.08	#2	126	6				
		139		213	9.08	#3	128	6				
		140		213	9.08	#4	130	6				
		141		213	9.08	#5	130	6				
		142		213	9.02	#1	118	6				
		143		213	9.02	#2	116	6				
		144		213	9.02	#3	119	6				
		145		213	9.02	#4	128	6				
		146		2709			135	7				
		147		213	9.01	#1	126	6				
		148		213	9.01	#2	121	6				
		149		213	9.01	#3	122	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

7/9

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/10	5420	150		213 9.01 #4	124	6				
		151		213 9.05 #1	124	6				
		152		213 9.05 #2	127	6				
		153		213 9.05 #3	131	6				
		154	203	STANDARDIZE						
		155		213 9.05 #4	151	6				
*		156		213 9.09 #1	129	6				
		157		213 9.09 #2	128	6				
		158		213 9.09 #3	133	6				
		159		213 9.09 #4	127	6				
		160		213 44.02 #1	231	7				
		161		213 44.02 #2	237	9				
		162		213 44.02 #3	228	10				
		163		213 44.02 #4	199	9				
*		164		213 44.08 #1	258	10				
*		165		213 44.08 #2	266	10				
*		166		213 44.08 #3	262	10				
*		167		213 44.08 #4	261	10				
		168		213 44.06 #1	91	5				
		169		213 44.06 #2	104	5				
		170		213 44.06 #3	106	5				

8/9

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/3/10	5420	171		213 44.06 #4	93	5				
		172		2709	148	7	Y			
		173		213 44.10 #1	699	13				
		174		213 44.10 #2	657	17				
		175		213 44.10 #3	699	18				
		176		213 44.10 #4	753	18				
		177		213 44.04 #1	671	18				
		178		213 44.04 #2	764	19				
		179		213 44.04 #3	849	21				
		180		213 44.04 #4	757	19				
		181		213 44.04 #5	807	20				
		182		" " #6	839	20				
		183		" #7	832	20				
		184		4315	30	4	Y			
		185		2709	138	7	Y			
		186		3212	221	6	N			
		187		3212	262	7	Y			
		188		408	531	11	Y			
		189		5861	645	11	Y			
		190		BLANK	-10	3	Y			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/8/2010	5420	1		Stainless Steel Standard			201 Pass			
9		2		Standard 4315	40	Fail	4			
		3		Standard 4315	21	4	Fail			
		4		Standard 4315	26	4	Pass			
		5		Standard 2709	152	7	Pass			
		6		Standard 3212	264	7	Pass			
		7		Standard RTC 408	546	14	Pass			
		8		Standard 5861	690	14	Pass			
		9		Blank Standard	-9	3	Pass			
		10		LOC 213 SU 15.02 #1	222	9				
		11		LOC 213 SU 15.02 #2	229	9				
		12		LOC 213 SU 15.02 #3	220	9				
		13		LOC 213 SU 15.02 #4	229	8				
		14		LOC 213 SU 15.05 #1	385	10				
		15		LOC 213 SU 15.05 #2	382	11				
		16		LOC 213 SU 15.05 #3	413	11				
		17		LOC 213 SU 15.05 #4	382	11				
		18		LOC 213 SU 15.06 #1	291	10				
		19		LOC 213 SU 15.06 #2	298	10				
		20		LOC 213 SU 15.06 #3	281	10				
		21		LOC 213 SU 15.06 #4 Rpl	277	10				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

P.1 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser. No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		22		LOC 213 SU 15.06 #5 Rep#2	268	10				
	5420	23		LOC 213 SU 15.06 #6 Rep#3	270	10				
		24		LOC 213 SU 15.06 #7 Rep#4	269	10				
		25		LOC 213 SU 15.06 #8 Rep#5	285	10				
		26		LOC 213 SU 15.06 #9 Rep#6	275	10				
		27		LOC 213 SU 15.06 #10 Rep#7	273	10				
		28		LOC 213 SU 15.08 #1	309	11				
		29		LOC 213 SU 15.08 #2	321	11				
		30		LOC 213 SU 15.08 #3	274	10				
		31		LOC 213 SU 15.08 #4	301	11				
		32		LOC 210 SUIS 15 (5 increments) #1	69	6				
		33		LOC 210 SUIS 15 #2	72	6				
		34		LOC 210 SUIS 15 #3	63	6				
		35		LOC 210 SUIS 15 #4	58	6				
		36		LOC 213 SU 15.10 #1	452	13				
		37		LOC 213 SU 15.10 #2	459	13				
		38		LOC 213 SU 15.10 #3	420	13				
		39		LOC 213 SU 15.10 #4	454	13				
		40		LOC ID 214 SUIS 53 #1	127	6				
		41		LOC ID 214 SUIS 53 #2	139	6				
		42		LOC ID 214 SUIS 53 #3	138	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.2. 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		43		LOC ID 214 SUIS 53 #4	127	6				
5420		44		LOC ID 214 SUIS 23 #1	126	6				
		45		LOC ID 214 SUIS 23 #2	111	5				
		46		LOC ID 214 SUIS 23 #3	103	5				
		47		LOC ID 214 SUIS 23 #4	101	5				
		48		LOC ID 214 SUIS 25 #1	594	12				
		49		LOC ID 214 SUIS 25 #2	627	17				
		50		LOC ID 214 SUIS 25 #3	568	16				
		51		LOC ID 214 SUIS 25 #4	607	16				
		52		LOC ID 217 SUIS 22 #1	340	11				
		53		LOC ID 217 SUIS 22 #2	333	12				
		54		LOC ID 217 SUIS 22 #3	315	12				
		55		LOC ID 217 SUIS 22 #4	318	12				
		56		LOC ID 217 SUIS 50 #1	172	6				
		57		LOC ID 217 SUIS 50 #2	179	7				
		58		LOC ID 217 SUIS 50 #3	200	7				
		59		LOC ID 217 SUIS 50 #4	168	6				
		60		LOC ID 217 SUIS 103 #1	318	12				
		61		LOC ID 217 SUIS 103 #2	310	12				
		62		LOC ID 217 SUIS 103 #3	280	11				
		63		LOC ID 217 SUIS 103 #4	287	11				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/2010		64		LOC 221 SUIS 109 #1	68	5				
5420		65		LOC 221 SUIS 109 #2	64	5				
		66		LOC 221 SUIS 109 #3	66	5				
		67		LOC 221 SUIS 109 #4	59	5				
		68		LOC 221 SUIS 150 #1	151	6				
		69		LOC 221 SUIS 150 #2	145	6				
		70		LOC 221 SUIS 150 #3	147	6				
		71		Stainless Steel Standard			203 Pass			
		72		LOC 221 SUIS 150 #4	140	6				
		73		LOC 221 SUIS 164 #1	101	5				
		74		LOC 221 SUIS 164 #2	98	5				
		75		LOC 221 SUIS 164 #3	106	5				
		76		LOC 221 SUIS 164 #4	93	5				
		77		LOC 213 SUIS 9 #1	117	6				
		78		" " #2	123	6				
		79		" " #3	115	6				
		80		" " #4	121	6				
		81		LOC 213 SUIS 44 #1	322	9				
		82		LOC 213 SUIS 44 #2	324	11				
		83		LOC 213 SUIS 44 #3	314	11				
		84		LOC 213 SUIS 41 #4	317	11				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

P.4. 2/9/2010

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9	5420	85		LOC 213	SUIS 15	#1	289	8				
		86		LOC 213	SUIS 15	#2	298	10				
		87		LOC 213	SUIS 15	#3	299	11				
		88		LOC 213	SUIS 15	#4	293	10				
				~~LOC~~	~~4.02~~							
		89		3212			256	9	Yes			
		90		LOC 223	SU 4.02	#1	47	5				
		91		LOC 223	SU 4.02	#2	55	5				
		92		LOC 223	SU 4.02	#3	56	5				
		93		LOC 223	SU 4.02	#4	51	5				
		94		223	4.04	#1	56	5				
		95		"	"	#2	49	5				
		96		"	"	#3	53	5				
		97		"	"	#4	64	5				
		98		223	4.06	#1	55	5				
		99				#2	72	5				
		100				#3	57	5				
		101				#4	53	6				
		102		223	4.08	#1	49	5				
		103				#2	44	5				
		104				#3	55	5				
		105				#4	51	5				
		106		VOID - EXTRA RUN Cause Michael Distracted me.								

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser. No.	XRF Run #	Res eV	Site Name/Sample ID				Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	9420	107		LOC	223	SU ~~44.03~~ 4.10	#1	58	5				
		108			223	4.10	#2	48	5				
		109			223	4.10	#3	53	5				
		110			223	4.10	#4	58	5				
		111		LOC	223	44.03	#1	123	6				
		112					#2	135	7				
		113					#3	121	6				
		114					#4	118	6				
		115		LOC	223	44.05	#1	90	6				
		116					#2	84	6				
		117					#3	87	6				
		118					#4	94	6				
		119		LOC	223	44.06	#1	101	6				
		120					#2	90	6				
		121					#3	124	6				
		122					#4	107	6				
		123		LOC	223	44.08	#1	130	6				
		124		LOC	223	44.06	#5	109	6				
		125		LOC	223	44.08	#2	138	6				
		126					#3	132	7				
		127					#4	133	15				
		128		S	2709			135	7				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5420	150		LOC 223 SU 28.07 2	68	5				
		151		3	69	5				
		152		4	58	5				
		153		LOC 223 SU 28.09 1	63	5				
		154		2	67	5				
		155		3	68	5				
		156		4	77	5				
		157		4315	32	4	OK			
		158		5861	695	11	OK			
		159		2709	136	7	OK			
		160		408 (RCRA)	550	11	OK			
		161		3212	265	7	OK			
2/9/10	5420	162		Blank	ND		OK			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/9/10	5420	129		LOC 223 SU 44.09 #1	107	6				
		130		#2	109	6				
		131		#3	106	6				
		132		#4	114	6				
		133		LOC 223 SU 28.01 #1	60	5				
		134		2	58	5				
		135		3	55	5				
		136		4	69	5				
		137		LOC 223 SU 28.03 1	76	6				
		138		2	81	6				
		139	201 ~~206~~	Standarized ~~3~~			PASS			
		140		LOC 223 SU 28.03 3 ~~4~~	78	6				
		141		SU 28.03 4	88	6				
		142		LOC 223 SU 28.~~05~~ 03 5	73	6				
		143		~~2~~6	88	6				
		144		LOC 223 SU 28.05 ~~3~~ 1	63	5				
		145		#2	62	5				
		146		3	59	5				
		147		4	70	5				
		148		2709 ~~2~~						
		149		LOC 223 SU 28.07 ~~2~~1	65	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

Report to QA/QC Rep. [illegible] PVed

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2-10-10	5420	1	201	STANDARDIZATION						
		2	205	"						
		3		BLANK	-12	3				
		4		4315	28	4	yes			
		5		2709	142	7	yes			
		6		3212	249	7	yes			
		7		408	582	13	no			
		8		5861	675	15	Yes			
		9		408	535	15	Yes			
		10		225 8.03 #1	255	8				
		11		225 8.03 #2	253	9				
		12		225 8.03 #3	262	9				
		13		225 8.03 #4	239	9				
		14		225 8.09 #1	136	8				
		15		225 8.09 #2	137	6				
		16		225 8.09 #3	146	6				
		17		225 8.09 #4	149	6				
		18		225 8.07 #1	103	6				
		19		225 8.07 #2	108	6				
		20		225 8.07 #3	102	6				
		21		225 8.07 #4	102	[illegible]				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	22		225	8.05	#1	105	6				
		23		225	8.05	#2	138	6				
		24		225	8.05	#3	106	6				
		25		225	8.05	#4	116	6				
		26		225	8.05	#5	109	6				
		27		225	8.05	#6	98	6				
		28		225	8.05	#7	104	6				
		29		225	8.05	#8	99	6				
		30		225	8.05	#9	120	6				
		31		225	8.05	#10	111	6				
		32		225	8.01	#1	136	6				
		33		225	8.01	#2	143	6				
		34		225	8.01	#3	135	6				
		35		225	8.01	#4	125	6				
		36		225	32.02	#1	100	5				
		37		225	32.02	#2	111	5				
		38		225	32.02	#3	114	5				
		39		225	32.02	#4	106	5				
		40		225	32.04	#1	79	5				
		41		225	32.04	#2	90	5				
		42		225	32.04	#3	75	5				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

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XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	43		225	32.04	#4	78	5				
		44		225	32.10	#1	77	5				
		45		225	32.10	#2	82	5				
		46		225	32.10	#3	~~98~~ 76	5				
		47		225	32.10	#4	~~16~~ 95	5				
		48		225	32.06	#1	~~114~~ 66	6				
		49		225	32.06	#2	~~106~~ 114	6				
		50		225	32.06	#3	~~110~~ 106	6				
		51		225	32.06	#4	~~124~~ 110	6				
		52				5	124	6				
		53				6 PREC.	115	6				
		54				7	121	6				
		55				8	116	6				
		56				9	117	6				
		57				10	114	6				
		58		225	32.08	#1	98	5				
		59		225	32.08	#2	86	5				
		60		225	32.08	#3	95	5				
		61		225	32.08	#4	81	5				
		62		225	60.08	#1	60	5				
		63		225	60.08	#2	63	5				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID			Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/p	S420	64		225	60.08	#3	66	5				
		65		225	60.08	#4	58	5				
		66		225	60.09	#1	69	5				
		67	203	STANDARDIZE			~~70~~	~~5~~				
		68		225	60.09	#2	70	5				
		69		"	" "	#3	65	5				
		70		"	"	#4	62	5				
		71		225	60.03	#1	56	5				
		72		225	"	#2	54	5				
		73		"	"	#3	63	5				
		74				#4	62	5				
		75		225	60.01	#1	63	5				
		76		"	"	#2	57	5				
		77		"	"	#3	53	5				
		78		"	"	#4	50	5				
		79		225	60.05	#1	68	5				
		80		225	60.05	#2	58	5				
		81		225	60.05	#3	56	5				
		82		225	60.05	#4	70	5				
		83		223	44 SUS	#1	98	6				
		84				#2	116	6				

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- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/16/10	5420	85		223 44SUIS #3	108	6				
		86		223 44 SUIS #4	109	6				
		87		223 28 SUIS #1	69	5				
		88		223 28 SUIS #2	77	5				
		89		223 28 SUIS #3	73	5				
		90		223 28 SUIS #4	65	5				
		91		223 4 SUIS #1	53	5				
		92		223 4 SUIS #2	52	5				
		93		223 4 SUIS #3	55	5				
		94		223 4 SUIS #4	54	5				
		95		202 DUIS #1	139	6				
		96		202 DUIS #2	130	6				
		97		202 DUIS #3	125	6				
		98		202 DUIS #4	131	6				
		99		203 DUIS #1	59	5				
		100		203 DUIS #2	70	5				
		101		203 DUIS #3	68	5				
		102		203 DUIS #4	70	5				
		103		204 DUIS #1	125	6				
		104		204 DUIS #2	129	6				
		105		204 DUIS #3	126	6				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

5/7

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	106		204 DUIS #4	124	6				
		107		210 DUIS #1	59	5				
		108		210 DUIS #2	59	5				
		109		210 DUIS #3	61	5				
		110		210 DUIS #4	63	5				
		111		213 DUIS #1	239	7				
		112		213 DUIS #2	279	10				
		113		213 DUIS #3	237	10				
		114		213 DUIS #4	278	10				
		115		213 DUIS #5	252	10				
		116		213 DUIS #6	249	10				
		117		213 DUIS #7	250	10				
		118		213 DUIS #8	245	10				
		119		214 DUIS #1	218	10				
		120		214 DUIS #2	225	10				
		121		214 DUIS #3	237	10				
		122		214 DUIS #4	219	9				
		123		3212	263	9	Y			
		124		217 DUIS #1	262	10				
		125		217 DUIS #2	261	10				
		126		217 DUIS #3	262	10				

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

6/7

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/10/10	5420	127		217 DUIS #4	$270	11				
		128		221 DUIS #1	96	5				
		129		221 DUIS #2	93	5				
		130		221 DUIS #3	100	5				
		131		221 DUIS #4	95	5				
		132		4315	26	4	Y			
		133		2709	135	7	Y			
		134	205	~~3210~~ STANDARDIZE						
		135		3212	269	7	Y			
		136		408	568	15	No			
		137		408	549	15	Y			
		138		5861	660	14	Y			
		139		BLANK	-6	4	Y			
			PA							

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

7/7

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
3/11/10	5420	1		STANDARDIZE - ACQUISITION ERROR						
		2	203	STANDARDIZE						
		3		BLANK	-8	3	YES			
		4		4315	24	4	Yes			
		5		2709	138	7	YES			
		6		3212 (245)(±16)	236	9	YES			
		7		408	565	15	NO			
		8		408	573	16	No			
		9		408 ABORTED TO CLEAN WINDOW	~~532~~	~~15~~	~~Yes~~			
		10		408	532	15	Yes			
		11		5861	701	15	Yes			
		12		223 DUIS #1	88	5				
		13		223 DUIS #2	77	5				
		14		223 DUIS #3	78	5				
		15		223 DUIS #4	76	5				
		16		225 8 SUIS #1	129	6				
		17		225 8 SUIS #2	135	6				
		18		225 8 SUIS #3	162	6				
		19		225 8 SUIS #4	133	6				
		20		225 32 SUIS #1	104	5				
		21		225 32 SUIS #2	94	5				

- **Only record resolution each time unit is calibrated.**
- **Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)**

XRF SAMPLE ANALYSIS LOG

Date	XRF Ser No.	XRF Run #	Res eV	Site Name/Sample ID	Result For Cr	+/-	Pass Control Chart?	%RSD	Mean	95% UCL
2/11/10	5420	22		225 32 SUIS #3	106	5				
		23		225 32 SUIS #4	94	5				
		24		225 60 SUIS #1	63	5				
		25		225 60 SUIS #2	64	5				
		26		225 60 SUIS #3	82	5				
		27		225 60 SUIS #4	70	5				
		28		225 60 SUIS #5	69	5				
		29		225 DUIS #1	86	5				
		30		225 DUIS #2	94	6				
		31		225 DUIS #3	105	6				
		32		~~222~~225 DUIS #4	100	5				
		33		225 DUIS #5	100	6				
		34		4315	33	4	YES			
		35		2709	142	7	YES			
		36		3212	251	9	YES			
		37		408	547	15	YES			
		38		5861	677	15	YES			
		39		BLANK	-5	4	YES			

- Only record resolution each time unit is calibrated.
- Record %RSD for each Precision Check series analyzed (min. 10% of samples or one per day)

Missouri Department of Natural Resources

Team No. 1

MS, PE, KH, RF

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	1671	218	87.01	1-26-10	0940	KH, PE, RF	Soybean Field, Low
2			87.02		0942		area near Road
3			87.03		0944		
4			87.04		0946		
5			87.05		0948		
6			87.06		0950		
7			87.07		0952		
8			87.08		0954		
9			87.09		0956		
10			87.10		0958		
11			146.01		1015		Cow Pasture, uplands
12			146.02		1017		uniform looking
13			146.03		1019		
14			146.04		1021		
15			146.05		1023		
16			146.06		1025		
17			146.07		1027		
18			146.08		1029		
19			146.09		1031		
20			146.10		1033		
21			102.01		1055		Cow Pasture, incl. upland +
22			102.02		1057		low areas, and buffered
23			102.03		1059		area near tree line
24			102.04		1101		
25			102.05		1103		
26			102.06		1105		
27			102.07		1107		
28			102.08		1109		
29			102.09		1111		
30			102.10		1113		
31							
32							

Team No. Z 1 MS, PE, KH, RF

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	1671	217	103.01	~~1-26-10~~ 1245	1-26-10	MS, KH, PE, RF	Hill top pasture
34			103.02	1247			uniform grassy.
35			.03	1249			
36			.04	1251			
37			.05	1253			
38			.06	1255			
39			.07	1257			
40			.08	1259			
41			.09	1301			
42			.10	1303			
43			22.01	1321			Corner near creek
44			.02	1323			incl. upland, buffer +
45			.03	1325			low areas. used heavily
46			.04	1327			by cows.
47			.05	1329			
48			.06	1331			
49			.07	1333			
50			.08	1335			
51			.09	1337			
52			.10	1339			
53			50.01	1147			Grassy pasture slight
54			.02	1149			slope, adj. to a residence.
55			.03	1151			uniform looking, incl.
56			.04	1153			buffer to yard.
57			.05	1155			
58			.06	1157			
59			.07	1159			
60			.08	1201			
61			.09	1203			
62			.10	1205			
63							
64							
65							

Missouri Department of Natural Resources

Team No. Z-1 Michael Ray, Ken, Paul

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	2247	216	32.01	1/26/10	1540	MS, KH, PE, RF	Near main gate
2			32.02	1/26/10	1542		soybean field
3			32.03		1546		possible sludge access
4			32.04		1548		area.
5			32.05		1550		
6			32.06		1552		
7			32.07		1554		
8			32.08		1556		
9			32.09		1558		
10			32.10		1600		
11			16.01		1603		Uniform Upland soybean
12			16.02		1605		field.
13			16.03		1607		
14			16.04		1609		
15			16.05		1611		
16			16..06		1613		
17			16.07		1615		
18			16.08		1617		
19			16.09		1619		
20			16.10		1621		
21			50.01		1628		Pasture near treeline
22			50.02		1630		incl. upland + low areas
23			50.03		1632		
24			50.04		1634		
25			50.05		1636		
26			50.06		1638		
27			50.07		1640		
28			50.08		1642		
29			50.09		1644		
30			50.10		1646		
31							
32							

Michael Paul, Ken, Ray

Team No. 2

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	2441	224	23.01	1-27-10	0900	MS, KN, RE, RF	Uniform Upland corn/soy
34			.02		0902		
35			.03		0904		
36			.04		0906		
37			.05		0908		
38			.06		0910		
39			.07		0912		
40			.08		0914		
41			.09		0916		
42			.10		0918		
43			74.01		0920		U-shaped turnaround near
44			.02		0922		tree line and small pond.
45			.03		0924		corn/soy.
46			.04		0926		
47			.05		0928		
48			.06		0930		
49			.07		0932		
50			.08		0934		
51			.09		0936		
52			.10		0938		
53			19.01		0940		Area adj. to main gate
54			.02		0942		and small barn. probable
55			.03		0944		point of access for sludge
56			.04		0946		delivery.
57			.05		0948		
58			.06		0950		
59			.07		0952		
60			.08		0954		
61			.09		0956		
62			.10		0958		
63							
64							
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Missouri Department of Natural Resources

Team No. 21 Michael, Ken, Paul, Ray

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	2517	215	110.01	1-27-10	1046	MS, KH, PE, RF	adj. to road encl the
2			.02		1048		gate access area
3			.03		1050		pasture
4			.04		1052		
5			.05		1054		
6			.06		1056		
7			.07		1058		
8			.08		1100		
9			.09		1102		
10			.10		1104		
11			82.01		1110		Uniform area in middle
12			.02		1112		of field pasture
13			.03		1114		
14			.04		1116		
15			.05		1118		
16			.06		1120		
17			.07		1122		
18			.08		1124		
19			.09		1126		
20			.10		1128		
21			55.01		1135		Area near tree line
22			.02		1137		and lake, buffered.
23			.03		1139		
24			.04		1141		
25			.05		1143		
26			.06		1145		
27			.07		1147		
28			.08		1149		
29			.09		1151		
30			.10		1153		
31							
32							

Team No. ~~2~~ 1 Michael Paul, Ken, Ray

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	2517	204	99.01	1-27-10	1256	MS, KH, PE, RF	Sludge Storage
34			.02		1258		Area
35			.03		1300		
36			.04		1302		
37			.05		1304		
38			.06		1306		
39			.07		1308		
40			.08		1310		
41			.09		1312		
42			.10		1314		
43			42.01		1320		Uniform pasture
44			.02		1322		upland Middle
45			.03		1324		of field
46			.04		1326		
47			.05		1328		
48			.06		1330		
49			.07		1332		
50			.08		1334		
51			.09		1336		
52			.10		1338		
53			23.01		1350		Bufferred area near tree
54			.02		1352		line + hay Round storage
55			.03		1354		
56			.04		1356		
57			.05		1358		
58			.06		1400		
59			.07		1402		
60			.08		1404		
61			.09		1406		
62			.10		1408		
63							
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Missouri Department of Natural Resources

Team No. 2 1

Michael, Paul, Ken, Ray

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	2517	304	Y1	1-27-10	1430	MS, KH, PE, RF	Residential YARD
2			Y1 REP1		1434		
3			Y1 REP2		1438		
4			Y2		1440		
5			Y3		1450		
6			Y4		1500		
7	2191	203	18.01		1530		Uniform pasture
8			.02		1532		east slope
9			.03		1534		
10			.04		1536		
11			.05		1538		
12			.06		1540		
13			.07		1542		
14			.08		1544		
15			.09		1546		
16			.10		1548		
17							
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Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33							
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37							
38							
39							
40							
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42							
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Missouri Department of Natural Resources

Team No. 2

Shelly, Pam, Ben

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	9949	209	138.01 ~~138.10~~ 5-5	1-25-10	1400		Selected as representing
2			138.02		1402		both corn + fallow
3			138.03		1404		parts of field
4			138.04		1406		
5			138.05		1408		
6			138.06		1400		
7			138.07		1402		
8			138.08		1404		
9			138.09		1406		
10			138.10		1408		
11	9949	209	144.01		1405		Very uniform - "not corn"
12			144.02		1410		
13			144.03		1411		
14			144.04		~~1415~~ 1413		
15			144.05		1415		
16			144.06		~~1410~~ ~~1405~~ 1405		
17			144.07		1410		
18			144.08		1411		
19			144.09		1413		
20			144.10		1415		
21	9949	209	109.01		1410		Corn field in area of
22			109.02		1412		depression
23			109.03		1413		
24			109.04		1415		
25			109.05		1416		
26			109.06		1410		
27			109.07		1413		
28			109.08		1415		
29			109.09		1417		
30			109.10		1418		
31							
32							

Team No. 2 Shelly, Pam, Ben

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	4859	325	Y1	1/26/10	0930		
34			Y2		0910		
35			Y3		0900		
36			Y4		0920		
37	4859	326	Y1		0940		
38			Y2		0950		
39			Y3		1000		
40			Y4		1010		
41	4859	225	32.01		1020		1/2 corn 1/2 other
42			32.02		1022		
43			32.03		1024		
44			32.04		1026		
45			32.05		1028		
46			32.06		1038		
47			32.07		1036		
48			32.08		1034		
49			32.09		1032		
50			32.10		1030		
51			60.01		1050		Corner cell w/ turning
52			60.02		1052		
53			60.03		1054		
54			60.04		1056		
55			60.05		1058		
56			60.06		1100		
57			60.07		1102		
58			60.08		1104		
59			60.09		1106		
60			60.10		1108		
61			8.01		1120		
62			8.02		1122		
63			8.03		1124		
64			8.04		1128 26		
65			8.05		1130 28		

Missouri Department of Natural Resources

Team No. 2 SJ, PH, BF

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	4859	225	8.06	1/26/10	1132 30		
2			8.07		1134 32		
3			8.08		1136 34		
4			8.09		1140 36		
5			8.10		1142 38		
6	1676	223	44.01		13 22		
7			44.02		13 24		
8			44.03		13 26		
9			44.04		13 28		
10			44.05		13 30		
11			44.06		13 32		
12			44.07		13 34		
13			44.08		13 36		
14			44.09		13 38		
15			44.10		13 40		
16			28.01		13 52		
17			28.02		13 54		
18			28.03		13 56		
19			28.04		13 58		
20			28.05		14 00		
21			28.06		14 02		
22			28.07		14 04		
23			28.08		14 06		
24			28.09		14 08		
25			28.10		14 10		
26			4.01		14 22		
27			4.02		14 24		
28			4.03		14 26		
29			4.04		14 28		
30			4.05		14 30		
31			4.06		14 32		
32			4.07		1434		
			4.08		1436		
			4.09		1438		
			4.10		14:40		

Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33							
34							
35							
36							
37							
38							
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42							
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63							
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65							

Missouri Department of Natural Resources

Team No. 2 Shelly, Ben, Pam

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	6488	313	Y1	1/26/10	1525		
2			Y2		1530		
3			Y3		1535		
4			Y4		1545		
5	6488	213	9.01		1600		
6			9.02		1602		
7			9.03		1604		
8			9.04		1606		
9			9.05		1608		
10			9.06		1610		
11			9.07		1612		
12			9.08		1614		
13			9.09		1616		
14			9.10		1618		
15			15.01		1626		
16			15.02		1628		
17			15.03		1630		
18			15.04		1632		
19			15.05		1634		
20			15.06		1636		
21			15.07		1638		
22			15.08		1640		
23			15.09		1642		
24			15.10		1644		
25			44.01		1646		
26			44.02		1647		
27			44.03		1648		
28			44.04		1649		
29			44.05		1650		
30			44.06		1652		
31			44.07		1653		
32			44.08		1654		
			44.09		1655		
			44.10		1656		

SJ, PH, BF

Team No. 2

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	5180	312	Y1	1/27/10	0820		
34			Y2		0835		
35			Y3		0850		
36		212	53.01		0902		Low area where
37			53.02		0903		run off pools.
38			53.03		0904		according to farmer
39			53.04		~~0906~~ 0905		
40			53.05		~~0907~~ 0906		
41			53.06		0907		
42			53.07		0908		
43			53.08		0909		
44			53.09		0910		
45			53.10		0911		
46			16.01		0948		terraced area, bisected
47			16.02		0950		by dirt road
48			16.03		0952		expected to be heterogeneous
49			16.04		0954		
50			16.05		0956		
51			16.06		0958		
52			16.07		~~095~~ 1000		
53			16.08		1002		
54			16.09		1004		
55			16.10		1006		
56			86.01		1030		top of hill, no terracing
57			86.02		1032		homogeneous
58			86.03		1034		
59			86.04		1036		
60			86.05		1038		
61			86.06		1040		
62			86.07		1042		
63			86.08		1044		
64			86.09		1046		
65			86.10		1048		

Missouri Department of Natural Resources

Team No. 2

Shelly, Pam, Ben

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	8940	214	53.01	1/27/10	1118		heterogeneous -
2			53.02		1120		1/2 sludge applied
3			53.03		1122		
4			53.04		1124		
5			53.05		1126		
6			53.06		1128		
7			53.07		1130		
8			53.08		1132		
9			53.09		1134		
10			53.10	~~1136~~	1136		
11			23.01		1210		homogeneous, on
12			23.02		~~1213~~ 1207		slope
13			23.03		~~1215~~ 1205		
14			23.04		~~1218~~ 1203		
15			23.05		~~1220~~ 1200		
16			23.06		~~1223~~ 1157		
17			23.07		~~12~~ 1155		
18			23.08		1152		
19			23.09		1149		
20			23.10		1147		
21			25.01		1235		drainage area in
22			25.02		1237		can pasture
23			25.03		1240		
24			25.04		1243		
25			25.05		1246		
26			25.06		1248		
27			25.07		~~940~~ 1250		
28			25.08		1252		
29			25.09		1254		
30			25.10		1256		
31							
32							

Team No. 2

Shelly, Ra
Ben

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
33	2191	303	Y1	1/27/10	1500		Residence samples
34			Y2		1510		
35			Y3		1520		
36			Y4		1550		
37	2191	303	27.01	1/27/10	1542		terraced, corner
38			27.02		1544		of field
39			27.03		1546		
40			27.04	~~1554~~	1548		
41			27.05	~~1550~~	1550		
42			27.06	~~1552~~	1552		
43			27.07	~~1554~~	1554		
44			27.08	~~1556~~	1556		
45			27.09	~~1558~~	1558		
46			27.10	~~1600~~	1600		
47							
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Department of Natural Resources

Team No. 3 Val, Hillary, Sean

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	18970	219	15.01	1-26-10	0900	~~SC~~, VW, HW	very evenly applied on
2			15.02		0905		whole field but dumped
3			15.03		0910		in corner of grid 15 for
4			15.04		0914		application on fields on
5			15.05		0918		both sides of road
6			15.06		0923		—
7			15.07		0925		
8			15.08		0929		
9			15.09		0935		
10			15.10		0938		
11	18970	319	319.Y1	1-26-10	1001	SC	[redacted] yard
12			319.Y2		1013	SC	
13			319.Y3		1010	HW	
14			319.Y4		1025	HW	
15	18971	320	320.Y1		1150	HW	[redacted] yard
16			320.Y2		1202	HW	
17			320.Y3		1122	SC	
18			320.Y4		1134	SC	
19	18970	219	55.01		0900	SC	Field north west of [redacted]
20			55.02		0905		[redacted] house
21			55.03		0910		soybean field.
22			55.04		0915		terraced - low area
23			55.05		0920		where water collected
24			55.06		0925		in one spot
25			55.07		0930		
26			55.08		0935		
27			55.09		0938		
28			55.10		0944		
29			42.01	1255	~~0950~~ HW	VW, SC, HW	fairly uniform - still terraced
30			42.02	1258	~~0952~~ VW		whole field - terraced
31			42.03	1302	~~0954~~ VW		soybean
32			42.04	1305	~~0958~~ HW		

Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
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Missouri Department of Natural Resources

Team No. 3 Val, Hillar Sean

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	18970	219	42.05	1-26-10	1310	SCHW W	
2			42.06		1313		
3			42.07		1317		
4			42.08		1320		
5			42.09		1323		
6			42.10		1327		
7	3383	202	79.01		1415		Near where sludge was
8			79.02		1418		~~applied~~ - corn
9			79.03		1422		unloaded
10			79.04		1426		
11			79.05		1430		
12			79.06		1433		
13			79.07		1437		
14			79.08		1441		
15			79.09		1443		
16			79.10		1445		
17			59.01		1434		Pasture grid on fence line
18			59.02		1436		West of hay field - very
19			59.03		1438		uneven ground - slopes
20			59.04		1440		
21			59.05		1442		
22			59.06		1444		
23			59.07		1446		
24			59.08		1448		
25			59.09		1450.		
26			59.10		1452		
27			29.01		1444		evenly distributed
28			29.02		1446		fairly flat - slight
29			29.03		1448		slope
30			29.04		1450		
31			29.05		1452		
32			29.06		1454		

Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
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Missouri Department of Natural Resources

Team No. 3 Val, Hillary, Sea

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	3383	202	29.07	1-26-10	1456	VW, SC, HW	
2			29.08		1458		
3			29.09		1460		
4			29.10		1462		
5		302	302.41		1610		[redacted] yard
6			302.42		1615		43 sampled in triplicate
7			302.43A		1625		
8			302.43B		1647		
9			302.43C		1650		
10	3383	102	1000501		1627	SC	[redacted] well sample
11			1000502		1635		field blank
12			1000503		~~1627~~		duplicate
13	6632	305	305.41	1-27-10	1026	SC	
14			305.42		1037	SC	
15			305.43		1046	HW	
16		205	34.01		1100	VW, SC, HW	low variability SU - corn
17			34.02		1102		very uniform, no turns
18			34.03		1104		slightly sloped
19			34.04		1106		
20			34.05		1108		
21			34.06		1110		
22			34.07		1112		
23			34.08		1114		
24			34.09		1116		
25			34.10		1118		
26			71.01		1120		right where sludge was dumped
27			71.02		1122		in a pile - high variability
28			71.03		1124		beans
29			71.04		1126		
30			71.05		1128		
31			71.06		1130		
32			71.07		1132		

Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
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Missouri Department of Natural Resources

Team No. 3 Val, Hillary, Sean

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	6632	205	71.08	1-27-10	1134	HW, SC, UW	
2			71.09		1136		
3			71.10		1138		
4			96.01		1100		Pasture land - not a lot of
5			96.02		1105		sludge applied since pasture
6			96.03		1110		had a lot of ditches - low
7			96.04		1117		variability slight slope
8			96.05		1120		borders fence w/ beans field
9			96.06		1125		
10			96.07		1130		
11			96.08		1135		
12			96.09		1140		
13			96.10		1145		
14	?	306	Y1		1254	SC	[redacted]
15			Y2		1302		house - assigned it a new LOCID
16			Y3		1310		not originally planned but directly
17	3627	301	Y1		1435		downwind of sludge stockpile area
18			Y2		1440		[redacted] yard
19			Y3		1449		
20			Y4		1457		
21	2191	203	7.01		1530	HW, UW, SC	Fairly evenly distributed
22			7.02		1532		brome grass
23			7.03		1534		
24			7.04		1536		
25			7.05		1538		
26			7.06		1540		
27			7.07		1542		
28			7.08		1544		
29			7.09		1546		
30			7.10		1548		
31							
32							

Team No.____

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
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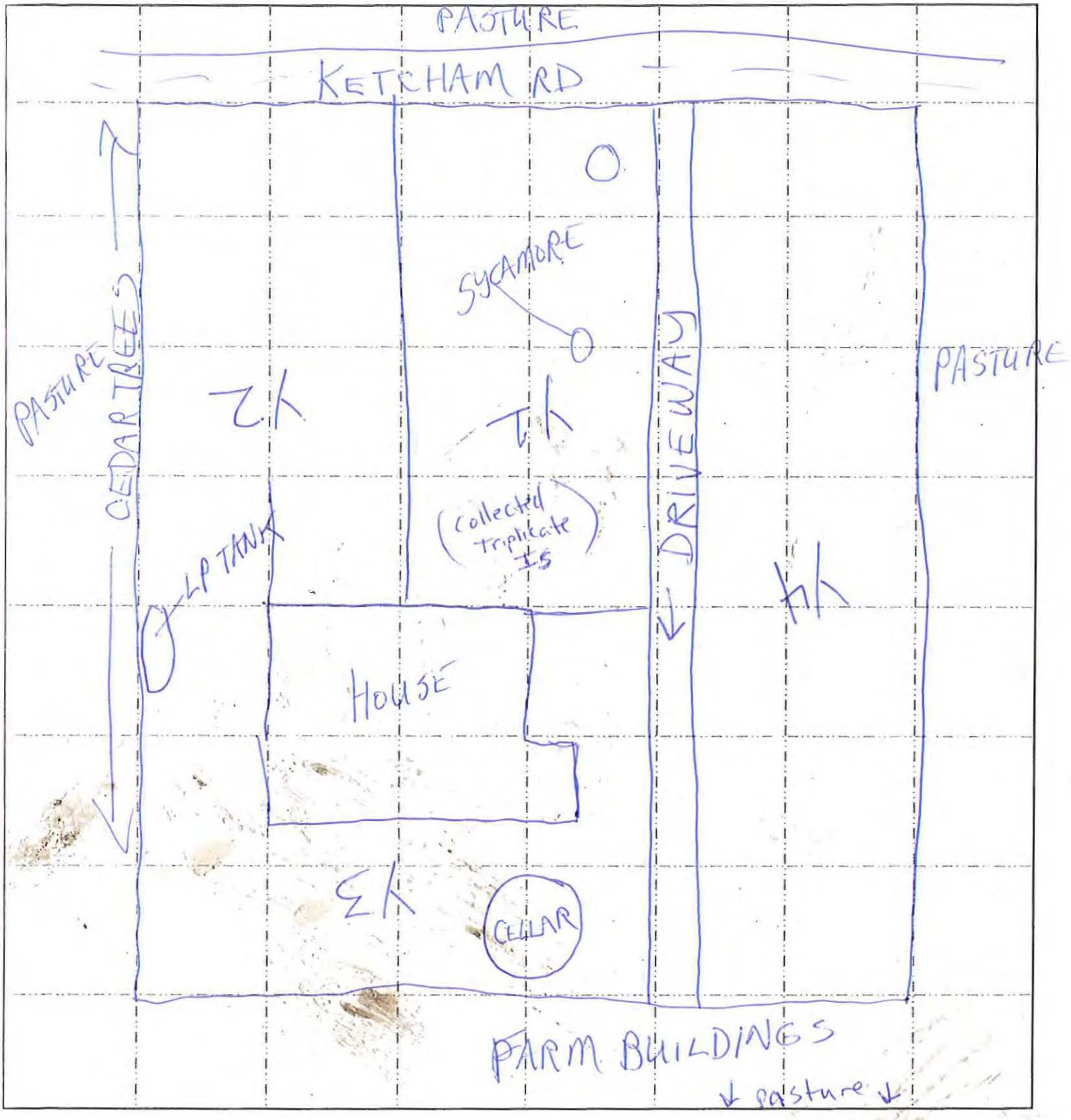
Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 304 **PARCEL #** 2517

N



Date Sampled 1-27-10

Team Member(s): MS, PE, KH, RF

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 304 Parcel # 2517

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled
(Street, City, State, Zip): [redacted], Maysville, MO

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐☐ No ☐**

Well Present? Yes ☐☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐☐ No ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

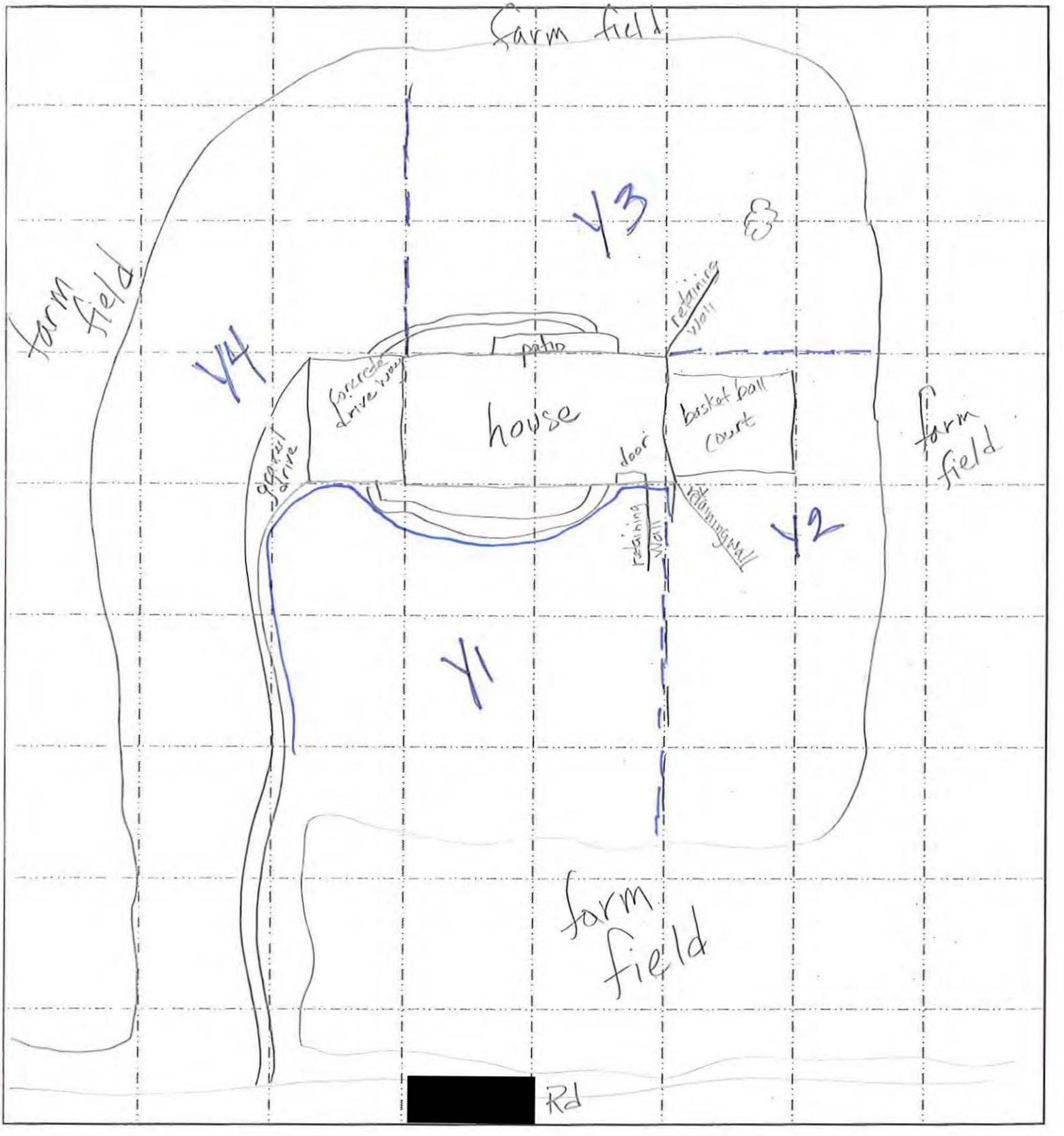
Comments:

Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 320 PARCEL # 18971

N



Date Sampled 1-26-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 320 Parcel # 18971

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted], Agency, MO

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐☐ No ☐**

Well Present? Yes ☐☐ No ☐ **Well Depth (ft)**_____

Well Shared? Yes ☐☐ No ☐ **Well Age (yrs)**_____

Latitude, Easting:_____**Longitude, Northing:**_____

Physical Description of House/Property:

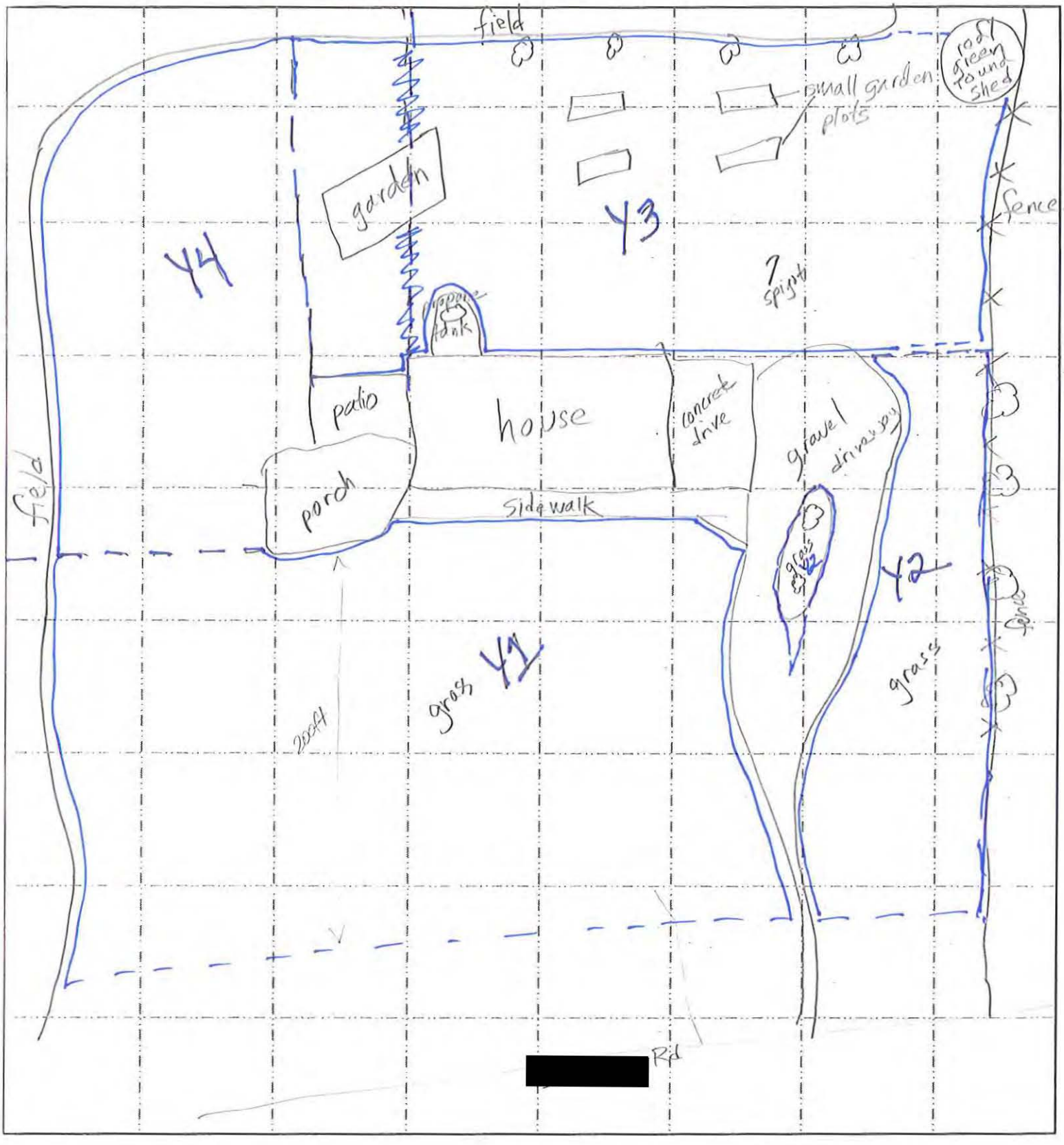
Comments:

Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 319 **PARCEL #** 18970

N



Date Sampled 1-26-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 319 Parcel # 18970

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted], Agency, MO

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☒ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐ No ☐**

Well Present? Yes ☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐ No ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

yellow siding w/ green shutters & black roof

Comments:

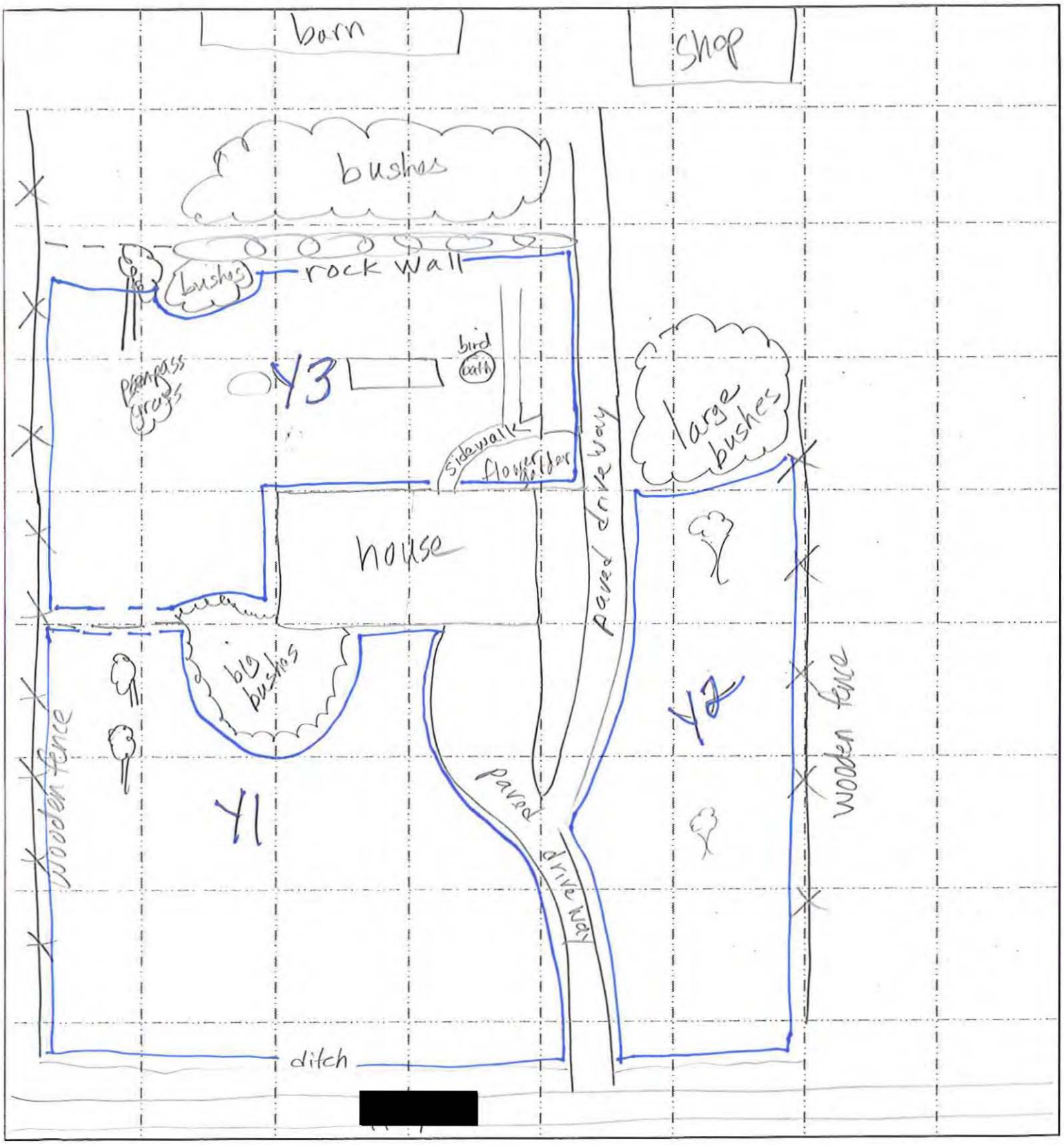
Sydney wants to know about analyzing for phosphorus & pot ash - he'll pay

Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 302 PARCEL # 3383

N



Date Sampled 1-26-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Y3 - triplicate samples

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 302 Parcel # 3383

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted], Easton, MO

Mailing Address (if diff): _____

Phone 1: [redacted] H Phone 2: [redacted] C

Owner Occupied? Yes ☒ ☐ **No** ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes** ☐☐ **No** ☐

Well Present? Yes ☒☐ **No** ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐☐ **No** ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

white siding

Comments:

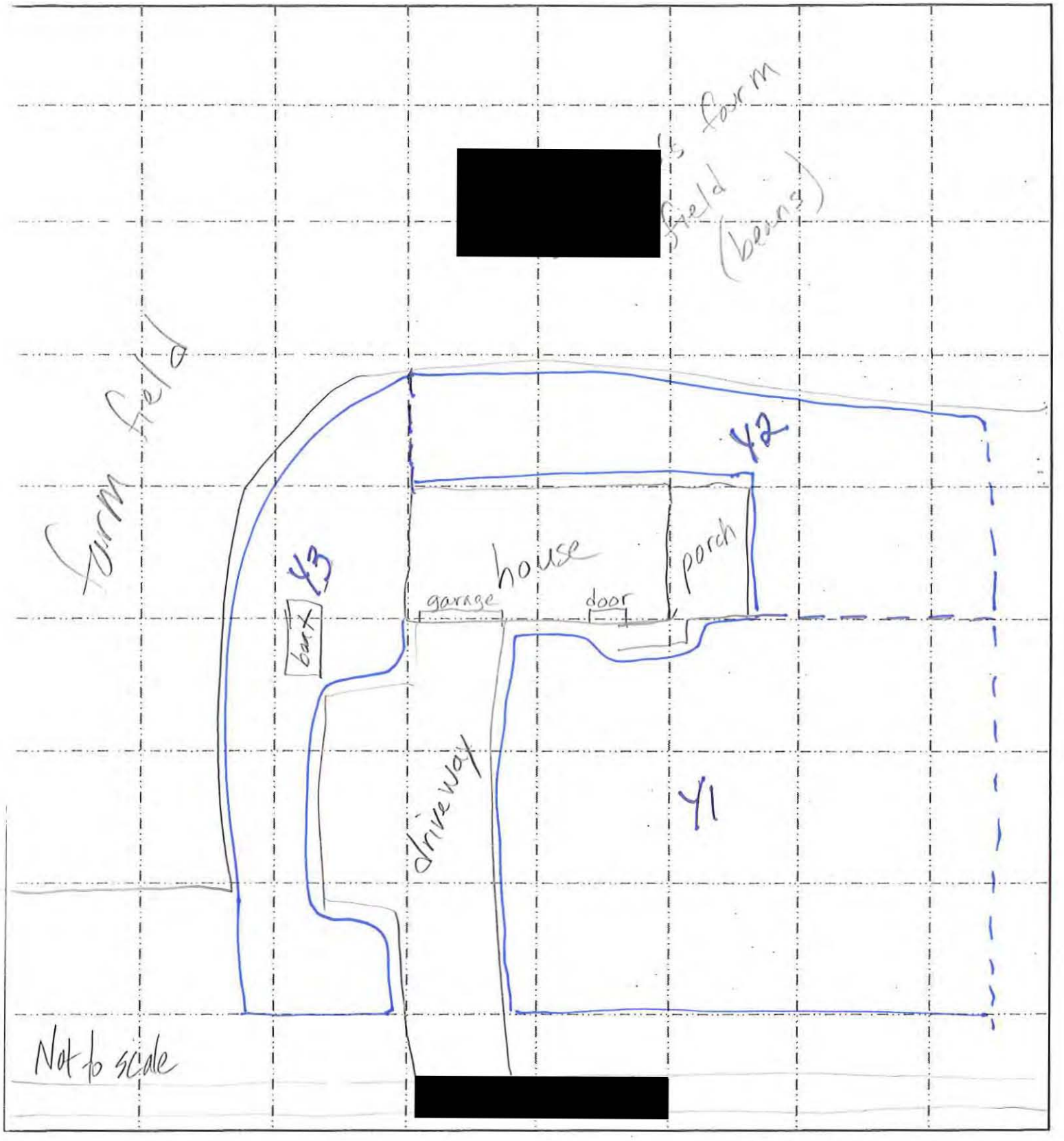
Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID 306 PARCEL #_____

N



Date Sampled 1-27-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 306 Parcel # _____

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sa[redacted] Agency MO 64401
(Street, City, State, Zip):

Mailing Address (if diff): _____

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐☐ No ☐**

Well Present? Yes ☐☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐☐ No ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

brown house w/ brown roof

Comments:

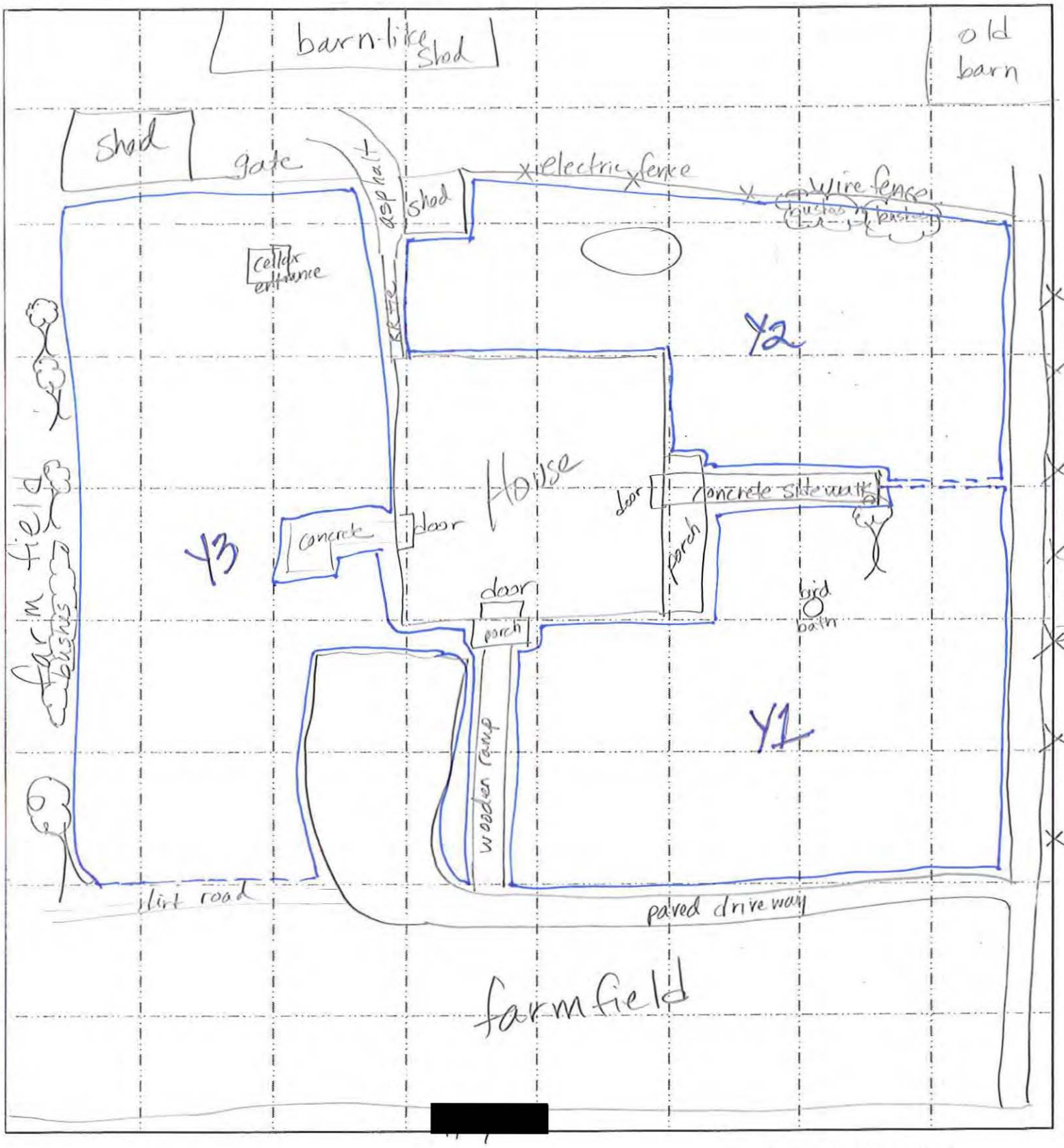
directly downwind from sludge stockpile area in SU 11 on Ellis' farm

Permission to Sample Granted Verbally By: [redacted] **On (date):** 1-27-10

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 305 **PARCEL #** 6632

N



[redacted]

Date Sampled 1-27-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 305 Parcel # 6632

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted], Agency, MO

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☒ **No** ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: 1 **Children Under 6 yrs? Yes** ☐ **No** ☒

Well Present? Yes ☒ **No** ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐ **No** ☒ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

mint green siding w/ grey roof two story

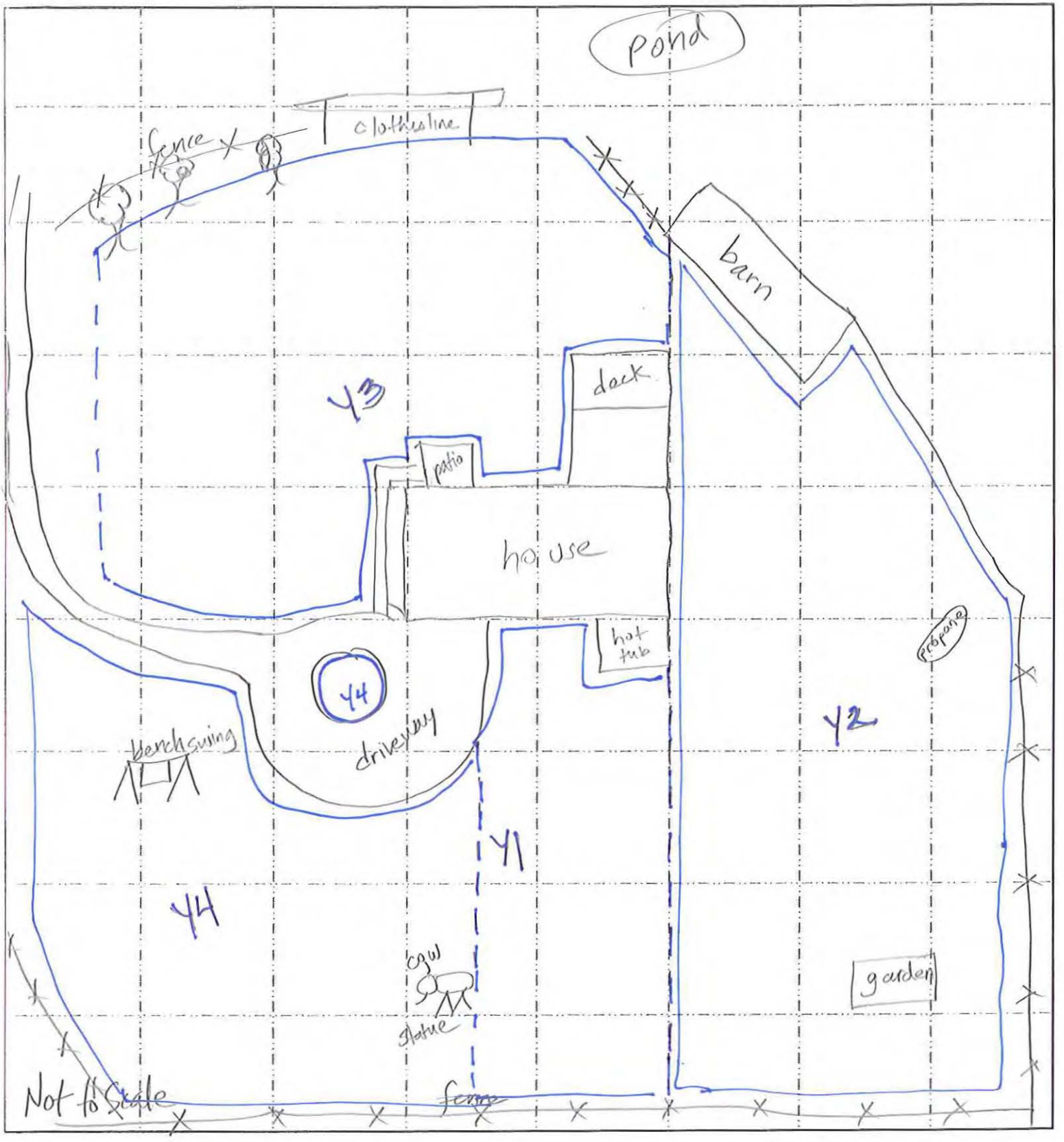
Comments:

Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 301 **PARCEL #** 3627

N



Date Sampled 1-27-10

Team Member(s): 3 Val, Hillary, Sean

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 301 Parcel # 3627

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted] Cameron, MO 64429

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☒ ☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐ ☐ No ☐**

Well Present? Yes ☒ ☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐ ☐ No ☒ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

red brick bottom 1/2, red wood siding top half

Comments:

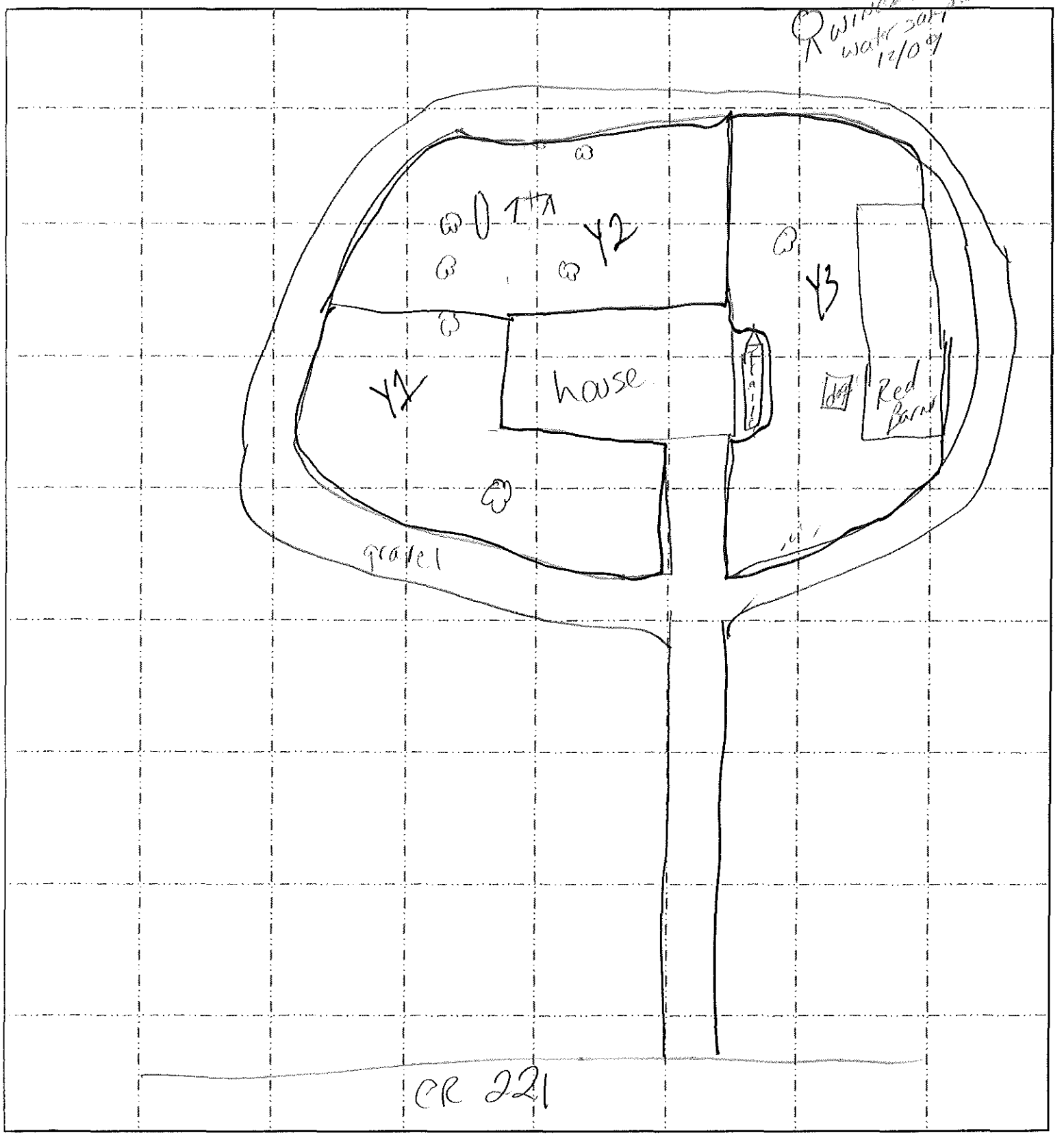
Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID 312 PARCEL # 5180

N



Date Sampled 4/27/10

Team Member(s): Pam, Beth, Shelly

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #:_____ Parcel # _____

Owner Contact Information:

Owner:_____

Physical Address of Property Sampled
(Street, City, State, Zip):_____

Mailing Address (if diff):_____

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s):_____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ Children Under 6 yrs? Yes ☐☐ No ☐

Well Present? Yes ☐☐ No ☐ Well Depth (ft)_____

Well Shared? Yes ☐☐ No ☐ Well Age (yrs)_____

Latitude, Easting:_____Longitude, Northing:_____

Physical Description of House/Property:

Comments:

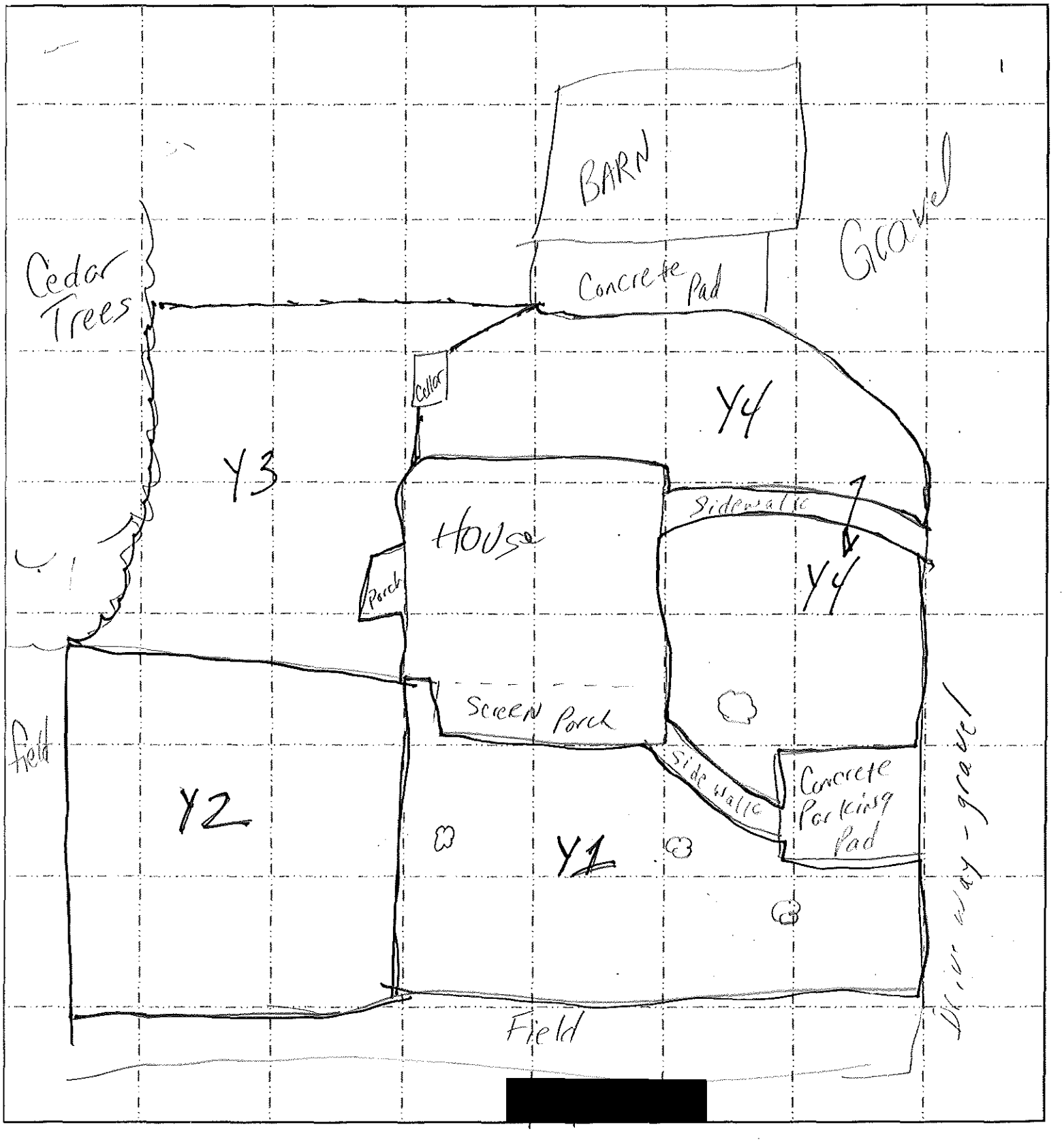
Permission to Sample Granted Verbally By: _____ On (date): _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID 312 PARCEL # 5180

N ↑



Sample Numbers Used:

Date Sampled_____

Team Member(s):_____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: ~~312~~ 325 Parcel # ~~5180~~ 4859

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted], ~~Union Star~~, MO

Mailing Address (if diff): _____

Phone 1: [redacted] Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: 2 **Children Under 6 yrs? Yes ☐☐ No** ~~☐~~

Well Present? Yes ☐☐ No ☐ Well Depth (ft) _____

Well Shared? Yes ☐☐ No ☐ Well Age (yrs) _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

Light beige house, white trim, green roof. Sunporch on South side.

Comments:

Waller farmed this land from 1983-2009. Spring 2010 a new tenant farmer will be farming here.

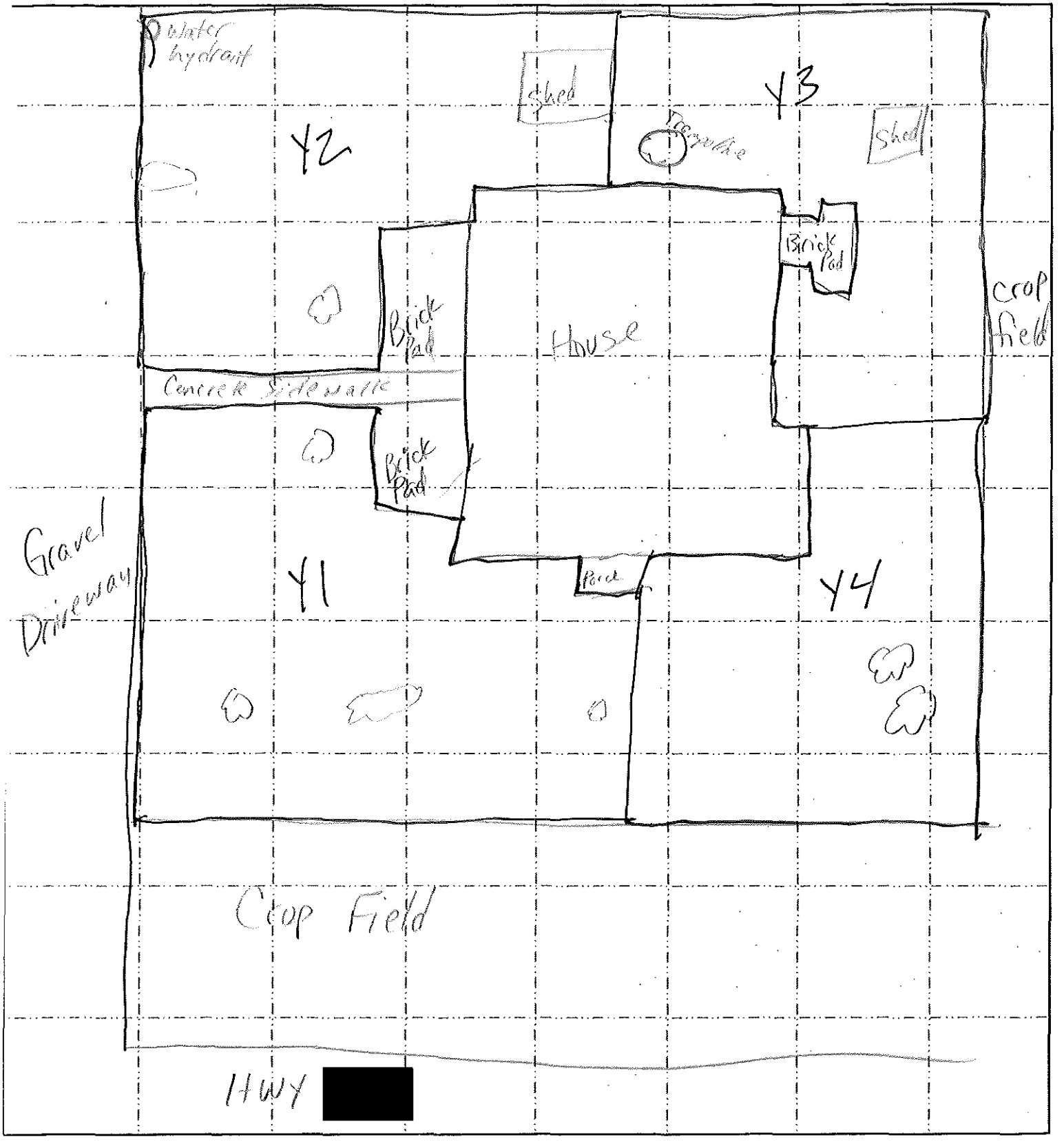
Permission to Sample Granted Verbally By: [redacted] **On (date):** 1/26/10

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID 326 PARCEL #4859

N↑



Date Sampled 1-26-10

Team Member(s): SS, PH, B

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 326 Parcel # 4859

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted]

Mailing Address (if diff): _____

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☒ ☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: 4 **Children Under 6 yrs?** Yes ☒ ☐ No ☐

Well Present? Yes ☐ ☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐ ☐ No ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

white house, green trim + roof, 2 outlying sheds, Surrounded on 3 sides by crop fields. House is across from [redacted] pt [redacted]

Comments:

Upon arriving at Loc ID 325, the owner requested we sample his son's place next door as the son has 2 young kids.

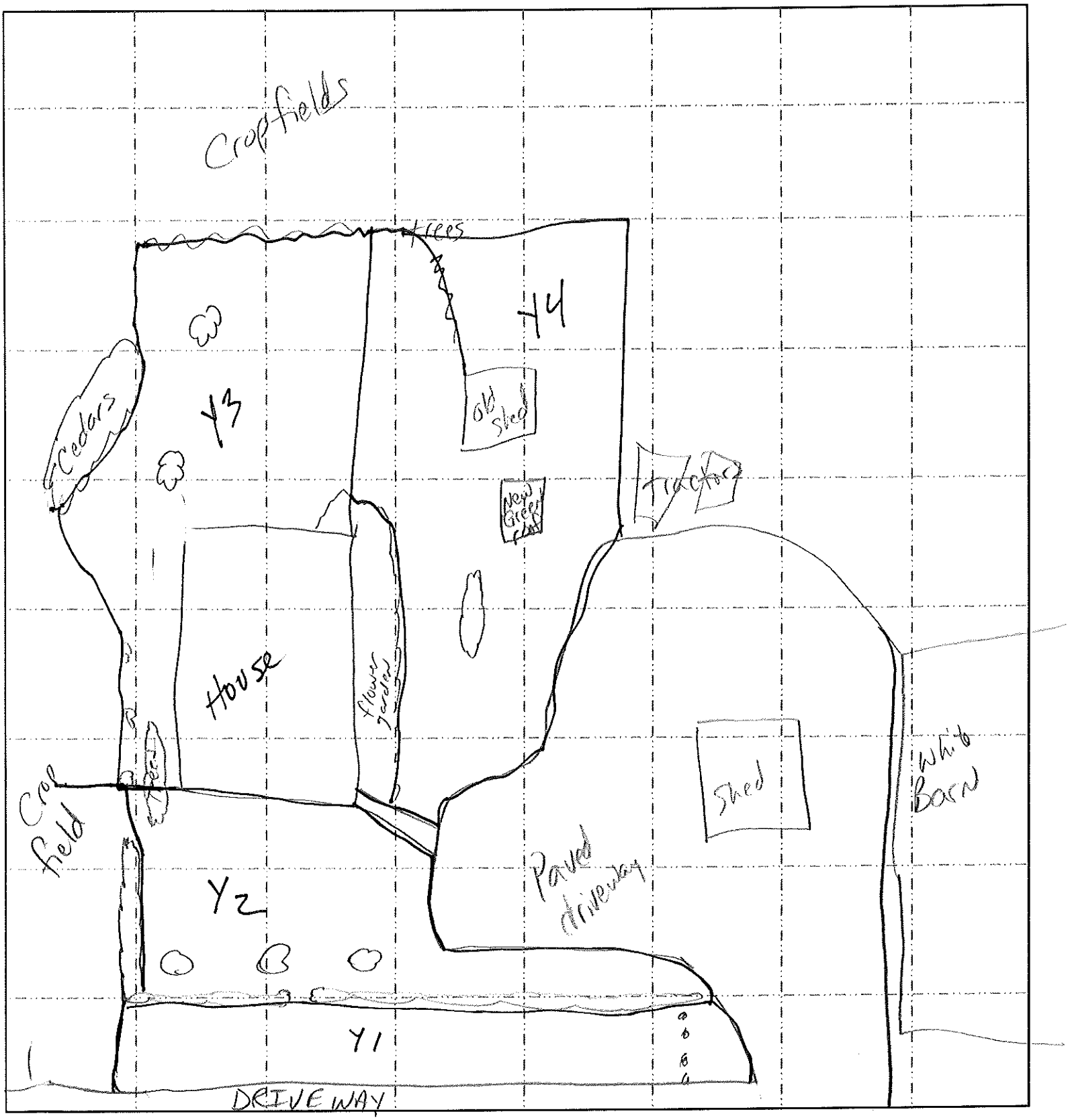
Permission to Sample Granted Verbally By: [redacted] **On (date):** 1/26/10

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID 213 PARCEL # 6488

N



Date Sampled 1/26/10

Team Member(s): Shelly Pam Ben

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #:_____ Parcel # _____

Owner Contact Information:

Owner:_____

Physical Address of Property Sampled
(Street, City, State, Zip):_____

Mailing Address (if diff):_____

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s):_____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ Children Under 6 yrs? Yes ☐☐ No ☐

Well Present? Yes ☐☐ No ☐ Well Depth (ft)_____

Well Shared? Yes ☐☐ No ☐ Well Age (yrs)_____

Latitude, Easting:_____Longitude, Northing:_____

Physical Description of House/Property:

Comments:

Permission to Sample Granted Verbally By: _____ On (date): _____

Site Investigation Findings Report
Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO
Order Number: 100413005

Site Information:

ESP LDPR Code: FEPA8

ESP Staff: Ken Hannon, Sean Counihan, Brad Swank

HWP Staff: Michal Stroh, Shelly Jackson, Valerie Wilder

Job Code: NJ10TSFF

Investigation Date: 4/6 and 4/7, 2010

Introduction:

The Missouri Department of Natural Resources (MDNR) Hazardous Waste Program (HWP) requested Environmental Services Program (ESP) personnel to conduct sampling related to an ongoing investigation involving the Prime Tanning Corporation located at 205 Florence Road in St. Joseph, Missouri. This Findings Report is intended as an interim measure to document recent sampling activities. A full project report will be written by the HWP project manager when sample results have been received and evaluated. ESP Environmental Specialists Ken Hannon, Brad Swank and Sean Counihan traveled to the site on April 6 and 7, 2010, to collect grab samples of soils from selected residences and farm fields where tannery sludge was historically applied as a fertilizer. Additional MDNR personnel on site included Valerie Wilder, Michael Stroh and Shelly Jackson with the HWP, site assessment unit. Sampling was conducted in accordance with established standard operating procedures (SOPs) within the MDNR, ESP and as outlined in the Tannery Sludge Farm Field Sampling and Analysis Plan (SAP), January 14, 2010 and the Farm Fields and Residential Yards Sapling and Analysis Plan Addendum (SAP Addendum), April 5, 2010.

Observations:

Personnel arrived on-site the afternoon of April 6, 2010, and began sampling in selected agricultural fields and residential yards. Custody of all samples collected was maintained by HWP personnel. Weather conditions generally mild with temperatures ranging from morning lows of 35 degrees to afternoon highs around 70 degrees Fahrenheit. Winds were low to moderate and from the west to southwest, increasing towards the afternoons. Fifteen residential yard decision unit incremental samples (DUIS) (including four background yards), and five background farm field DUIS were sampled during this event. In addition, incremental samples were collected from three 1-acre farm field sampling units in triplicate for quality control purposes. Sampling locations are shown in the map in Appendix A. No deviations from the SAP or the SAP Addendum were noted at any sample locations.

On April 7, 2010, Mr. Matt Sugar of ARCADIS Consulting met with DNR personnel and collected replicate samples at residential yard Location ID 312 and farm field Location ID 214.

Field Methods:

Below is a brief discussion of the sampling activities conducted. A more detailed description of sampling procedures is outlined in the SAP and SAP Addendum.

Ten-increment soil samples were collected from the 0-1 inch depth within three 1-acre sampling units at each of five background farm field decision units. At three previously-sampled target farm field decision units, triplicate sampling unit incremental samples (SUIS) samples were also collected for quality control (QC). One sample was split and processed as a blind field duplicate to assess precision. The samples were air dried, disaggregated and passed through a #60 mesh sieve. The background and QC SUIS samples were then analyzed for total chromium with an x-ray fluorescence (XRF) analyzer. The background SUIS samples were then combined to form DUIS samples, which were also analyzed by XRF. The background DUIS and QC SUIS were then placed into sample containers and submitted for analysis of hexavalent chromium on April 14, 2010. Some samples were also analyzed for the following parameters: pH, TOC, ORP, percent moisture, Cr,Fe, Mn, Mo, V, and Al. Two farm field samples were analyzed in duplicate by the laboratory to assess subsampling and analytical precision.

Residential yards were divided into Sampling Units (SU) according to each specific site location and recorded field forms (Appendix B). Fifteen to twenty soil increments were collected from a depth of 0-1 inch and combined in the field to create one DUIS for each resident yard sampled. All soil samples transported to the ESP lab and allowed to air dry at ambient temperatures for four days. The samples were then disaggregated and passed through a #60 mesh (0.25mm) sieve. The material passing through the sieve was placed into sample containers and submitted for analysis of the following parameters on April 14, 2010: pH, TOC, ORP, percent moisture, Cr, Cr^{+6},Fe, Mn, Mo, V, and Al. Two yard soil samples were analyzed in duplicate by the laboratory to assess subsampling and analytical precision. Aqueous matrix spikes were requested for Cr^{+6} on every yard sample to evaluate matrix effects. In addition, for select samples, solid matrix spikes were requested using a NIST standard reference material containing a known concentration of Cr^{+6}.

Table 1 is a listing of the samples collected. Chains of custody are provided in Appendix B.

Table 1: Sample Collection Data

Sample Number	Date Collected	Time Collected	Location Collected & Description
1004716	4/6/10	0950	Farm field soil location 201, DUIS. (Background)
1004717	4/6/10	1518	Farm field soil location 251, DUIS. (Background)
1004718	4/6/10	1620	Farm field soil location 252, DUIS. (Background)
1004719	4/6/10	1617	Farm field soil location 253, DUIS. (Background)
1004720	4/6/10	1239	Farm field soil location 254, DUIS. (Background)
1004721	4/6/10	0941	Residential soil composite collected from Location 301, DUIS. (Background)
1004722	4/6/10	1430	Residential soil composite collected from Location 302, DUIS.
1004723	4/6/10	1227	Residential soil composite collected from Location 303, DUIS.
1004724	4/6/10	1255	Residential soil composite collected from Location 304, DUIS.
1004725	4/6/10	1316	Residential soil composite collected from Location 305, DUIS.
1004726	4/6/10	1306	Residential soil composite collected from Location 306, DUIS.

Table 1: Sample Collection Data

Sample Number	Date Collected	Time Collected	Location Collected & Description
1004727	4/7/10	0818	Residential soil composite collected from Location 312, DUIS.
1004728	4/6/10	1415	Residential soil composite collected from Location 313, DUIS.
1004729	4/6/10	1350	Residential soil composite collected from Location 319, DUIS.
1004730	4/6/10	1407	Residential soil composite collected from Location 320, DUIS.
1004731	4/6/10	1510	Residential soil composite collected from Location 325, DUIS.
1004732	4/6/10	1516	Residential soil composite collected from Location 326, DUIS.
1004733	4/6/10	1520	Residential soil composite collected from Location 352, DUIS. (Background)
1004734	4/6/10	1753	Residential soil composite collected from Location 353, DUIS. (Background)
1004735	4/6/10	1215	Residential soil composite collected from Location 354, DUIS. (Background)
1004736	4/6/10	1241	Farm field soil location 205, SU 88, replicate 1.
1004737	4/6/10	1245	Farm field soil location 205, SU 88, replicate 2.
1004738	4/6/10	1253	Farm field soil location 205, SU 88, replicate 3.
1004739	4/7/10	0835	Farm field soil location 214, SU 37, replicate 1.
1004740	4/7/10	0845	Farm field soil location 214, SU 37, replicate 2.
1004741	4/7/10	0855	Farm field soil location 214, SU 37, replicate 3.
1004742	4/6/10	1624	Farm field soil location 221, SU 161, replicate 1.
1004743	4/6/10	1632	Farm field soil location 221, SU 161, replicate 2.
1004744	4/6/10	1640	Farm field soil location 221, SU 161, replicate 3.
1004745	4/6/10	-------	Blind replicate of 1004744

Findings:

Full analytical results are provided in Appendix B. A summary of the results is provided in Tables 2 and 3 on the following page. A copy of field notes and photo log is provided in Appendix C.

None of the farm field or residential yard soil samples was found to contain concentrations of hexavalent chromium above the screening levels developed for the project. The data are currently undergoing data quality review and statistical uncertainty analysis. Results of this analysis will be provided in the full project report anticipated to be finalized in late summer 2010.

Table 2: Summary of Farm Field Sample Results

Tag Number	DU	SU		Date Collected	Cr 6^+, mg/kg	Total Cr, mg/kg (XRF)	ORP (mV)	TOC, %	pH	Fe, mg/kg	Mn, mg/kg	Mo, mg/kg	V, mg/kg	Al, mg/kg
1004739	214	37	Repl1	4/7/2010	1.13	264	413	5.8	7.89	30,000	417	2.05	38.5	16,000
1004740	214	37	Repl2	4/7/2010	0.715	289	NA	NA	NA	NA	NA	NA	NA	NA
1004741	214	37	Repl3	4/7/2010	0.674	267	NA	NA	NA	NA	NA	NA	NA	NA
1004736	205	88	Repl1	4/6/2010	1.110	105	467	3	6.57	27,000	575	1.11	38.2	15,100
1004736	205 Lab Dup	88	Repl1	4/6/2010	0.938	NA	NA	NA	NA	NA	NA	NA	NA	NA
1004737	205	88	Repl2	4/6/2010	0.652	149	NA	NA	NA	NA	NA	NA	NA	NA
1004738	205	88	Repl3	4/6/2010	0.779	159	NA	NA	NA	NA	NA	NA	NA	NA
1004742	221	162	Repl1	4/6/2010	3.45	97	425	2.1	7.58	20,300	383	0.461	47.2	17,300
1004743	221	162	Repl2	4/6/2010	4.57	115	NA	NA	NA	NA	NA	NA	NA	NA
1004744	221	162	Repl3	4/6/2010	4.38	105	NA	NA	NA	NA	NA	NA	NA	NA
1004745	221	162	Repl3 Blind Dup	4/6/2010	3.76	NA	NA	NA	NA	NA	NA	NA	NA	NA
1004716	201	0	Background Field	4/6/2010	0.060	33	442	3.1	6.52	15500	281	0.797	43.9	13200
1004716	201 Lab Dup	0	Background Field	4/6/2010	0.063	NA	NA	NA	NA	NA	NA	NA	NA	NA
1004717	251	0	Background Field	4/6/2010	0.178	29	460	6.03	6.03	14200	288	0.538	41.2	14800
1004718	252	0	Background Field	4/6/2010	0.132	32	546	6.31	6.31	18400	462	0.582	43.2	18200
1004719	253	0	Background Field	4/6/2010	0.083	30	470	6.47	6.47	15000	487	0.488	32.8	12700
1004720	254	0	Background Field	4/6/2010	0.039	26	482	6.19	6.19	14000	411	0.827	32.9	12100

Table 3: Summary of Residential Yard Sample Results

Tag Number	DU	SU	Date Collected	Cr 6+, mg/kg	TOC (%)	ORP	pH	Fe, mg/kg	Mn, mg/kg	Mo, mg/kg	V, mg/kg	Al, mg/kg
1004729	319	Yard	4/6/2010	0.073	3.1	444	7.25	20600	800	0.893	44.5	17600
1004725	305	Yard	4/6/2010	0.233	3.2	431	7.54	16100	705	0.779	34.5	13500
1004730	320	Yard	4/6/2010	0.325	1.4	443	7.14	21200	757	0.71	44.2	17800
1004730	320 Lab Dup	Yard	4/6/2010	0.312	NA	NA	NA	NA	NA	NA	NA	NA
1004731	325	Yard	4/6/2010	0.153	2.3	441	7.55	14100	374	0.549	27.7	8850
1004732	326	Yard	4/6/2010	0.086	1.4	451	7.54	13500	345	0.527	26.3	8420
1004727	312	Yard	4/6/2010	0.049	1.5	430	7.72	19000	687	1.04	40.1	15900
1004728	313	Yard	4/6/2010	0.148	2.3	435	7.25	13500	559	0.578	35.3	14800
1004724	304	Yard	4/6/2010	0.290	5.2	416	7.78	16700	549	0.631	38.3	14600
1004723	303	Yard	4/6/2010	0.02(J)	3.7	433	7.15	13900	224	0.495	35.9	17400
1004723	303 Lab Dup	Yard	4/6/2010	0.022 (J)	NA	NA	NA	NA	NA	NA	NA	NA
1004726	306	Yard	4/6/2010	0.096	2	436	7.47	17600	768	0.49	33.5	13300
1004722	302	Yard	4/6/2010	0.110	2.4	464	6.49	16300	535	0.552	38.3	15700
1004721	301	Background Yard	4/6/2010	0.053	3.9	454	7.03	15200	510	0.627	37.7	15900
1004733	352	Background Yard	4/6/2010	0.034	3.4	450	7.41	17400	607	0.785	33.5	13900
1004734	353	Background Yard	4/6/2010	0.050	2.2	442	7.90	15400	636	0.938	22.2	9260
1004735	354	Background Yard	4/6/2010	0.095	2.2	440	7.00	16400	384	0.552	36.8	16300

Submitted by: 6/30/10

Michael Stroh (Date)
Environmental Specialist
Superfund Section
Hazardous Waste Program

Reviewed by:

Ken Hannon
Environmental Specialist
Field Services Unit
Environmental Services Program

Approved by:

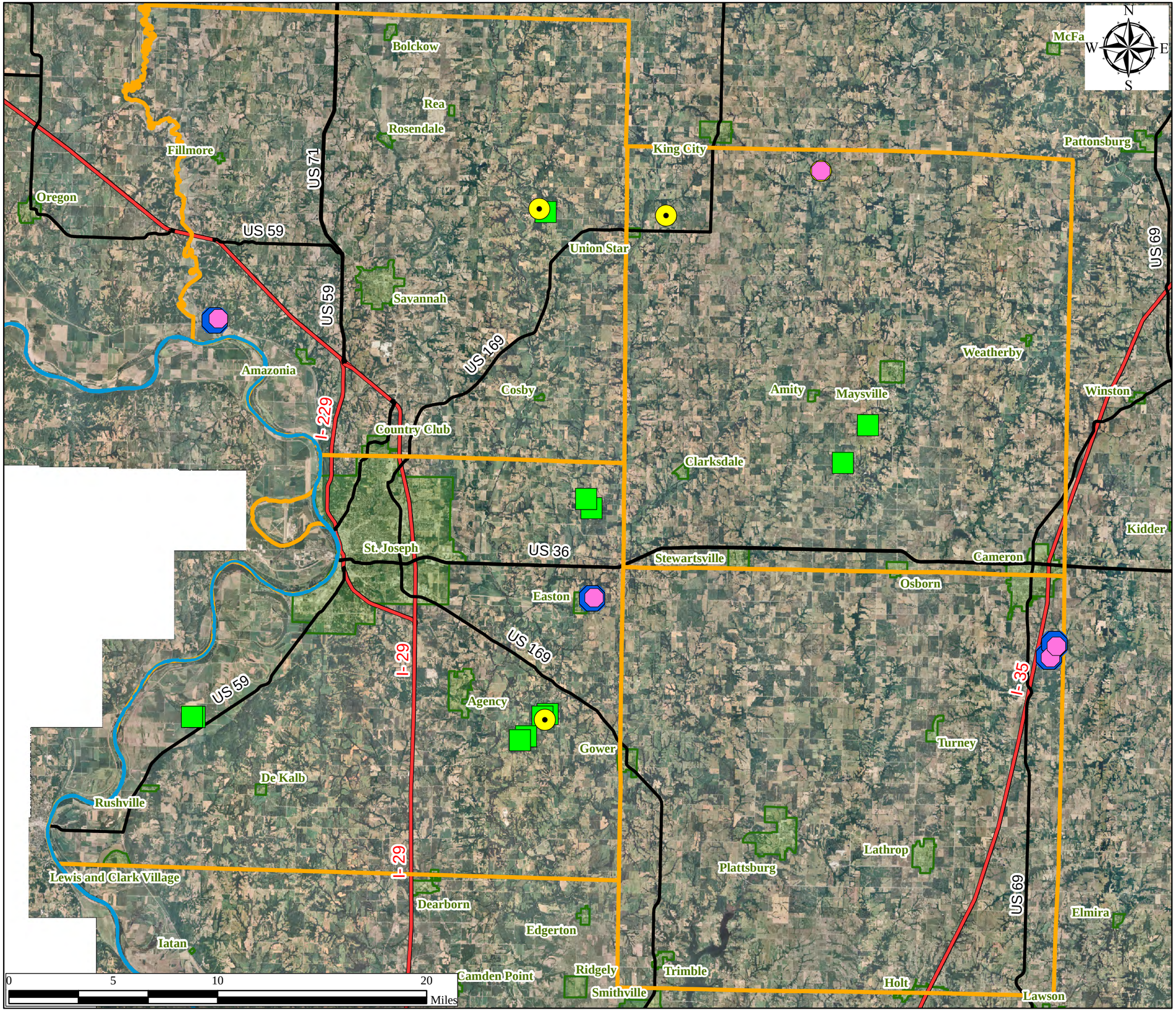
Eric Sappington
Unit Chief
Field Services Unit
Environmental Services Program

APPENDIX A

Site Map

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

Tannery Sludge Farm Fields Site
Sampling Locations for
April 2010 Sampling Event
Andrew, Buchanan, Clinton and
Dekalb Counties
Northwest Missouri

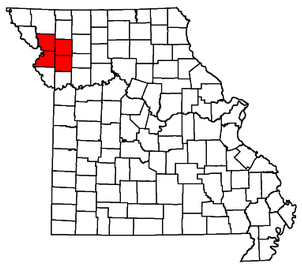


Legend

- Residential Soil Sample
- Residential Soil Sample - Background
- Field Soil Sample
- Field Soil Sample - Background
- Missouri River
- County Boundary

Federal Roads

- Interstate Highway
- US Highway
- Municiple Boundary



Map Created on June 25, 2010 by Shelly Jackson.

This map can be found at M:\Superfund\Tannery Sludge Farm Fields\Maps\2010April_SamplingMap.mxd

Base Map: National Agricultural Imagey Program. Flight Date: 2007.

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

APPENDIX B

Chain of Custody/Analytical Results

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

Missouri Department of Natural Resources
Environmental Services Program

Order ID 100413005 **Program, Contact:** HWP Julieann Warren

Report Date: 05/26/2010 **LDPR/JobCode:** FEPA8 / NJ10TSFF

Sample: AB18511

Customer #: 1004716

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 201
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 9:50:00AM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13200000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	19600		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	15500000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	281000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	797		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	43900		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.060	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	442	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	4.4	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.65		%	4,724	Infrared Drying
pH	pH	6.52	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.1	04		5,060	Contract Lab Dep

Sample: AB18512

Customer #: 1004717

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 251
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 3:18:00PM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	14800000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	18800		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	14200000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	288000		µg/kg	5,248	SW 846 6010B

Sample: AB18512

Customer #: 1004717

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 251
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 3:18:00PM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Molybdenum	538		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	41200		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.18	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	460	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	3.8	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	3.32		%	4,724	Infrared Drying
pH	pH	6.03	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.2	04		5,060	Contract Lab Dep

Sample: AB18513

Customer #: 1004718

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 252
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 4:20:00PM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	18200000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	21500		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	18400000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	462000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	582		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	43200		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.13	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	456	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	4.3	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.34		%	4,724	Infrared Drying
pH	pH	6.31	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.3	04		5,060	Contract Lab Dep

Sample: AB18514

Customer #: 1004719

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 253
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 4:17:00PM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	12700000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	16600		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	15000000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	487000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	488	05	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	32800		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.083	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	470	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.4	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.23		%	4,724	Infrared Drying
pH	pH	6.47	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.1	04		5,060	Contract Lab Dep

Sample: AB18515

Customer #: 1004720

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 254
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:39:00PM
Entry Point:
Sample Comment: FF DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	12100000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	17300	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	14000000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	411000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	827		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	32900	09	µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.039	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	482	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.7	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.77		%	4,724	Infrared Drying
pH	pH	6.19	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.7	04		5,060	Contract Lab Dep

Sample: AB18516

Customer #: 1004721

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 301
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 9:41:00AM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	15900000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	18900		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	15200000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	510000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	627		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	37700		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.053	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	454	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	7.6	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	7.52		%	4,724	Infrared Drying
pH	pH	7.03	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.9	04		5,060	Contract Lab Dep

Sample: AB18517

Customer #: 1004722

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 302
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 2:30:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	15700000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	20000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16300000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	535000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	552		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	38400		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.11	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	464	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	7.1	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	7.29		%	4,724	Infrared Drying
pH	pH	6.49	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.4	04		5,060	Contract Lab Dep

Sample: AB18518

Customer #: 1004723

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 303
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:27:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	17400000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	18300		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	13900000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	224000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	495	05	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	35900		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.020	04,05	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	433	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	4.1	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	3.92		%	4,724	Infrared Drying
pH	pH	7.15	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.7	04		5,060	Contract Lab Dep

Sample: AB18519

Customer #: 1004724

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 304
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:55:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	14600000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	19700		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16700000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	549000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	631		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	38300		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.029	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	416	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	4.2	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.15		%	4,724	Infrared Drying
pH	pH	7.78	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	5.2	04		5,060	Contract Lab Dep

Sample: AB18520

Customer #: 1004725

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 305
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 1:16:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13500000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	19000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16100000	09	µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	705000		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	779		µg/kg	5,248	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	34500		µg/kg	5,248	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.23	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	431	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	7.6	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	7.59		%	4,724	Infrared Drying
pH	pH	7.54	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.2	04		5,060	Contract Lab Dep

Sample: AB18521

Customer #: 1004726

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 306
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 1:06:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13300000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	17100		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	17600000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	768000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	490	05	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	33500		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.096	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	436	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	7.0	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.99		%	4,724	Infrared Drying
pH	pH	7.47	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.0	04		5,060	Contract Lab Dep

Sample: AB18522

Customer #: 1004727

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 312
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/7/2010 8:18:00AM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	15900000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	30000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	19000000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	687000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	1040		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	40100		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.049	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	430	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	2.2	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	2.48		%	4,724	Infrared Drying
pH	pH	7.72	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.8	04		5,060	Contract Lab Dep

Sample: AB18523

Customer #: 1004728

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 313
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 2:15:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	14800000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	23100		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	15300000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	559000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	578		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	35300		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.15	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	435	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.5	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.27		%	4,724	Infrared Drying
pH	pH	7.25	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.3	04		5,060	Contract Lab Dep

Sample: AB18524

Customer #: 1004729

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 319
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 1:50:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	17600000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	22500		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	20600000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	800000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	893		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	44500		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.073	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	444	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	11.9	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	11.65		%	4,724	Infrared Drying
pH	pH	7.25	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.1	04		5,060	Contract Lab Dep

Sample: AB18525

Customer #: 1004730

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 320
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 2:07:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	17800000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	25800		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	21200000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	757000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	710		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	44200		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.32	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	443	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.1	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.31		%	4,724	Infrared Drying
pH	pH	7.14	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.4	04		5,060	Contract Lab Dep

Sample: AB18526

Customer #: 1004731

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 325
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 3:10:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	8850000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	22600		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	14100000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	374000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	549		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	27700		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.15	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	441	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.5	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.88		%	4,724	Infrared Drying
pH	pH	7.55	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.3	04		5,060	Contract Lab Dep

Sample: AB18527

Customer #: 1004732

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 326
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 3:16:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	8420000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	15700		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	13500000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	345000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	527		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	26300		µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.086	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	451	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	5.0	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.84		%	4,724	Infrared Drying
pH	pH	7.54	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	1.4	04		5,060	Contract Lab Dep

Sample: AB18528

Customer #: 1004733

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 352
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 3:20:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	13900000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	17900	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	17400000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	607000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	785		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	33500	09	µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.034	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	450	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	2.8	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	3.13		%	4,724	Infrared Drying
pH	pH	7.41	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.4	04		5,060	Contract Lab Dep

Sample: AB18529

Customer #: 1004734

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 353
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 5:53:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	9260000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	16800		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	15400000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	636000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	938		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	22200	09	µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.050	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	442	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	2.4	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	2.92		%	4,724	Infrared Drying
pH	pH	7.90	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.2	04		5,060	Contract Lab Dep

Sample: AB18530

Customer #: 1004735

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 354
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:15:00PM
Entry Point:
Sample Comment: YARD DUIS

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	16300000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	21200		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Iron	16400000	09	µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	384000		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	552		µg/kg	5,249	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	36800	09	µg/kg	5,249	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	0.095	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	440	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	6.8	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	6.74		%	4,724	Infrared Drying
pH	pH	7.00	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.2	04		5,060	Contract Lab Dep

Sample: AB18531

Customer #: 1004736

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:41:00PM
Entry Point:
Sample Comment: SU 88 repl 1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	15100000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	145000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Iron	27000000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	575000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	1110		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	38200		µg/kg	5,250	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.11	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	467	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	7.5	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	7.90		%	4,724	Infrared Drying
pH	pH	6.57	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	3.0	04		5,060	Contract Lab Dep

Sample: AB18532

Customer #: 1004737

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:45:00PM
Entry Point:
Sample Comment: SU 88 repl 2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.65	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	6.5	04	%	5,055	Contract Lab Dep

Sample: AB18533

Customer #: 1004738

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 205
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:52:00PM
Entry Point:
Sample Comment: SU 88 repl 3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.78	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	7.0	04	%	5,055	Contract Lab Dep

Sample: AB18534

Customer #: 1004739

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/7/2010 8:35:00AM
Entry Point:
Sample Comment: SU 37 repl 1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	16000000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	377000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Iron	30000000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	417000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	2050		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	39500		µg/kg	5,250	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	1.13	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	413	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	3.8	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	4.24		%	4,724	Infrared Drying
pH	pH	7.89	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	5.8	04		5,060	Contract Lab Dep

Sample: AB18535

Customer #: 1004740

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/7/2010 8:45:00AM
Entry Point:
Sample Comment: SU 37 repl 2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.72	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	9.2	04	%	5,055	Contract Lab Dep

Sample: AB18536

Customer #: 1004741

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 214
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/7/2010 8:55:00AM
Entry Point:
Sample Comment: SU 37 repl 3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	0.67	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	3.9	04	%	5,055	Contract Lab Dep

Sample: AB18537

Customer #: 1004742

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 4:24:00PM
Entry Point:
Sample Comment: SU 161 repl 1

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
6010B Metals-Total Recoverable	Aluminum	17300000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Chromium	132000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Iron	20300000	09	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Manganese	383000		µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Molybdenum	461	05	µg/kg	5,250	SW 846 6010B
6010B Metals-Total Recoverable	Vanadium	47200		µg/kg	5,250	SW 846 6010B
Hexavalent Chromium	Hexavalent Chromium	3.45	04	mg/Kg	5,054	Contract Lab Dep
Oxidation Reduction Potential	Oxidation Reduction Potential	425	04	mV	5,061	Contract Lab Dep
Percent Moisture	Percent Moisture	2.9	04	%	5,055	Contract Lab Dep
Percent Moisture	Percent Moisture	2.59		%	4,724	Infrared Drying
pH	pH	7.58	04	pH Units	5,062	Contract Lab Dep
Total Organic Carbon	Total Organic Carbon	2.1	04		5,060	Contract Lab Dep

Sample: AB18538

Customer #: 1004743

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 4:32:00PM
Entry Point:
Sample Comment: SU 161 repl 2

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	4.57	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	3.8	04	%	5,055	Contract Lab Dep

Sample: AB18539

Customer #: 1004744

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID: 221
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 4:40:00PM
Entry Point:
Sample Comment: SU 161 repl 3

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	4.38	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	7.1	04	%	5,055	Contract Lab Dep

Sample: AB18540

Customer #: 1004745

Facility ID:
County: Multiple
Site: Tannery Sludge Farm Fields
Sample Reference ID:
Collector: KEN HANNON
Affiliation: ESP
Collect Date: 4/6/2010 12:00:00AM
Entry Point:
Sample Comment: BLIND REPLICATE

Test	Parameter	Result	Qualifier	Units	QC Batch ID	Method
Hexavalent Chromium	Hexavalent Chromium	3.76	04	mg/Kg	5,054	Contract Lab Dep
Percent Moisture	Percent Moisture	7.1	04	%	5,055	Contract Lab Dep

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01 Improper collection method
02 Improper preservation
03 Exceeded holding time
04 Analyzed by Contract Laboratory
05 Estimated value, detected below PQL
06 Estimated value, QC data outside limits
07 Estimated value, analyte outside calibration range
08 Analyte present in blank at > 1/2 reported value
09 Sample was diluted during analysis
10 Laboratory error
11 Estimated value, matrix interference
12 Insufficient quantity
13 Estimated value, true result is >= reported value
14 Estimated value, non-homogeneous sample
15 No Result - Failed Quality Controls Requirements
16 Not analyzed - related analyte not detected
17 Results in dry weight
18 Sample pH is outside the acceptable range
19 Estimated value
20 Not analyzed - Instrument failure
21 No result - spectral interference
22 pH was performed at the Laboratory
23 Contract Lab specific qualifier - see sample comments
24 No result - matrix interference
ND Not detected at reported value

APPLIED SPECIATION
AND CONSULTING, LLC

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Tel: (425) 483-3300 Fax: (425) 483-9818
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May 11, 2010

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102
(573) 522-9902

Dear Mr. Stroh,

Attached is the report associated with thirty (30) soil samples submitted for hexavalent chromium quantitation and conventionals (TOC, percent moisture, pH, and ORP) analyses on April 14, 2010. The samples were received on April 15, 2010 in sealed containers at -4°C. The submitted samples were extracted using EPA Method 3060A and then analyzed for hexavalent chromium via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). All conventionals analyses were performed using established methods as described in this report. Any analytical issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Ben Wozniak

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report Prepared for:

Michael Stroh
Missouri Department of Natural Resources / Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102

May 11, 2010

1. Sample Reception

Thirty (30) soil samples were submitted in wide-mouth glass jars (not provided by Applied Speciation and Consulting) for hexavalent chromium quantitation and conventionals (TOC, percent moisture, pH, and ORP) analyses on April 14, 2010. The samples were received in acceptable condition on April 15, 2010 in sealed containers at -4°C.

All samples were received in a laminar flow clean hood void of trace metals contamination and ultra-violet radiation. Upon reception, all samples were designated discrete sample identifiers and then stored in a secure, monitored refrigerator (maintained at a temperature of $\leq 4^{o}C$) until all preparatory and analytical procedures could be performed. Splits of each sample requesting TOC analysis were distributed to Amtest Inc.

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Hexavalent Chromium Quantification by IC-ICP-DRC-MS Prior to analysis, all samples were extracted using EPA Method 3060A on either April 19th (Batch C4), April 20th (Batches C2 and C3), or April 23rd (Batch C1). In summary, each sample was first spread into a thin layer onto a clean surface and a known mass of each sample was then weighed into a polypropylene centrifuge tube by taking approximately fifteen random subsamples of the original sample. A buffered alkaline extraction solution, $MgCl_2$, and a phosphate buffer solution were then applied to each sample. All vials were then heated at 90-95°C in a sonicating bath for a minimum of one (1) hour. The resulting extracts were cooled, filtered, and injected directly into sealed autosampler vials prior to analysis for hexavalent chromium.

pH and ORP Analyses Prior to the analyses, all samples submitted for pH and ORP measurements were prepared in accordance with EPA Method 9045D on April 21, 2010. In summary, a known mass of each sample was placed into a polypropylene centrifuge tube and an equivalent mass of reagent water was also added. The resulting suspensions were shaken for five (5) minutes, after which each was briefly centrifuged and then decanted into a new centrifuge vial. Each sample extract was then analyzed for pH and ORP as described herein.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform. All hexavalent chromium sample results have also been **dry-weight corrected** using the measured total solids (percent moisture) values.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Hexavalent Chromium Quantitation by IC-ICP-DRC-MS All sample extracts for hexavalent chromium quantitation were analyzed via a modified version of EPA Method 7199 employing ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Aliquots of each sample are injected onto an anion exchange column and mobilized by an alkaline (pH > 7) gradient. The eluting chromium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge (m/z) ratios. A solid-state detector detects ions transmitted through the mass analyzer, on the basis of their mass-to-charge ratio (m/z), and the resulting current is processed by a data handling system.

The retention time for hexavalent chromium is compared to known standards for species identification.

Total Solids (Percent Moisture) Analysis Approximately 1-2 grams of each sample was placed into a pre-weighed pan, and the combined mass of the sample and pan was recorded. All samples were then placed into a convection oven maintained at a temperature of 65-70°C. After drying for a minimum of eight (8) hours, all samples

were briefly cooled and reweighed. The total solids percentage of each sample was calculated by dividing the weight of the dried sample by the weight of the original sample. All samples were prepared for total solids on April 22, 2010.

pH Analysis All sample extracts for pH measurement were analyzed in accordance with EPA Method 9045D on April 21, 2010.

ORP Analysis All sample extracts for ORP measurement were analyzed in accordance with ASTM D 1498-93 on April 21, 2010. All measured ORP values were corrected for the reference electrode in accordance with the guidance provided in EPA Method 3060A.

TOC Analysis All samples submitted for TOC measurements were analyzed via EPA Method 9060 on May 4, 2010.

4. Analytical Issues

Although the overall analyses went well, significant issues were encountered during the applied hexavalent chromium extraction procedure, as described below:

Hexavalent Chromium Quantitation – LCS/CRM Three laboratory control samples (LCS) and one certified reference material (CRM) were extracted with each batch of samples to identify the extraction efficiency and capacity of the extraction procedure to induce conversion of trivalent chromium to hexavalent chromium. The laboratory control samples spiked with an aqueous hexavalent chromium and a solid $PbCrO_4$ standard produced acceptable recoveries for each batch (ranging from 77.8% to 98.0%), indicating that the applied method effectively extracts and stabilizes the hexavalent chromium species. Similarly, the results obtained for the NIST 2701 CRM extracted with each batch of samples were in close agreement with the informational value provided for Method 7199 in Table A2 of the certificate of analysis (recoveries ranging from 96.1% to 117.4%), suggesting acceptable method performance.

The laboratory control sample spiked with an aqueous trivalent chromium standard solution resulted in a hexavalent chromium recovery of less than 1% for each of the sample batches. The quantity of hexavalent chromium detected in these trivalent chromium laboratory control samples is near that present in the associated preparation blanks, which is attributed to trace levels of hexavalent chromium in the reagents used for the extraction procedure. The low recoveries for the trivalent chromium spikes demonstrate that the extraction procedure, under ideal conditions, induces minimal conversion of trivalent to hexavalent chromium.

Hexavalent Chromium Quantitation – Matrix Spike / Matrix Spike Duplicates (MS/MSDs) Similar to the laboratory control samples, three discrete sets of matrix spikes were extracted with each batch to identify the interaction of the sample matrix with trivalent and hexavalent chromium. The client also requested solid matrix

spikes be performed on specific samples using the NIST 2701 CRM. The performance of the matrix spikes can assist in identifying chemical interferences associated with the sample matrix and the applied extraction procedure.

Hexavalent Chromium Quantitation – Cr(III) Matrix Spikes The hexavalent chromium recoveries associated with each aqueous trivalent chromium MS and MSD performed for Batches C1 and C2 were less than 2%. These low trivalent chromium matrix spike recoveries confirm that the extraction procedure induces minimal oxidation of trivalent chromium to hexavalent chromium in the spiked sample matrices.

For Batch C3 the recoveries of the trivalent chromium MS/MSD were slightly elevated at 7.5% and 4.2% respectively. These recoveries suggest that partial oxidation of trivalent chromium to hexavalent chromium may have occurred in this spiked sample matrix during the extraction despite the application of the buffered $MgCl_2$ solution to all extracts.

The recoveries of the trivalent chromium MS/MSD performed for Batch C4 were 3.9 and -4.7%, respectively. The fact that the concentrations of hexavalent chromium detected in the trivalent chromium MS and MSD (1.234 and 0.782mg/kg, respectively) were near the ambient sample concentration (1.025mg/kg average for the MD set performed on 1004736) must be carefully considered when applying these results.

The RPDs associated with the MSDs performed for batches C3 and C4 were above the established control limit of 25% (56.6% and 2064% respectively). These elevated RPDs are attributable to the fact that a minimal amount of the trivalent chromium spikes was converted to hexavalent chromium during the applied extraction procedure, resulting in hexavalent chromium concentrations that represented an increase in Cr(VI) less than twice the ambient sample concentration. Since greater variability is expected as spike concentrations approach the ambient sample concentrations, the elevated RPDs are identified as an inherent limitation of any quantitative method and do not impact the validity of the reported results.

Hexavalent Chromium Quantitation – Aqueous Cr(VI), Solid $PbCrO_4$, and NIST 2701 Matrix Spikes To assist in the interpretation of the data, the client requested that an aqueous Cr(VI) matrix spike be performed for most of the submitted samples. The recoveries associated with these aqueous Cr(VI) spikes were below the established control limit of 75% for the samples identified as 1004716-1004729, 1004731-1004736, and 1004739. The insoluble $PbCrO_4$ matrix spikes performed on 1004716 and the NIST 2701 spikes performed on 1004729 and 1004739 recovered below 75% as well. As previously mentioned, the recoveries of the aqueous Cr(VI) LCS, the $PbCrO_4$ LCS, and the NIST 2701 CRM were within control for all batches of samples, demonstrating that the applied procedure both extracts and stabilizes Cr(VI) in solution. Since the low bias observed for these soluble and insoluble Cr(VI) matrix spikes may therefore be attributed to interference from the spiked sample matrices, no

further corrective action was deemed necessary. These MS/MSD results suggest that the spiked sample matrices favor reduction of hexavalent chromium. The measured TOC and/or pH and ORP values obtained for these samples also suggest they are reducing in nature.

The hexavalent chromium recoveries associated with the aqueous Cr(VI) and the solid $PbCrO_4$ matrix spikes performed on the sample identified as 1004730 were within established control limits, as were those of the aqueous Cr(VI) and solid NIST 2701 matrix spikes performed on 1004742. These acceptable recoveries suggest that the applied method effectively extracts and stabilizes hexavalent chromium in these particular sample matrices.

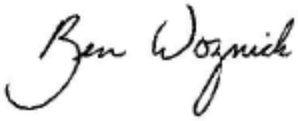
The RPD associated with the aqueous Cr(VI) MS/MSD set performed on the sample identified as 1004723 in Batch C2 was above the established control limit of 25% (65.4%). The RPD associated with the solid $PbCrO_4$ matrix spikes performed on this sample was within acceptance limits (3.4%), as was the RSD (5.7%) of the NIST 2701 triplicate matrix spike set performed on sample 1004729 in this same batch. Since this additional RPD and RSD were acceptable, the elevated RPD obtained for the aqueous Cr(VI) MS/MSD is deemed to be an isolated occurrence which reflects the variability of the reducing capacity of sample 1004723.

The RPD associated with the aqueous Cr(VI) MS/MSD set performed on the sample identified as 1004736 in Batch C4 was above the established control limit of 25% (182.9%). This sample matrix exhibited reducing conditions, as previously mentioned, which resulted in Cr(VI) concentrations for the MS and MSD that were less than twice the ambient sample concentration. Since greater variability is expected as spike concentrations approach the ambient sample concentration, the elevated RPD is identified as an inherent limitation of any quantitative method and does not impact the validity of the reported results. The acceptable RPD obtained for solid $PbCrO_4$ matrix spike performed on 1004736 instead demonstrates the precision of the extraction and analysis.

The estimated method detection limit (eMDL) for hexavalent chromium for each batch of solids is generated using the standard deviation of the associated preparation blanks, in accordance with Applied Speciation and Consulting's SOP.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,



Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
1004716	S1, C1, T1	4/23/2010 21:00	0.060	95.6	3.1	442	6.52
1004717	S1, C1, T1	4/23/2010 20:31	0.178	96.2	1.2	460	6.03
1004718	S1, C1, T1	4/23/2010 22:12	0.132	95.7	2.3	456	6.31
1004719	S1, C1, T1	4/23/2010 22:27	0.083	93.6	2.1	470	6.47
1004720	S1, C1, T1	4/23/2010 22:41	0.039	93.3	3.7	482	6.19
1004721	S1, C1, T1	4/23/2010 23:32	0.053	92.4	3.9	454	7.03
1004722	S1, C1, T1	4/23/2010 23:47	0.110	92.9	2.4	464	6.49

dw = dry weight
* Times reported in CST
** ORP measurements corrected for reference electrode as specified in EPA Method 3060A
NR = Not requested
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
1004723	S1, C2, T1	4/21/2010 22:52	0.020 J	95.9	3.7	433	7.15
1004724	S1, C2, T1	4/21/2010 22:23	0.029	95.8	5.2	416	7.78
1004725	S1, C2, T1	4/22/2010 0:04	0.233	92.4	3.2	431	7.54
1004726	S1, C2, T1	4/22/2010 0:19	0.096	93.0	2.0	436	7.47
1004727	S1, C2, T1	4/22/2010 0:33	0.049	97.8	1.8	430	7.72
1004728	S1, C2, T1	4/22/2010 0:48	0.148	93.5	2.3	435	7.25
1004729	S1, C2, T1	4/22/2010 1:39	0.073	88.1	3.1	444	7.25

dw = dry weight
* Times reported in CST
** ORP measurements corrected for reference electrode as specified in EPA Method 3060A
NR = Not requested
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
1004730	S1, C3, T1	4/22/2010 16:56	0.325	93.9	1.4	443	7.14
1004731	S2, C3, T1	4/22/2010 16:11	0.153	93.5	2.3	441	7.55
1004732	S2, C3, T1	4/22/2010 16:41	0.086	95.0	1.4	451	7.54
1004733	S2, C3, T1	4/22/2010 18:08	0.034	97.2	3.4	450	7.41
1004734	S2, C3, T1	4/22/2010 18:23	0.050	97.6	2.2	442	7.90
1004735	S2, C3, T1	4/22/2010 18:37	0.095	93.2	2.2	440	7.00

dw = dry weight
* Times reported in CST
** ORP measurements corrected for reference electrode as specified in EPA Method 3060A
NR = Not requested
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Batch Identifiers	Date & Time Analyzed for Cr(VI)*	Cr(VI) in mg/kg (dw)	% Solids	TOC in %	ORP (mV)**	pH
1004736	S2, C4, T2	4/21/2010 18:02	1.11	92.5	3.0	467	6.57
1004737	S2, C4	4/21/2010 17:33	0.652	93.5	NR	NR	NR
1004738	S2, C4	4/21/2010 17:40	0.779	93.0	NR	NR	NR
1004739	S2, C4, T2	4/21/2010 19:14	1.13	96.2	5.8	413	7.89
1004740	S2, C4	4/21/2010 19:36	0.715	90.8	NR	NR	NR
1004741	S2, C4	4/21/2010 19:43	0.674	96.1	NR	NR	NR
1004742	S2, C4, T2	4/21/2010 19:51	3.45	97.1	2.1	425	7.58
1004743	S2, C4	4/21/2010 20:27	4.57	96.2	NR	NR	NR
1004744	S2, C4	4/21/2010 20:34	4.38	92.9	NR	NR	NR
1004745	S2, C4	4/21/2010 20:41	3.76	92.9	NR	NR	NR

dw = dry weight
* Times reported in CST
** ORP measurements corrected for reference electrode as specified in EPA Method 3060A
NR = Not requested
U = Sample concentration is less than the estimated Method Detection Limit (eMDL)
J = Sample concentration is between the eMDL and the Reporting Limit (RL)

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte	Units	Batch	PBS1	PBS2	PBS3	PBS4	Mean	StdDev	eMDL	RL
TOC	%	T1	< 0.05	-	-	-	-	-	-	0.05
TOC	%	T2	< 0.05	-	-	-	-	-	-	0.05
Cr(VI)	mg/kg (dw)	C1	0.009	0.006	0.011	0.007	0.009	0.002	0.007	0.025
Cr(VI)	mg/kg (dw)	C2	0.010	0.009	0.010	0.010	0.010	0.001	0.002	0.025
Cr(VI)	mg/kg (dw)	C3	0.011	0.005	0.010	0.014	0.010	0.003	0.010	0.025
Cr(VI)	mg/kg (dw)	C4	0.006	0.006	0.007	0.008	0.007	0.001	0.003	0.025

eMDL = Estimated Method Detection Limit
RL = Reporting Limit

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Laboratory Control Samples

Analyte	Units	Batch	LCS	True Value	Result	Recovery
TOC	%	T1	LCS	1.2	1.1	91.7
TOC	%	T2	LCS	1.2	1.1	91.7
Cr(III)	mg/kg (dw)	C1	LCS	5.000	0.009	0.2
Cr(VI)	mg/kg (dw)	C1	LCS	5.000	4.157	83.1
$PbCrO_4$	mg/kg (dw)	C1	LCS	6371	4957	77.8
Cr(VI)	mg/kg (dw)	C1	NIST 2701*	388.7	373.6	96.1
Cr(III)	mg/kg (dw)	C2	LCS	5.000	0.010	0.2
Cr(VI)	mg/kg (dw)	C2	LCS	5.000	4.900	98.0
$PbCrO_4$	mg/kg (dw)	C2	LCS	5566	5050	90.7
Cr(VI)	mg/kg (dw)	C2	NIST 2701*	388.7	456.1	117.4
Cr(III)	mg/kg (dw)	C3	LCS	5.000	0.007	0.1
Cr(VI)	mg/kg (dw)	C3	LCS	5.000	4.507	90.1
$PbCrO_4$	mg/kg (dw)	C3	LCS	6532	5844	89.5
Cr(VI)	mg/kg (dw)	C3	NIST 2701*	388.7	398.9	102.6
Cr(III)	mg/kg (dw)	C4	LCS	5.000	0.008	0.2
Cr(VI)	mg/kg (dw)	C4	LCS	5.000	4.756	95.1
$PbCrO_4$	mg/kg (dw)	C4	LCS	6596	5866	88.9
Cr(VI)	mg/kg (dw)	C4	NIST 2701*	388.7	428.1	110.1

* True value listed is the mean value for Method 7199 in Table A2 of the NIST 2701 CoA

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicate / Triplicate

Analyte	Units	Batch	Sample ID	Rep 1	Rep 2	Rep 3	Mean	RSD
TOC	%	T1	1004716	3.1	3.1	3.1	3.1	0.0
TOC	%	T1	1004735	2.2	2.4	1.7	2.1	17.2
TOC	%	T2	1004739	5.8	6.8	5.7	6.1	10.0

Quality Control Summary - Matrix Duplicate

Analyte	Units	Batch	Sample ID	Rep 1	Rep 2	Mean	RPD
% Solids	%	S1	1004716	95.58	95.59	95.58	0.0
% Solids	%	S2	1004731	93.51	93.13	93.32	0.4
Cr(VI)	mg/kg (dw)	C1	1004716	0.060	0.063	0.061	5.1
Cr(VI)	mg/kg (dw)	C2	1004723	0.020 J	0.022 J	0.021 J	9.2
Cr(VI)	mg/kg (dw)	C3	1004730	0.325	0.312	0.318	4.1
Cr(VI)	mg/kg (dw)	C4	1004736	1.112	0.938	1.025	17.0

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike / Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	C1	1004716	5.125	0.116	1.1	5.295	0.108	0.9	18.1
Cr(VI)	mg/kg (dw)	C1	1004716	5.094	0.411	6.9*	5.220	0.440	7.3*	5.5
$PbCrO_4$	mg/kg (dw)	C1	1004716	7890	5569	70.6*	7250	5118	70.6*	0.0
Cr(VI)	mg/kg (dw)	C1	1004717	5.102	3.364	62.4*	-	-	-	-
Cr(VI)	mg/kg (dw)	C1	1004718	5.169	2.992	55.3*	-	-	-	-
Cr(VI)	mg/kg (dw)	C1	1004719	5.388	3.547	64.3*	-	-	-	-
Cr(VI)	mg/kg (dw)	C1	1004720	5.377	0.173	2.5*	-	-	-	-
Cr(VI)	mg/kg (dw)	C1	1004721	5.472	0.421	6.7*	-	-	-	-
Cr(VI)	mg/kg (dw)	C1	1004722	5.355	2.818	50.6*	-	-	-	-

* The recovery is below the established control limit of 75%; please see narrative.

** The RPD is above the established control limit of 25%; please see narrative.

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike / Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	C2	1004723	5.183	0.048	0.5	5.185	0.045	0.5	13.1
Cr(VI)	mg/kg (dw)	C2	1004723	5.227	0.673	12.5*	5.182	1.296	24.6*	65.4**
$PbCrO_4$	mg/kg (dw)	C2	1004723	6214	4910	79.0	5957	4547	76.3	3.4
Cr(VI)	mg/kg (dw)	C2	1004724	5.148	0.525	9.6*	-	-	-	-
Cr(VI)	mg/kg (dw)	C2	1004725	5.147	2.691	47.8*	-	-	-	-
Cr(VI)	mg/kg (dw)	C2	1004726	5.324	2.871	52.1*	-	-	-	-
Cr(VI)	mg/kg (dw)	C2	1004727	5.098	0.298	4.9*	-	-	-	-
Cr(VI)	mg/kg (dw)	C2	1004728	5.193	1.680	29.5*	-	-	-	-
Cr(VI)	mg/kg (dw)	C2	1004729	5.714	3.205	54.8*	-	-	-	-

* The recovery is below the established control limit of 75%; please see narrative.
** The RPD is above the established control limit of 25%; please see narrative.

Quality Control Summary - NIST 2701 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Triplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	RSD
Cr(VI)	mg/kg (dw)	C2	1004729	18.70	10.00	53.1*	5.7
Cr(VI)	mg/kg (dw)	C2	1004729	16.61	8.615	51.4*	-
Cr(VI)	mg/kg (dw)	C2	1004729	21.10	12.18	57.4*	-

* The recovery is below the established control limit of 75%; please see narrative.
Note: True value for the matrix spike calculated using the mean value for Method 7199 in Table A2 of the NIST 2701 CoA

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike / Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	C3	1004730	5.370	0.722	7.5	5.274	0.540	4.2	56.6**
Cr(VI)	mg/kg (dw)	C3	1004730	5.306	4.633	81.3	5.189	4.710	84.6	4.0
$PbCrO_4$	mg/kg (dw)	C3	1004730	7300	6136	84.1	7193	6206	86.3	2.6
Cr(VI)	mg/kg (dw)	C3	1004731	5.291	4.079	74.2*	-	-	-	-
Cr(VI)	mg/kg (dw)	C3	1004732	5.375	3.571	64.8*	-	-	-	-
Cr(VI)	mg/kg (dw)	C3	1004733	4.979	0.236	4.1*	-	-	-	-
Cr(VI)	mg/kg (dw)	C3	1004734	5.073	2.269	43.7*	-	-	-	-
Cr(VI)	mg/kg (dw)	C3	1004735	5.335	2.765	50.0*	-	-	-	-

* The recovery is below the established control limit of 75%; please see narrative.

** The RPD is above the established control limit of 25%; please see narrative.

Hexavalent Cr & Conventionals Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Spike / Matrix Spike Duplicate

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Cr(III)	mg/kg (dw)	C4	1004736	5.427	1.234	3.9	5.191	0.782	-4.7	2064**
Cr(VI)	mg/kg (dw)	C4	1004736	5.391	0.828	-3.6*	5.374	1.016	-0.2*	182.9**
$PbCrO_4$	mg/kg (dw)	C4	1004736	6857	5257	76.6	6969	5258	75.4	1.6
Cr(VI)	mg/kg (dw)	C4	1004739	5.110	1.050	-1.6*	-	-	-	-
Cr(VI)	mg/kg (dw)	C4	1004742	5.122	8.149	91.8	-	-	-	-

* The recovery is below the established control limit of 75%; please see narrative.
** The RPD is above the established control limit of 25%; please see narrative.

Quality Control Summary - NIST 2701 Matrix Spike

Analyte	Units	Batch	Sample ID	Spike Conc	MS Result	Recovery
Cr(VI)	mg/kg (dw)	C4	1004739	15.39	1.221	0.6*
Cr(VI)	mg/kg (dw)	C4	1004742	17.57	17.45	79.7

* The recovery is below the established control limit of 75%; please see narrative.
Note: True value for the matrix spike calculated using the mean value for Method 7199 in Table A2 of the NIST 2701 CoA

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Calibration Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
0.050	0.051	102.9
0.050	0.054	107.6
0.050	0.064	127.3
0.050	0.061	121.9
0.500	0.507	101.3
5.000	5.039	100.8
25.00	25.03	100.1
0.050	0.054	108.9
0.050	0.055	109.7
0.050	0.059	118.0
0.050	0.056	112.0
0.500	0.506	101.1
5.000	5.091	101.8
25.00	24.96	99.8
0.050	0.057	113.5
0.050	0.061	122.8
0.050	0.069	138.0
0.050	0.063	125.4
0.500	0.537	107.4
5.000	5.111	102.2
25.00	24.97	99.9

All results are reported in µg/L

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical CCV Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	4.660	93.2
5.000	5.049	101.0
5.000	5.079	101.6
5.000	5.254	105.1
5.000	5.259	105.2
5.000	5.021	100.4
5.000	5.312	106.2
5.000	5.175	103.5
5.000	5.242	104.8
5.000	5.102	102.0
5.000	5.159	103.2
5.000	4.568	91.4
5.000	4.899	98.0
5.000	4.881	97.6
5.000	4.848	97.0
5.000	4.968	99.4
5.000	4.914	98.3
5.000	4.947	98.9
5.000	4.845	96.9
5.000	5.030	100.6

CCV = Continuing Calibration Verification
All results are reported in µg/L

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Second Source Standards

Cr(VI) True Value	Cr(VI) Measured Result	Percent Recovery
5.000	5.495	109.9
5.000	5.107	102.1
100.0	95.38	95.4
5.000	4.932	98.6
5.000	4.706	94.1
20.00	20.30	101.5
5.000	5.029	100.6
100.0	107.2	107.2
5.000	5.369	107.4
5.000	5.557	111.1
5.000	4.986	99.7
5.000	5.474	109.5
5.000	5.445	108.9
5.000	4.546	90.9
5.000	4.900	98.0
5.000	4.756	95.1
5.000	4.507	90.1
5.000	4.157	83.1

Second source standard = Cr(VI) Blank Spike (from 3060A Extraction)
All results are reported in mg/kg

Hexavalent Cr Results for the Missouri Department of Natural Resources
Contact: Michael Stroh

Date: May 11, 2010
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Historical Matrix Spikes

Ambient Cr(VI) Conc.	MS Spike Conc.	MS Measured Result	MS Recovery	MSD Spike Conc.	MSD Measured Result	MSD Recovery	RPD
0.061	5.094	0.411	6.9	5.220	0.440	7.3	5.5
0.178	5.102	3.364	62.4	-	-	-	-
0.132	5.169	2.992	55.3	-	-	-	-
0.083	5.388	3.547	64.3	-	-	-	-
0.039	5.377	0.173	2.5	-	-	-	-
0.053	5.472	0.421	6.7	-	-	-	-
0.110	5.355	2.818	50.6	-	-	-	-
0.021	5.227	0.673	12.5	5.182	1.296	24.6	65.4
0.029	5.148	0.525	9.6	-	-	-	-
0.233	5.147	2.691	47.8	-	-	-	-
0.096	5.324	2.871	52.1	-	-	-	-
0.049	5.098	0.298	4.9	-	-	-	-
0.148	5.193	1.680	29.5	-	-	-	-
0.073	5.714	3.205	54.8	-	-	-	-
0.318	5.306	4.633	81.3	5.189	4.710	84.6	4.0
0.153	5.291	4.079	74.2	-	-	-	-
0.086	5.375	3.571	64.8	-	-	-	-
0.034	4.979	0.236	4.1	-	-	-	-
0.050	5.073	2.269	43.7	-	-	-	-
0.095	5.335	2.765	50.0	-	-	-	-
1.025	5.391	0.828	-3.6	5.374	1.016	-0.2	182.9
1.131	5.110	1.050	-1.6	-	-	-	-
3.448	5.122	8.149	91.8	-	-	-	-

All results are reported in mg/kg

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Transfer COC to Applied Speciation and Consulting, LLC

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
x Shipped-Carrier: Next Day Air
x Tape sealed and initialed
Hand Delivered
No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1004716 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 950	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1004717 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1518	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1004718 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1620	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
1004719 (Sample D)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1617	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
[signature] 4/14/10	[signature] -4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Transfer COC to Applied Speciation and Consulting, LLC

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- x Shipped-Carrier: Next Day Air
- x Tape sealed and initialed
- Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004720 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1239	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004721 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 941	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004722 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1430	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004723 (Sample D)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1227	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Lori Dunmire 4/14/10	[illegible] -4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Transfer COC to Applied Speciation and Consulting, LLC

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- x Shipped-Carrier: Next Day Air
- x Tape sealed and initialed
- Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004724 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1255	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004725 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1316	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004726 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1306	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004727 (Sample D)	Date: 04/07/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 818	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Lori Dunnie 4/14/10	[illegible] ~4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: Transfer COC to Applied Speciation and Consulting, LLC
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
x Shipped-Carrier: Next Day Air
x Tape sealed and initialed
Hand Delivered
No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004728 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1415	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004729 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1350	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004730 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1407	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004731 (Sample D)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1510	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Lori Cummins 4/14/10	[illegible] -4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID:

Collector's Name: Transfer COC to Applied Speciation and Consulting, LLC
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
x Shipped-Carrier: Next Day Air
x Tape sealed and initialed
Hand Delivered
No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004732 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1516	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004733 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1520	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004734 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1753	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004735 (Sample D)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1215	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
[illegible] 4/14/10	[illegible]	4/15/10	1932
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID:

Collector's Name: Transfer COC to Applied Speciation and Consulting, LLC
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
x Shipped-Carrier: Next Day Air
x Tape sealed and initialed
Hand Delivered
No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004736 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1241	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004737 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1245	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004738 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1252	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004739 (Sample D)	Date: 04/07/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 835	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
[signature] 4/14/10	[signature] -4°C	4/15/10	1932
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: _____

Collector's Name: (Please Print) Transfer COC to Applied Speciation and Consulting, LLC

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- x Shipped-Carrier: Next Day Air
- x Tape sealed and initialed
- Hand Delivered

No. Of Containers: 4

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004740 (Sample A)	Date: 04/07/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 845	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004741 (Sample B)	Date: 04/07/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 855	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004742 (Sample C)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, TOC, pH, Percent Moisture, ORP						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1624	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004743 (Sample D)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / / 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1632	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Lori Dunmire 4/14/10	[illegible] -4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID:

Collector's Name: Transfer COC to Applied Speciation and Consulting, LLC
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:
(circle one)

Description of Shipment
x Shipped-Carrier: Next Day Air
x Tape sealed and initialed
Hand Delivered
No. Of Containers: 2

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
1004744 (Sample A)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only	Time: 1640	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
1004745 (Sample B)	Date: 04/06/10	Hexavalent Cr 6+ by EPA modified method 7199, Percent Moisture						Grab / x Composite / Modified / Other:	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
(Sample C)	Date:							Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
(Sample D)	Date:							Grab / x Composite / Modified / Other:	Water / Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other:	120 mL / Nalgene 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 4° C(None) / Disinfected / Other
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Lori Dunmire 4/14/10	[illegible] -4°C	4/15/10	1732
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 100413005 B35

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered
- No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
1 1004716 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Cr, Al)						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618511	Time: 0950	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
2 1004717 (Sample B)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Cr, Al)						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618512	Time: 1518	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
3 1004718 (Sample C)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Cr, Al)						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618513	Time: 1620	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
4 1004719 (Sample D)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Cr, Al)						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag / 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618514	Time: 1617	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Dave Nudger	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): ~~PERFORM MATRIX SPIKE~~ KH ~~YARD~~ FF DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 201	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): KH ~~YARD~~ FF DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 251	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): KH ~~YARD~~ FF DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 252	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): KH ~~YA~~ FF DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 253	

REMARKS:
HWP: Michael Stroh PERFORM MATRIX SPIKES ON ALL SAMPLES for Cr^{+6}

2

B35

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 100413005

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment

Shipped-Carrier:

Tape sealed and initialed

x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
5 1004720 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18515	Time: 1239	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
6 1004721 (Sample B)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18516	Time: 0941	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
7 1004722 (Sample C)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18517	Time: 1430	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
8 1004723 (Sample D)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18518	Time: 1227	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Duk Endrego	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): FF DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 254	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 301	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 302	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing	**Accuracy**	(check one) EPE (meters) / PDOP	**Sample Reference ID:** 303	

REMARKS:
HWP: Michael Stroh

PERFORM MATRIX SPIKES ON EACH SAMPLE FOR Cr^{+6}

3

B35

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 1004130005

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
9 1004724 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18519	Time: 1255	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
10 1004725 (Sample B)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18520	Time: 1316	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
11 1004726 (Sample C)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18521	Time: 1306	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
12 1004727 (Sample D)	Date: 4-7-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18522	Time: 0818	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Derek Rudger	4-13-10	1320
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 304	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 305	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 306	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 312	

REMARKS:
HWP: Michael Stroh

Perform Matrix Spikes on All Samples for Cr^{+6}

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B35

LABORATORY ORDER ID: 100413005

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
13 1004728 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618523	Time: 1415	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
14 1004729 (Sample B)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618524	Time: 1350	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
15 1004730 (Sample C)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618525	Time: 1407	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
16 1004731 (Sample D)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only A618526	Time: 1510	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Duck Rutgers	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUST S				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 313	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUST S / PERFORM SRM SPIKE IN TRIPLICATE				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 319	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUST S				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 320	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUST S				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 325	

REMARKS:
HWP: Michael Stroh

PERFORM MATRIX SPIKE ON ALL SAMPLES FOR Cr^{+6}
PERFORM SRM SPIKE ON 1004729 IN TRIPLICATE FOR Cr^{+6}

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B35

LABORATORY ORDER ID: 100413005

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 8

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container		Preserved
17 1004732 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18527	Time: 1516	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
18 1004733 (Sample B)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18528	Time: 1520	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
19 1004734 (Sample C)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18529	Time: 1753	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					
20 1004735 (Sample D)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 1 8 oz glass / VOA vial / Encore / 1 Other: bag	120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18530	Time: 1215	D.O	Flow	pH	Spec. Cond.	Temp.	Other:					

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Derek Rodgers	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 326	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 352	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 353	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): YARD DUIS				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 354	

REMARKS:
HWP: Michael Stroh

PERFORM MATRIX SPIKES ON ALL SAMPLES FOR Cr^{+6}

B35

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

LABORATORY ORDER ID: 1004130025

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) ESP KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 6

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
21 1004736 (Sample A)	Date: 4-6-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18531	Time: 1241	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
22 1004737 (Sample B)	Date: 4-6-10	Hexavalent Chromium, ~~TOC, pH,~~ KH Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						Grab / x Composite / Modified / Other:	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: ; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB18532	Time: 1245	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
23 1004738 (Sample C)	Date: 4-6-10	Hexavalent Chromium, ~~TOC, pH,~~ KH Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						Grab / x Composite / Modified / Other:	Water / 1 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: ; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 1 4° C(None) / Disinfected / Other
For Lab Use Only AB18533	Time: 1252	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				
24 1004739 (Sample D)	Date: 4-7-10	Hexavalent Chromium, TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						Grab / x Composite / Modified / Other:	Water / 2 Soil / Organic / Sludge / Other:	1L amber / Cubitainer / 2 oz glass / 8 oz glass / VOA vial / Encore / Other: bag; 120 mL / Nalgene / 1L / 500mL / 250mL	H_2SO_4 / HNO_3 / NAOH / HCL / 2 4° C(None) / Disinfected / Other
For Lab Use Only AB18534	Time: 0835	D.O	Flow	pH	Spec. Cond.	Temp.	Other:				

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Derek Rudger	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 88 Repl 1				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:** 205	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 88 Repl. 2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:** 205	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 88 Repl 3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:** 205	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 37 REPL 1 ~~PERFORM 1 SRM SPIKE ON THIS SAMPLE~~ KH				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one): EPE (meters) / PDOP	**Sample Reference ID:** 214	

REMARKS:

HWP: Michael Stroh ~~PERFORM MATRIX SPIKES~~ KH

PERFORM MATRIX SPIKES ON 1004736 and 1004739 for Cr^{+6}

PERFORM SRM SPIKE ON 1004739 for Cr^{+6}

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B35

LABORATORY ORDER ID: 1004130005

Collector's Name: (Please Print) Ken Hannon

Affiliation: (circle one) (ESP) KCRO NERO SERO SLRO SWRO WPP DGLS HWP Other:

Description of Shipment
- ___ Shipped-Carrier:
- ___ Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 5

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
25 1004740 (Sample A)	Date: 4-7-10	Hexavalent Chromium ~~, TOC, pH,~~ K H Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						___ Grab x Composite ___ Modified	___ Water 1 Soil ___ Organic ___ Sludge	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene 1 8 oz glass ___ 1L	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL
For Lab Use Only AB18535	Time: 0845	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:	___ Other:	___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	1 4° C(None) ___ Disinfected ___ Other
26 1004741 (Sample B)	Date: 4-7-10	Hexavalent Chromium ~~, TOC, pH,~~ K H Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						___ Grab x Composite ___ Modified	___ Water 1 Soil ___ Organic ___ Sludge	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene 1 8 oz glass ___ 1L	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL
For Lab Use Only AB18536	Time: 0855	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:	___ Other:	___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	1 4° C(None) ___ Disinfected ___ Other
27 1004742 (Sample C)	Date: 4-6-10	Hexavalent Chromium , TOC, pH, Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al) Cr						___ Grab x Composite ___ Modified	___ Water 2 Soil ___ Organic ___ Sludge	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene 1 8 oz glass ___ 1L	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL
For Lab Use Only AB18537	Time: 1624	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:	___ Other:	___ VOA vial ___ 500mL ___ Encore ___ 250mL 1 Other: bag	2 4° C(None) ___ Disinfected ___ Other
28 1004743 (Sample D)	Date: 4-6-10	Hexavalent Chromium ~~, TOC, pH,~~ K H Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						___ Grab x Composite ___ Modified	___ Water 1 Soil ___ Organic ___ Sludge	___ 1L amber ___ 120 mL ___ Cubitainer ___ 2 oz glass ___ Nalgene 1 8 oz glass ___ 1L	___ H_2SO_4 ___ HNO_3 ___ NAOH ___ HCL
For Lab Use Only AB18538	Time: 1632	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	___ Other:	___ Other:	___ VOA vial ___ 500mL ___ Encore ___ 250mL ___ Other:	1 4° C(None) ___ Disinfected ___ Other

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	Dale Bridger	4-13-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 37 Repl. 2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 214	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 37 Repl. 3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 214	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 161 Repl. 2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 161 Repl. 2				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	

REMARKS:
HWP: Michael Stroh

PERFORM MATRIX SPIKE ON 100~~472~~ 742 FOR Cr^{+6}

PERFORM SRM SPIKE ON 100472 FOR Cr^{+6}

8

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

B35

LABORATORY ORDER ID: 100413005

Collector's Name: Ken Hannon
(Please Print)

Affiliation: ESP KCRO NERO SERO SLRO SWRO WPP
(circle one) DGLS HWP Other:

Description of Shipment
- Shipped-Carrier:
- Tape sealed and initialed
- x Hand Delivered

No. Of Containers: 2

Sample Number	Sample Collected	Analyses						Sample Type	For Lab Use Only: Matrix	Container	Preserved
29 1004744 (Sample A)	Date: 4-6-10	Hexavalent Chromium, ~~TOC, pH,~~ KH Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						Grab x Composite Modified	Water ✓ Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB18539	Time: 1640	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
30 1004745 (Sample B)	Date: 4-6-10	Hexavalent Chromium, ~~TOC, pH,~~ KH Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V, Al)~~						Grab x Composite Modified	✓ Water Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene ✓ 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only AB18540	Time: —	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	✓ 4° C(None) Disinfected Other
(Sample C)	Date:	Hexavalent Chromium, TOC, pH, KH Percent Moisture, ORP, Total Metals (Fe, Mn, Mo, V, Al)						Grab x Composite Modified	Water Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other
(Sample D)	Date:	~~Hexavalent Chromium, TOC,~~ pH, KH Percent Moisture, ~~ORP, Total Metals (Fe, Mn, Mo, V,~~ Al)						Grab x Composite Modified	Water Soil Organic Sludge	1L amber 120 mL Cubitainer 2 oz glass Nalgene 8 oz glass 1L	H_2SO_4 HNO_3 NAOH HCL
For Lab Use Only	Time:	D.O	Flow	pH	Spec. Cond.	Temp.	Other:	Other:	Other:	VOA vial 500mL Encore 250mL Other:	4° C(None) Disinfected Other

Relinquished By:	Received By:	Date:	Time:
Ken Hannon	David Rudzyn	3-14-10	1320

Sample I.D. Letter	Site Description				
Sample A	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): SU 161 Rpl. 3				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:** 221	
Sample B	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.): BLIND REPLICATE				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	
Sample C	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	
Sample D	**Facility ID:**	**Site/Study Name:** Tannery Sludge Farm Fields	**County:** (Multiple)	**LDPR Code:** FEPA8	**Job Code:** NJ10 TSFF
	Sample Comment (briefly describe where and how the sample was collected, station number, sample type, etc.):				
	GPS Coordinates (Record Coordinates in UTM Zone 15 NAD 83 Only): X Easting / Y Northing		**Accuracy** (check one) EPE (meters) / PDOP	**Sample Reference ID:**	

REMARKS:
HWP: Michael Stroh

APPENDIX C

Field Notes and Photo Log

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton and DeKalb Counties, MO

back to Hwy 21 south to bridge over ~~that same stream~~. Photo 22 ~~Gps # 1.~~ MS Big River! 23, 24
Theres MDC signs along here for Bootleg River access. No boat ramp, but canoe access + fishing River looks fishable + floatable here. photos 25 @ Bootleg Access

Returned to Jeff City 14:00

Loc ID 201/301
12:15
Collected yard DUTS from 4 yard SUs. / 5 incr. per SU.
photo #1 camera B5

1231 SU 14 - Selected as uniform upland pasture. well vegetated lots of cow flops.

1250 SU 66 selected as low swampy area very wet, but well vegetated.

1305 SU 41 Selected as mix of upland and low areas. also borders tree line. ~~where~~

Loc ID 251
SU: 144 soybean field uniform
14:35 upland photo #2 Camera B5

14:48 SU: 221 Fallow grassland
uniform, slight slope
bordered by tree line

1505 SU: 409½ - just N of SU 409 across
gravel road. Grassland uniform
photo #4 camera B5

1518 SU: 387 - soybean field uniform
upland: near gravel road.
photos 5+6 Camera B5

Loc ID 221
1624
1632 SU 162 QC replicates x 3
1640 uniform corn field
photos 7, 8, 9

Loc ID 353 Andrew Co.
BKgnd. Residence
17:35 3 SUs. photos 10, 11

Loc ID 312.

0815 Residence collected DUIS from 3 yard SUs / 5 incr. each. ~~Split~~ collected repl. bag for Matt Sugar w/ Accedis.

Loc ID 214

0835 SU 37. Collected 6 replicate
0845 IS 10 increments each.
0855 Gave 3 to Matt w/ Accedis.
Collected
Provided Matt with hardcopy map and list of analytical parameters.

Uniform pasture - lots of cow flops

Missouri Department of Natural Resources

Team No.____

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1		~~301~~ 354	YARD DUIS	4-6-10	1215	Ken H.	4 sus
2	254	~~201~~ MS	14	"	1239	"	pasture upland uniform
3	254	~~201~~ MS	66	"	1250	"	pasture low wet area
4	254	~~201~~ MS	41	"	1305	"	pasture incl. both upland + low
5		251	144	"	1435	"	Soybean field upland
6		251	221	"	1448	"	fallow grassland bordered by treeline
7		251	4.387	"	151~~8~~05 MS	"	Soybean field uniform upland
8							~~Soybean field, uniform~~ MS
9		251	409½	"	1448	"	fallow grassland N. slope
10		221	162 repl.1	"	1624	"	Cornfield uniform
11		221	162 repl.2	"	1632	"	"
12		221	162 repl.3	"	1640	"	"
13		353	YARD DUIS	"	1735	"	3 sus
14		312	YARD DUIS	4-7-10	0815	"	3 sus
15		214	37	"	0835	"	Repl. 1 uniform pasture
16		214	37	"	0845	"	Repl. 2 "
17		214	37	"	0855	"	Repl. 3 "
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							

Missouri Department of Natural Resources

Team No.____

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments
1	6632	205	88A	4/6/10	1241	SC	pasture
2	6632	205	88B	"	~~1245~~	VW	pasture
3	6632	205	88C	"	1252	SC	pasture
4	6632	306	Y	"	1306	SC	yard
5	6632	305	Y	"	1316	SC	yard
6	18970	319	Y	"	1350	SC	yard - applied fertilizer one week ago
7	18971	320	Y	"	1407	SC	yard
8	4859	325	Y	"	1510	SC	yard
9	4859	326	Y	"	1516	VW	yard
10		253	56	"	1617	SC	straddles ridge formerly hay field
11		253	87	"	1657	SC	highest ridge "
12		253	63	"	1720	VW	South sloping hill along tree line "
13		353	Yard	"	1735	KH	background yard abandoned house
14		301	yard	4/7/10	941	SC	yard
15		201	South field	"	950	SC	pasture w/ brush - lowlying SU
16		201	North field	"	955	BS	collects runoff sloping SU
17		201	east field	"	1015	BS	drainage ditch runs through SU cattle in field
18							all pasture
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							

Missouri Department of Natural Resources

Team No. 3
Shelly + Brad

SOIL SAMPLE LOG
TANNERY SLUDGE FARM FIELDS SITE

	Parcel #	Loc. ID	Sample ID (SUgridcell #.#)	Date Collected	Time Collected	Collector's Name	Comments row crop vs pasture
1		303	Yard	4-6-10	1227	Brad Swank	Yard
2		304	Yard	"	1255	"	Yard
3	~~57~~	204	51	"	1310	"	Pasture
4		313	Yard	"	1415	"	Yard
5		~~302~~	~~Yard~~	"			Y1 was fertilized field until 7 or 8 yrs ago
6		302	Yard	4-6-10	1430	"	Yard
7		352	Yard	4-6-10	1520	"	Yard - Bkgrnd
8		252	10	4-6-10	1600	"	Pasture
9		252	90	4-6-10	1620	"	Pasture
10		252	05	4-6-10	1635	"	Corn Row Crop
11	505			~~4-7-10~~	~~1015~~	~~"~~	~~P~~
12		~~201~~	~~Nor Unk~~	~~4-7-10~~	~~955~~	~~"~~	~~Pasture~~
13		~~201~~	~~East~~	~~4-7-10~~			~~on Val's shed~~
14			~~South~~	~~4-7-10~~		~~Sea~~	
15							
16							
17							
18							
19							
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21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							

Photograph 1
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 254. Background Yard

Photograph 2
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 251, SU 144. Background farm field. Evenly sloped upland soybean field.

Photograph 3
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 251, SU221. Background farm field. Evenly sloped fallow field with slight slope bordered by treeline.

Photograph 4
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

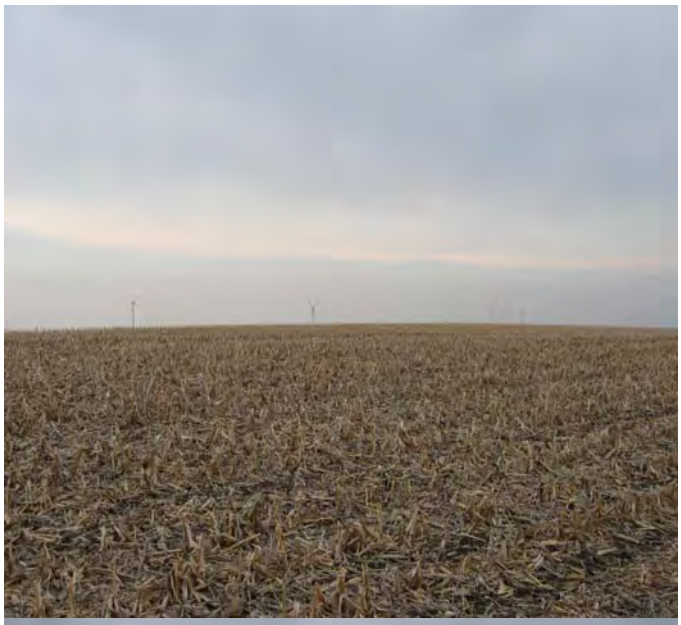
Location ID 251, SU 409.5.
Background farm field. Just north of SU 409 across gravel road. Uniform looking pasture with slight slope.

Photograph 5
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 251, SU 387.
Background farm field.
Soybean field, uniform upland near gravel road.

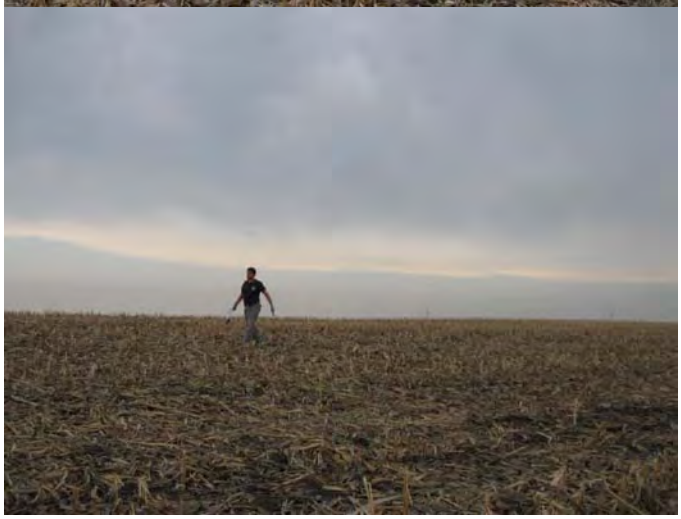
Photograph 6
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 251, SU 387.
Background farm field.
Soybean field, uniform upland near gravel road.



Photograph 7
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 221, SU 162.
Target farm field. Uniform corn field with little topography.
Selected for triplicate SU QC samples.



Photograph 8
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 221, SU 162.
Target farm field. Uniform corn field with little topography.
Selected for triplicate SU QC samples.

Photograph 9
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 353.
Background residence Andrew County.

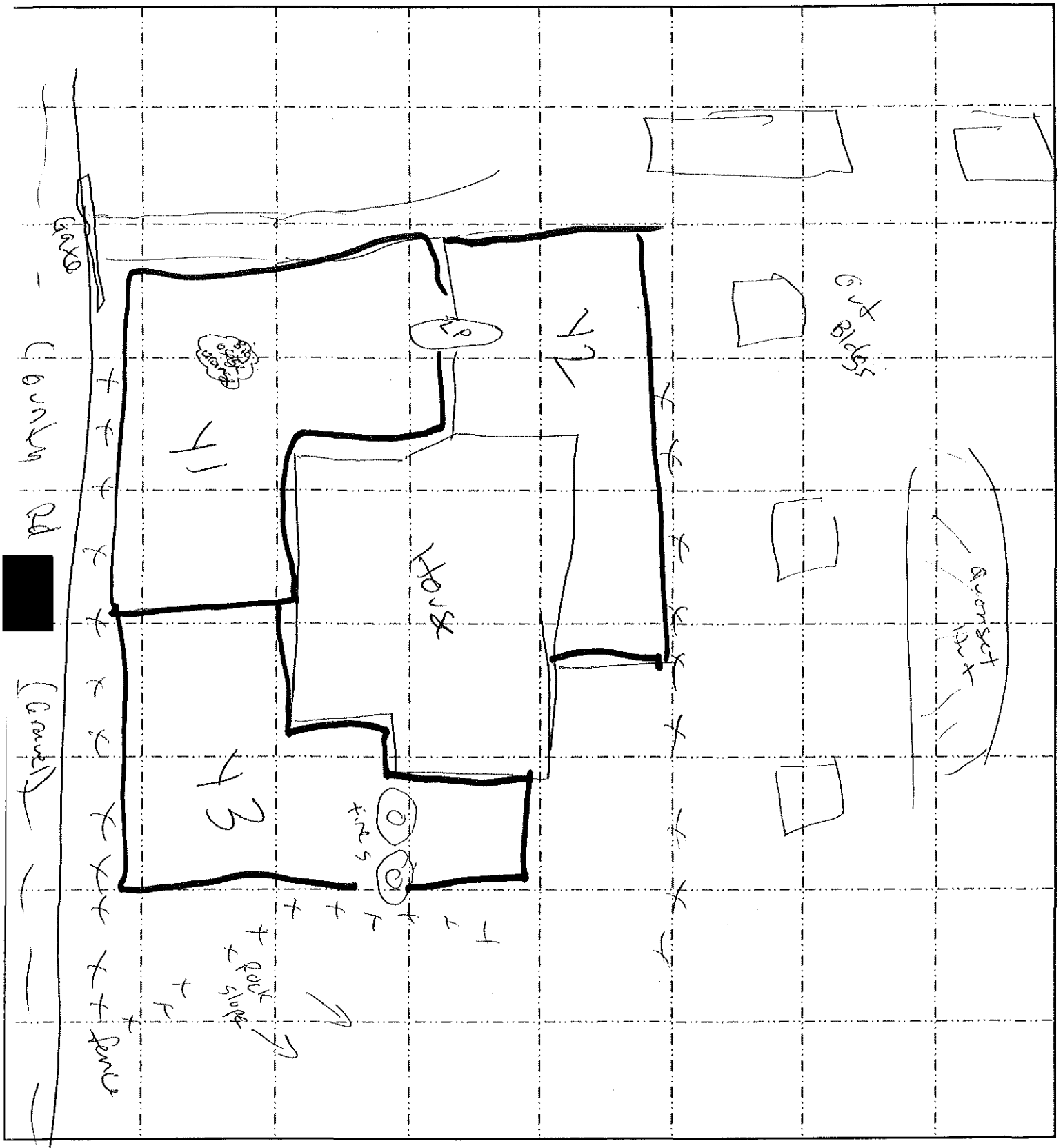
Photograph 10
Tannery Sludge Farm Fields Site
Photo taken 4/6/10 by
Michael Stroh,
DEQ, HWP, SPF

Location ID 353.
Background residence Andrew County.

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 353 PARCEL #_____

N



Date Sampled 4-6-10

Team Member(s): MS, KH

Sample Numbers Used:

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 353 Parcel # _____

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): County Road [redacted]

Mailing Address (if diff): _____

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☐☐ No ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐☐ No ☐**

Well Present? Yes ☐☐ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐☐ No ☐ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

Comments:

Vacant House

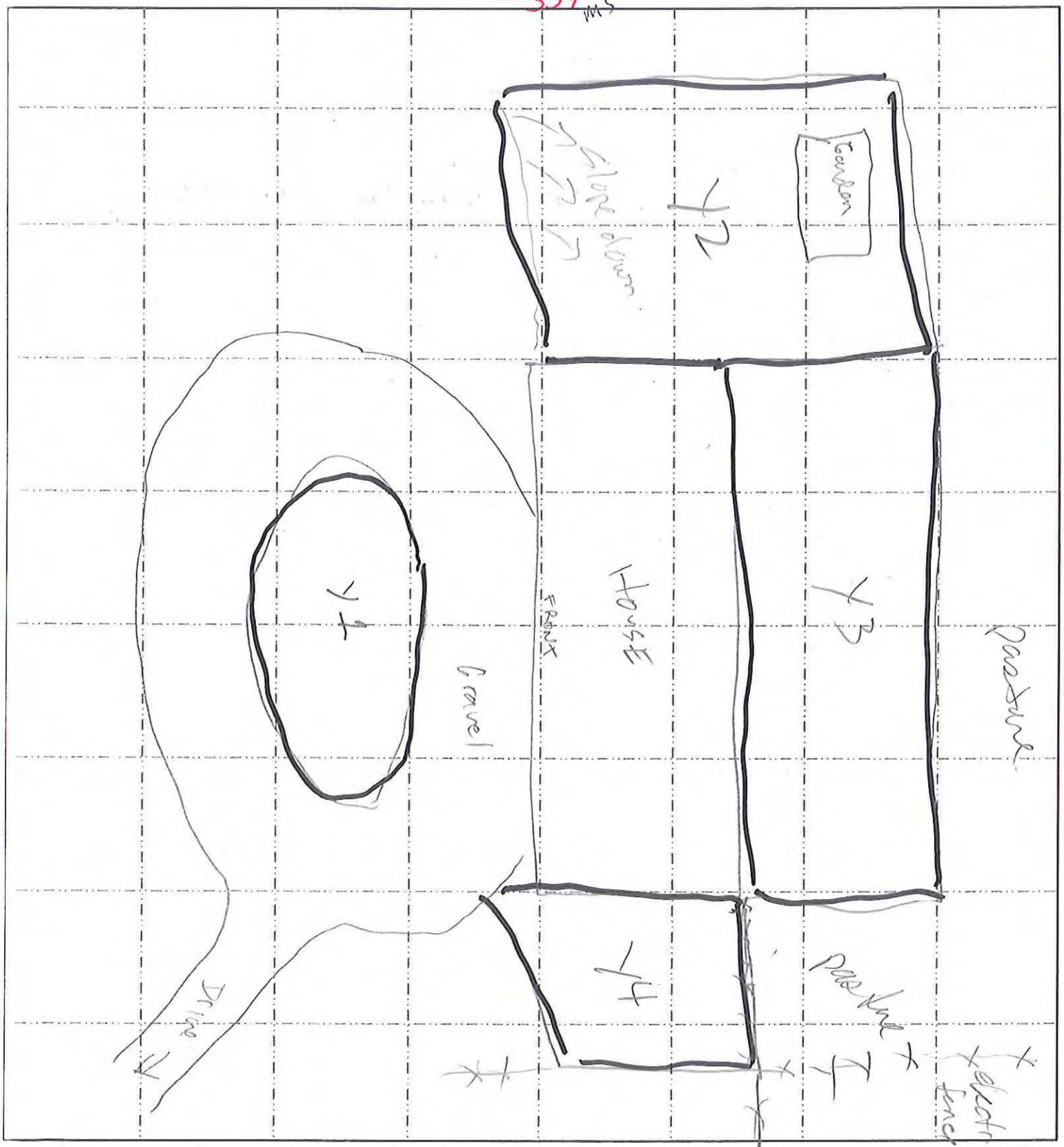
Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET

LOCATION ID ~~301~~ 354 MS PARCEL # 3627

N



Sample Numbers Used:

Date Sampled 4-6-10

Team Member(s): MS, KH

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: ~~304~~ 354 Parcel # 3627

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted]

Mailing Address (if diff): Same

Phone 1: unk [redacted] Phone 2: _____

Owner Occupied? Yes ☒ ☐ **No** ☐

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: 2 **Children Under 6 yrs? Yes** ☐ ☐ **No** ☒

Well Present? Yes ☒ ☐ **No** ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐ ☐ **No** ☒ **Well Age (yrs)** _____

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

Stucco + Stone facade, new 2 story

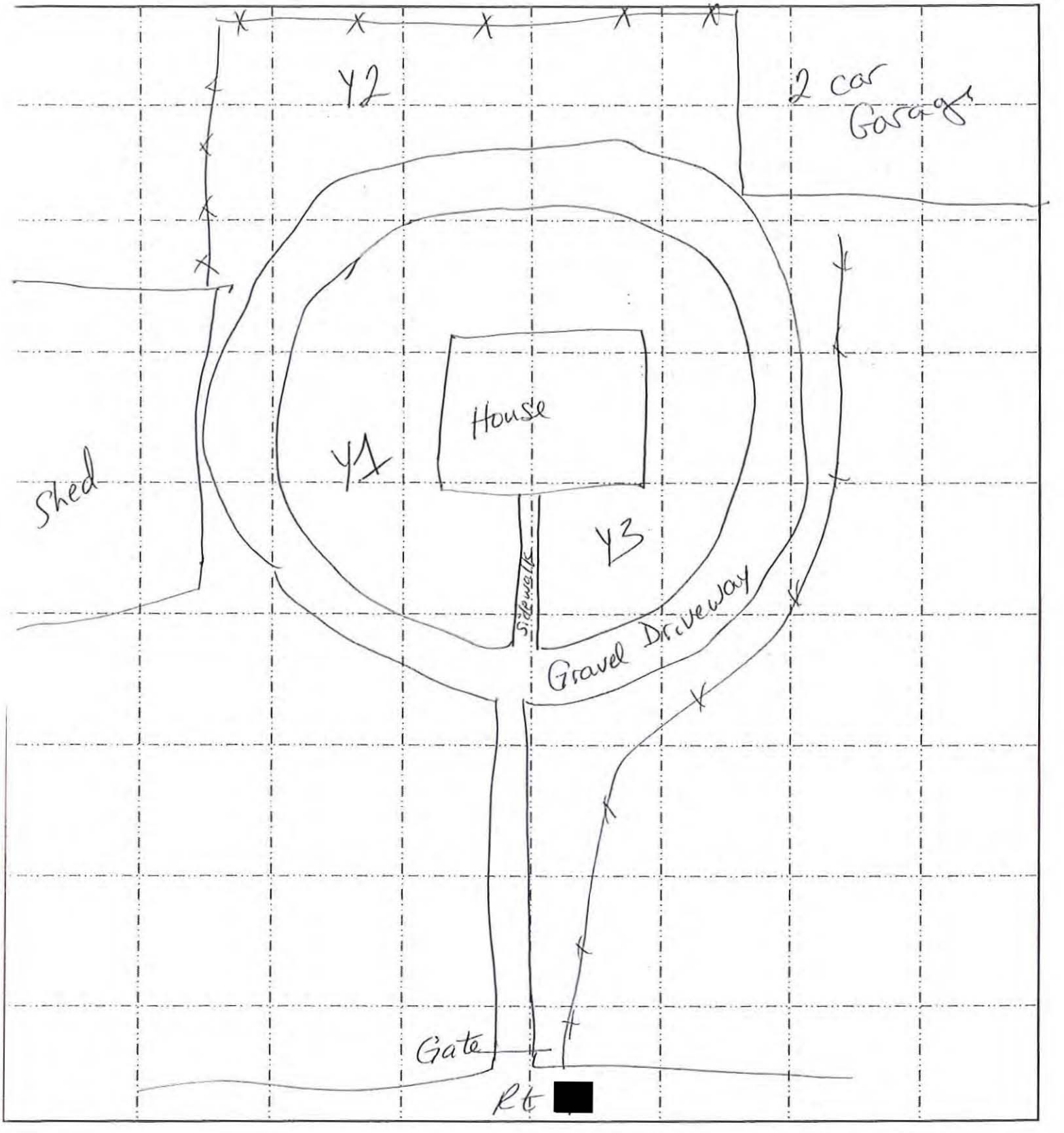
Comments:

Permission to Sample Granted Verbally By: _____ **On (date):** _____

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT
RESIDENTIAL YARD FIELD SHEET
LOCATION ID 352 **PARCEL #**_____

N



Date Sampled 4-6-10

Team Member(s): Shelly + Brad

Sample Numbers Used:
One DU Collected only

Missouri Department of Natural Resources

TANNERY SLUDGE FARM FIELDS PROJECT

RESIDENTIAL YARD FIELD SHEET

Location ID #: 352 Parcel # 6522

Owner Contact Information:

Owner: [redacted]

Physical Address of Property Sampled (Street, City, State, Zip): [redacted] Easton MO

Mailing Address (if diff): [redacted] Dearborn MO

Phone 1: _____ Phone 2: _____

Owner Occupied? Yes ☐☐ No ☒ VACANT

Occupant Contact Info (fill-out only if not owner-occupied):

Name(s): _____

Phone 1: _____ Phone 2: _____

Number of Residents: _____ **Children Under 6 yrs? Yes ☐☐ No ☐**

Well Present? Yes ☐☒ No ☐ **Well Depth (ft)** _____

Well Shared? Yes ☐☐ No ☐ **Well Age (yrs)** _____

Well Not Sampled

Latitude, Easting: _____ **Longitude, Northing:** _____

Physical Description of House/Property:

Comments:

Permission to Sample Granted Verbally By: [redacted] **On (date):** _____

APPENDIX E
REFERENCES

Missouri Department of Health and Senior Services
P.O. Box 570, Jefferson City, MO 65102-0570 Phone: 573-751-6400 FAX: 573-751-6010
RELAY MISSOURI for Hearing and Speech Impaired 1-800-735-2966 VOICE 1-800-735-2466

Margaret T. Donnelly
Director

Jeremiah W. (Jay) Nixon
Governor

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and
DeKalb Counties, Missouri
Pre-CERCLIS Site Screening
Reference DHSS, 2009

December 17, 2009

Dennis Stinson, Chief
Superfund Section
Hazardous Waste Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Department of Health and Senior Services recommendation for a screening level for hexavalent chromium in drinking water for the Tannery Sludge Farm Fields site.

Dear Mr. Stinson:

The Department of Health and Senior Services (DHSS) received a request from the Department of Natural Resources (DNR) to provide a recommendation for a screening level for hexavalent chromium in drinking water, as part of the ongoing Tannery Sludge Farm Field (TSFF) site investigation in northwest Missouri. Upon review, DHSS recommends a level of 0.3 micrograms per liter (ug/L, also known as parts per billion or ppb) as a health protective screening level for hexavalent chromium in drinking water. Sampling concentrations found below this level are not expected to be a potential health concern. Sampling concentrations found above this level do not necessarily indicate a public health threat is present, but that further evaluation may be needed.

A screening level such as this combines scientific information on a chemical's toxicity and known health effects with conservative factors of potential exposure in order to be considered health-protective, even for sensitive groups, over a lifetime. Some background of the derivation of this recommended drinking water screening level is provided below.

Since April 2009, DHSS has been working closely with DNR, the U.S. Environmental Protection Agency – Region VII (EPA-RVII), the Agency for Toxic Substances and Disease Registry (ATSDR) and other agencies to address whether hexavalent chromium in sludge used as fertilizer at northwest Missouri area farms is present in the environment at a level that is of a public health concern. As part of the effort to assess the presence and levels of hexavalent chromium in farm fields, DHSS staff recently worked with EPA staff to develop a health protective risk-based screening level for farm field soils at the TSFF site. That farm field soil screening level incorporated the most recent health studies on the toxicity and cancer potential from oral exposure to hexavalent chromium.

There is currently an established EPA Maximum Contaminant Level for *total* chromium in drinking water of 100 ppb. This is the federally enforceable standard for drinking water that considers human health as well as technical and economic feasibility. In addition, ATSDR has established a chronic

Environmental Media Evaluation Guide (EMEG) value for hexavalent chromium in drinking water of 10 ppb (child) or 40 ppb (adult) to be protective of noncancer health effects. However, neither the MCL nor the EMEGs consider the carcinogenicity of hexavalent chromium via the oral route that was examined in a recent National Toxicology Program (NTP) study.

A recent study in animals has shown chronic ingestion of hexavalent chromium to be associated with cancers of the mouth, tongue and intestines. The study published in 2008 and sponsored by the NTP provides dose-response data sufficient to derive a chronic oral cancer slope factor for quantitative cancer risk calculations. We have confidence in the suitability of this study for our purposes because it was designed and carried out specifically to answer questions of ingestion of hexavalent chromium compounds. Furthermore, EPA-RVII staff previously identified draft or final oral cancer slope factors based on this new information from several sources, including the EPA-Office of Pesticide Programs (OPP) and New Jersey Department of Environmental Protection (NJDEP). When calculating the farm field soils screening level previously, instead of making a determination as to the relative appropriateness of each slope factor, the EPA-OPP oral cancer slope factor of 0.79 $(mg/kg/day)^{-1}$ was chosen because it was the most conservative (health protective) of the identified slope factors derived from the 2008 NTP study.

The attached table shows the calculation for the recommended hexavalent chromium drinking water screening level of 0.3 ppb, using the EPA-OPP slope factor. This is most consistent with the calculation of the farm field soil screening level. In addition to using the EPA-OPP oral slope factor, this recommended screening level also accounts for recent evidence that hexavalent chromium may have a mutagenic mode of action, which would mean that early life exposures may have greater potential for risk. While the choice to account for a mutagenic mode of action is very conservative, this use is consistent with the calculation of the farm field soils screening level and increases our confidence that the calculated screening level is health protective.

The NJDEP oral cancer slope factor of 0.5 $(mg/kg/day)^{-1}$ has since been approved by EPA Office of Solid Waste and Emergency Response as an appropriate Tier III toxicity value. If not for the previous decision to use the EPA-OPP slope factor, the NJDEP factor would likely be the choice. Therefore, for comparison purposes the table also presents the results of using the NJDEP slope factor to calculate a drinking water screening level. As you will see, there is very little difference between the two numbers (0.3 ppb vs. 0.4 ppb).

For developing screening levels, a target cancer risk for risk management decision-making is normally set within the range of 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1,000,000). The recommended screening level is calculated at a 1×10^{-5} excess lifetime cancer risk level. Because screening levels do not identify health threats *per se*, but that further evaluation of the chemical and pathway is needed, a 1×10^{-5} screening level is appropriately protective. Also, because several conservative assumptions are used to account for uncertainties in the screening level development, the true risk may be lower than the calculated risk, so the 1×10^{-5} level may provide greater protection than 1 excess cancer in 100,000 exposed individuals.

Although a 1×10^{-6} screening level would be an order of magnitude more conservative at 0.03 ppb, it is our understanding from discussions with staff both at DNR and EPA-RVII that current drinking water laboratory analysis technology cannot reliably detect concentrations of hexavalent chromium in drinking

water at that low level. Therefore, a screening level set below the 1×10^{-5} level would not be useful for making public health determinations because there could be little to no good empirical data produced to make such a determination. Additionally, there is some concern that even the 1×10^{-5} screening level of 0.3 ppb, and more likely a screening level at 1×10^{-6} of 0.03 ppb, may be within a range of naturally occurring background levels of hexavalent chromium in groundwater. Although there is no evidence of this currently at the TSFF site, chromium may occur in different valence states in the environment, and it is a real concern for other metals such as arsenic. Conversely, a level set at only a 1×10^{-4} would be less appropriate for "screening" than it would for other decision-making.

Therefore, the recommended drinking water screening level of 0.3 ppb hexavalent chromium is believed to be protective of public health and consistent with the previous recommendations at the TSFF site. If you have questions, please contact Jonathan Garoutte of my staff at (573) 751-6102.

Sincerely,

Cherri Baysinger, Chief
Bureau of Environmental Epidemiology

CB/JG/mp

Cc: Julieann Warren
Ron King
Don Lininger
Kelly Schumacher
Denise Jordan-Izaguirre
Sue Casteel
Alan Parham

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John R. Haug
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jhaug@sonnenschein.com

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and
DeKalb Counties, Missouri
Pre-CERCLIS Site Screening
Reference Hackman, 2009

August 4, 2009

VIA FACSIMILE

Shelley A. Woods
Attorney General's Office
207 West High Street
P.O. Box 899
Jefferson City, MO 65102

Re: Keystone Pipeline ROW Sampling -- Chromium
Buchannan, Clinton, Caldwell Counties

Dear Ms. Woods:

Confirming earlier conversations and on behalf of Keystone Pipeline, we are pleased to enclose the chromium test results recently done along those cultivated portions of the right-of-way (ROW).

As you recall, there was concern, albeit very remote, that leather tannery sludge containing chromium may have been applied to cultivated farmland in the three subject counties.

Out of an abundance of caution, Keystone elected to do chromium testing along the ROW and further agreed to share the results with the state. Samples were taken of cultivated farmland where possible, but some portions of the ROW were flooded, or otherwise unsafe to sample due to field conditions.

The results are summarized in the attached letter report dated July 31, 2009. As always, please call with any questions. Thank you.

Very truly yours,

John R. Haug

cc: R. Stout, MDNR
F. Hackmann

23293479\V-1

AECOM

AECOM Environment
1601 Prospect Parkway, Fort Collins, Colorado 80525
T 970.493.8878 F 970.493.0213 www.aecom.com

July 31, 2009

Mr. John Evans
Mr. Frank Hackman
Sonnenschein, Nath, and Rosenthal LLP
One Metropolitan Square
Suite 3000
St. Louis, MO 63102-2741

Subject: Keystone Pipeline
Summary of Soil Samples with Chromium VI – Sampled May, 2009

Dear Mr. Evans and Mr. Hackman:

In response to your request, attached is a table summarizing hexavalent chromium concentrations in the soil samples taken from cultivated areas along the Keystone Pipeline right-of-way in Caldwell, Clinton, and Buchannan counties, Missouri. The table indentifies those concentrations of hexavalent chromium (chromium VI) detected in soil samples above the laboratory reporting limits. However, all detected samples above the reporting limits were all below the most conservative USEPA Regional Screening Level (RSL) of 230 mg/kg. If you have any questions, please contact us at (970) 493-8878.

Sincerely,

Dennis Alexander
Senior Geologist

Janie Castle
Project Coordinator

Enclosure

cc: Jean Decker (AECOM)
Jon Schmidt (Trow)
Buster Gray (UEI)
Jim White (TC)

Keystone Pipeline Summary of Soil Samples with Chromium VI Concentration Above Reporting Limit - May 2009

Samples Collected (ID)	Date Surveyed	From Milepost	To Milepost	Latitude	Longitude	Tract #	State/County	Concentration Above Reporting Limit (mg/kg)	Reporting Limit (mg/kg)
BU-1974#3	5.20.09	751.5190917	751.6319813	39.68981149	-94.96509791	MO-BU-1974	MO/Buchanan		
BU-1974#1	5.20.09	751.6366263	752.6509909	39.68907879	-94.95718902	MO-BU-1974	MO/Buchanan		
BU-1974#2	5.20.09	751.6366263	752.6509909	39.6896825	-94.96431721	MO-BU-1974	MO/Buchanan		
BU-1976#1	5.20.09	751.6366263	752.6509909	39.68693362	-94.94629941	MO-BU-1976	MO/Buchanan		
BU-1977#1	5.20.09	752.6972916	753.7148063	39.68673873	-94.94488961	MO-BU-1977	MO/Buchanan		
BU-1980#1	5.20.09	752.6972916	753.7148063	39.68581986	-94.94014196	MO-BU-1980	MO/Buchanan		
BUB-1981#1	5.20.09	752.6972916	753.7148063	39.68331753	-94.9268924	MO-BUB-1981	MO/BUBchanan		
BU-1982#1	5.20.09	753.7171886	754.6944363	39.68325975	-94.92639829	MO-BU-1982	MO/Buchanan		
BU-1983#1	5.20.09	753.7171886	754.6944363	39.68181828	-94.91917329	MO-BU-1983	MO/Buchanan		
BU-1985#1	5.20.09	753.7171886	754.6944363	39.67975936	-94.90928221	MO-BU-1985	MO/Buchanan		
BU-1987#1	5.20.09	754.7316145	754.8479115	39.67935122	-94.90667904	MO-BU-1987	MO/Buchanan		
BU-1989#1	5.20.09	754.8976399	755.2495702	39.67870611	-94.90406888	MO-BU-1989	MO/Buchanan		
BU-1991#1	5.20.09	754.8976399	755.2495702	39.67856371	-94.90298208	MO-BU-1991	MO/Buchanan		
BU-1991#2	5.20.09	754.8976399	755.2495702	39.6783508	-94.90157188	MO-BU-1991	MO/Buchanan		
BU-1992#1	5.20.09	755.2569102	755.5611824	39.67652834	-94.89354088	MO-BU-1992	MO/Buchanan		
BU-1992#2	5.20.09	755.2569102	755.5611824	39.67699222	-94.89522349	MO-BU-1992	MO/Buchanan		
BU-1992#3	5.20.09	755.2569102	755.5611824	39.67740837	-94.89711146	MO-BU-1992	MO/Buchanan		
BU-1992.0001#1	5.20.09	755.6581348	755.7316465	39.67516539	-94.89128294	MO-BU-1992.0001	MO/Buchanan		
BU-1994#1	5.20.09	755.7750515	755.8475062	39.67447146	-94.88973654	MO-BU-1994	MO/Buchanan		
BU-1998#1	5.20.09	756.3420728	756.6541691	39.67175437	-94.87856899	MO-BU-1998	MO/Buchanan		
BU-1999#1	5.20.09	756.3420728	756.6541691	39.67155353	-94.8752409	MO-BU-1999	MO/Buchanan		
BU-1999#2	5.20.09	756.3420728	756.6541691	39.67167523	-94.87726053	MO-BU-1999	MO/Buchanan		
BU-2000#3	5.20.09	756.6416257	756.8296694	39.67175296	-94.87170738	MO-BU-2000	MO/Buchanan		
BU-2000#4	5.20.09	756.6416257	756.8296694	39.67161236	-94.87334357	MO-BU-2000	MO/Buchanan		
BU-2000#1	5.20.09	756.879977	757.0936748	39.671831	-94.866368	MO-BU-2000	MO/Buchanan		
BU-2000#2	5.20.09	756.879977	757.0936748	39.67188745	-94.86789287	MO-BU-2000	MO/Buchanan		
BU-2005#1	5.20.09	758.426846	758.9097484	39.66902322	-94.83360884	MO-BU-2005	MO/Buchanan		
BU-2005#2	5.20.09	758.426846	758.9097484	39.66904087	-94.83717141	MO-BU-2005	MO/Buchanan		
BU-2005#3	5.20.09	758.426846	758.9097484	39.66878732	-94.84002675	MO-BU-2005	MO/Buchanan		
BU-2006#1	5.20.09	758.9196236	759.1636534	39.6688423	-94.82989349	MO-BU-2006	MO/Buchanan		
BU-2006#2	5.20.09	758.9196236	759.1636534	39.66902634	-94.83108775	MO-BU-2006	MO/Buchanan		
BU-2006#3	5.20.09	758.9196236	759.1636534	39.66904523	-94.83188348	MO-BU-2006	MO/Buchanan		
BU-2009#1	5.20.09	759.4260335	759.5268675	39.66820131	-94.82293163	MO-BU-2009	MO/Buchanan		
BU-2013#3	5.19.09	760.0348859	760.1578153	39.66848576	-94.81067084	MO-BU-2013	MO/Buchanan		
BUB-2013#1	5.19.09	760.1835915	760.4052413	39.66815939	-94.80679125	MO-BUB-2013	MO/BUBchanan		
BUB-2013#2	5.19.09	760.1835915	760.4052413	39.66826638	-94.80860204	MO-BUB-2013	MO/BUBchanan		
BU-2017#1	5.19.09	760.8519748	760.9005061	39.66681517	-94.79703388	MO-BU-2017	MO/Buchanan		
BUB-2017#2	5.19.09	760.8920515	760.9396613	39.66666174	-94.79586664	MO-BUB-2017	MO/BUBchanan		
BU-2023#1	5.19.09	762.0515921	762.2011578	39.66373003	-94.7739886	MO-BU-2023	MO/Buchanan		
BU-2023#2	5.19.09	762.0515921	762.2011578	39.66356884	-94.77554361	MO-BU-2023	MO/Buchanan	2	0.48
BUB-2027#1	5.19.09	762.6268445	763.083145	39.65973325	-94.75951645	MO-BUB-2027	MO/BUBchanan		
BUB-2027#2	5.19.09	762.6268445	763.083145	39.66045143	-94.7611788	MO-BUB-2027	MO/BUBchanan		
BUB-2027#3	5.19.09	762.6268445	763.083145	39.66119775	-94.76301781	MO-BUB-2027	MO/BUBchanan		
BU-2028#1	5.19.09	763.2381208	763.424525	39.65676268	-94.7534127	MO-BU-2028	MO/Buchanan		
BU-2028#2	5.19.09	763.2381208	763.424525	39.6573143	-94.75447437	MO-BU-2028	MO/Buchanan		
BUB-2031#1	5.19.09	763.6352218	763.848344	39.65387527	-94.74929603	MO-BUB-2031	MO/BUBchanan		
BU-2033#2	5.19.09	763.6352218	763.848344	39.65291748	-94.74793048	MO-BU-2033	MO/Buchanan		
BU-2033#1	5.19.09	763.8672613	763.8956281	39.6526984	-94.74675581	MO-BU-2033	MO/Buchanan		
BU-2034#1	5.19.09	763.8997575	764.2672293	39.65229156	-94.74571612	MO-BU-2034	MO/Buchanan		
BU-2039#7	5.12.09	765.170946	765.2845099	39.65661194	-94.72181621	MO-BU-2039	MO/Buchanan		
BU-2039#5	5.12.09	765.2798218	765.526312	39.65626548	-94.71770839	MO-BU-2039	MO/Buchanan		
BU-2039#6	5.12.09	765.2798218	765.526312	39.65637434	-94.71870173	MO-BU-2039	MO/Buchanan		
BU-2039#4	5.12.09	765.534023	765.588519	39.65613483	-94.71638517	MO-BU-2039	MO/Buchanan		
BU-2039#1	5.12.09	765.5888579	765.902996	39.65553075	-94.71121712	MO-BU-2039	MO/Buchanan		
BU-2039#2	5.12.09	765.5888579	765.902996	39.65579744	-94.71316697	MO-BU-2039	MO/Buchanan		
BU-2039#3	5.12.09	765.5888579	765.902996	39.65609453	-94.71548323	MO-BU-2039	MO/Buchanan		
BU-2041#5	5.12.09	765.9092439	765.9424399	39.65534274	-94.70962679	MO-BU-2041	MO/Buchanan		
BU-2041#4	5.12.09	765.9931971	766.0398009	39.65530561	-94.7082171	MO-BU-2041	MO/Buchanan		
BU-2041#2	5.12.09	766.0530801	766.2694972	39.65490988	-94.70430149	MO-BU-2041	MO/Buchanan		
BU-2041#3	5.12.09	766.0530801	766.2694972	39.65509884	-94.70610275	MO-BU-2041	MO/Buchanan		
BU-2041#1	5.12.09	766.2704352	766.2968011	39.65479321	-94.70305092	MO-BU-2041	MO/Buchanan		
BU-2042#1	5.12.09	766.6628818	766.801488	39.65408022	-94.69399108	MO-BU-2042	MO/Buchanan		
BU-2042#2	5.12.09	766.6628818	766.801488	39.65425045	-94.69485282	MO-BU-2042	MO/Buchanan		
BU-2043#1	5.12.09	766.8034454	766.8473046	39.65391841	-94.69302966	MO-BU-2043	MO/Buchanan		
BU-2043#2	5.12.09	766.8663397	767.0324745	39.65365845	-94.69130433	MO-BU-2043	MO/Buchanan		
BU-2043#3	5.12.09	766.8663397	767.0324745	39.65332553	-94.68938374	MO-BU-2043	MO/Buchanan		
BU-2044#1	5.12.09	767.0334667	767.2205699	39.65295992	-94.68760038	MO-BU-2044	MO/Buchanan		
BU-2044#2	5.12.09	767.0334667	767.2205699	39.65284413	-94.68641424	MO-BU-2044	MO/Buchanan		
BU-2044#3	5.12.09	767.2353317	767.2906069	39.65266889	-94.68527375	MO-BU-2044	MO/Buchanan		
BU-2045#3	5.12.09	767.324099	767.5521477	39.65199903	-94.68186605	MO-BU-2045	MO/Buchanan		
BU-2045#4	5.12.09	767.324099	767.5521477	39.65224768	-94.68285805	MO-BU-2045	MO/Buchanan		
BU-2045#2	5.12.09	767.5803464	767.6582923	39.65184647	-94.67984764	MO-BU-2045	MO/Buchanan		
BU-2045#1	5.12.09	767.7051317	767.795515	39.65116993	-94.6758516	MO-BU-2045	MO/Buchanan		
BU-2047#1	5.12.09	768.0166756	768.1722331	39.64936458	-94.6694142	MO-BU-2047	MO/Buchanan		
BU-2047#2	5.12.09	768.0166756	768.1722331	39.64954111	-94.67106372	MO-BU-2047	MO/Buchanan		
BU-2049#4	5.11.09	768.3088655	768.4187893	39.64880238	-94.66541378	MO-BU-2049	MO/Buchanan		
BU-2049#1	5.11.09	768.4305964	768.8206471	39.64853275	-94.65931889	MO-BU-2049	MO/Buchanan		
BU-2049#2	5.11.09	768.4305964	768.8206471	39.64859448	-94.6614902	MO-BU-2049	MO/Buchanan		

Keystone Pipeline Summary of Soil Samples with Chromium VI Concentration Above Reporting Limit - May 2009

Samples Collected (ID)	Date Surveyed	From Milepost	To Milepost	Latitude	Longitude	Tract #	State/County	Concentration Above Reporting Limit (mg/kg)	Reporting Limit (mg/kg)
BU-2049#3	5.11.09	768.4305964	768.8206471	39.64868424	-94.66300955	MO-BU-2049	MO/Buchanan		
BU-2050#2	5.11.09	768.9051307	769.2475354	39.64754921	-94.64932052	MO-BU-2050	MO/Buchanan		
BUB-2050#3	5.11.09	768.9051307	769.2475354	39.64779549	-94.65135119	MO-BUB-2050	MO/BUBchanan		
BU-2050#4	5.11.09	768.9051307	769.2475354	39.64797179	-94.65253725	MO-BU-2050	MO/Buchanan		
BU-2050#1	5.11.09	769.2793774	769.3659906	39.64713741	-94.6470898	MO-BU-2050	MO/Buchanan		
BU-2051#1	5.11.09	769.3660793	769.6315195	39.6464854	-94.64289934	MO-BU-2051	MO/Buchanan		
BU-2051#2	5.11.09	769.3660793	769.6315195	39.64667942	-94.64448632	MO-BU-2051	MO/Buchanan		
BU-2051#3	5.11.09	769.3660793	769.6315195	39.64701174	-94.64625388	MO-BU-2051	MO/Buchanan		
BU-2055#1	5.11.09	770.4445721	770.8351524	39.64392091	-94.62138271	MO-BU-2055	MO/Buchanan		
BU-2055#2	5.11.09	770.4445721	770.8351524	39.64379031	-94.62342703	MO-BU-2055	MO/Buchanan		
BU-2055#3	5.11.09	770.4445721	770.8351524	39.64397129	-94.6247943	MO-BU-2055	MO/Buchanan		
BU-2056.001#1	5.11.09	770.8896001	771.1379443	39.64318422	-94.61755736	MO-BU-2056.001	MO/Buchanan		
BU-2059#4	5.11.09	770.8896001	771.1379443	39.64260676	-94.61602821	MO-BU-2059	MO/Buchanan		
BU-2059#1	5.11.09	771.1414261	771.5917778	39.64199916	-94.60989951	MO-BU-2059	MO/Buchanan		
BU-2059#2	5.11.09	771.1414261	771.5917778	39.64216707	-94.61164734	MO-BU-2059	MO/Buchanan		
BU-2059#3	5.11.09	771.1414261	771.5917778	39.64238755	-94.614097	MO-BU-2059	MO/Buchanan		
CL-2061#2	5.11.09	771.8673666	772.1972491	39.64101219	-94.59581996	MO-CL-2061	MO/Clinton		
CL-2061#3	5.11.09	771.8673666	772.1972491	39.64115266	-94.59776275	MO-CL-2061	MO/Clinton		
CL-2061#4	5.11.09	771.8673666	772.1972491	39.64137641	-94.60017545	MO-CL-2061	MO/Clinton		
CL-2061#1	5.11.09	772.2108405	773.2075911	39.64084024	-94.59453178	MO-CL-2061	MO/Clinton		
CL-2062#3	5.11.09	772.2108405	773.2075911	39.63871896	-94.57880427	MO-CL-2062	MO/Clinton		
CL-2062#4	5.11.09	772.2108405	773.2075911	39.63916156	-94.58223054	MO-CL-2062	MO/Clinton		
CL-2062#1	5.11.09	773.2113154	773.431168	39.63830323	-94.57288996	MO-CL-2062	MO/Clinton		
CL-2062#2	5.11.09	773.2113154	773.431168	39.63855114	-94.57535322	MO-CL-2062	MO/Clinton		
CL-2064#3	5.10.09	773.4341248	773.5772369	39.63811894	-94.57067044	MO-CL-2064	MO/Clinton		
CL-2064#4	5.10.09	773.4341248	773.5772369	39.63818925	-94.57169471	MO-CL-2064	MO/Clinton		
CL-2064#1	5.10.09	773.5943567	773.7685355	39.63787434	-94.56775986	MO-CL-2064	MO/Clinton		
CL-2064#2	5.10.09	773.5943567	773.7685355	39.63811894	-94.57067044	MO-CL-2064	MO/Clinton		
CL-2065.0000#3	5.10.09	774.1297022	774.1892423	39.63664813	-94.55870378	MO-CL-2065.0000	MO/Clinton		
CL-2065.0000#1	5.10.09	774.1851025	774.4429962	39.63508619	-94.55509651	MO-CL-2065.0000	MO/Clinton		
CL-2065.0000#2	5.10.09	774.1851025	774.4429962	39.63608223	-94.55691736	MO-CL-2065.0000	MO/Clinton		
CL-2065.001#1	5.10.09	774.4230744	774.4932119	39.63608223	-94.55691736	MO-CL-2065.0001	MO/Clinton		
CL-2066#1	5.10.09	774.4965099	774.526106	39.63433244	-94.55326088	MO-CL-2066	MO/Clinton		
CL-2067#1	5.10.09	774.5244813	774.7529998	39.63403882	-94.54918671	MO-CL-2067	MO/Clinton		
CL-2067#2	5.10.09	774.5244813	774.7529998	39.63417422	-94.55069839	MO-CL-2067	MO/Clinton		
CL-2068#1	5.10.09	774.7474069	774.9696914	39.63344944	-94.54678316	MO-CL-2068	MO/Clinton		
CL-2068#2	5.10.09	774.7474069	774.9696914	39.63389473	-94.5483967	MO-CL-2068	MO/Clinton		
CL-2070#2	5.10.09	775.6664889	775.7924128	39.63155444	-94.53015415	MO-CL-2070	MO/Clinton	0.54	0.47
CL-2070#1	5.10.09	775.8041045	775.855795	39.63140216	-94.52945967	MO-CL-2070	MO/Clinton		
CL-2071#1	5.10.09	775.8948351	776.0407577	39.6308717	-94.52626189	MO-CL-2071	MO/Clinton		
CL-2073#1	5.10.09	775.9754965	776.2226735	39.63023633	-94.52208588	MO-CL-2073	MO/Clinton		
CL-2073#2	5.10.09	775.9754965	776.2226735	39.63056432	-94.52462012	MO-CL-2073	MO/Clinton		
CL-2074#3	5.10.09	776.5040251	776.6187991	39.62933051	-94.5150952	MO-CL-2074	MO/Clinton	0.56	0.5
CL-2074#4	5.10.09	776.5040251	776.6187991	39.6293596	-94.51652071	MO-CL-2074	MO/Clinton	0.91	0.51
CL-2074#1	5.10.09	776.6301671	776.8538585	39.6292798	-94.51330698	MO-CL-2074	MO/Clinton		
CL-2074#2	5.10.09	776.6301671	776.8538585	39.62931788	-94.51422223	MO-CL-2074	MO/Clinton		
CL-2078#5	5.10.09	777.9984327	778.1377091	39.62655451	-94.48685719	MO-CL-2078	MO/Clinton		
CL-2078#6	5.10.09	777.9984327	778.1377091	39.62666997	-94.48804647	MO-CL-2078	MO/Clinton		
CL-2078#4	5.10.09	778.194697	778.2417184	39.62645937	-94.4847851	MO-CL-2078	MO/Clinton		
CL-2078#1	5.10.09	778.2527532	778.5571846	39.62590566	-94.47980606	MO-CL-2078	MO/Clinton	0.84	0.49
CL-2078#2	5.10.09	778.2527532	778.5571846	39.62616096	-94.48149005	MO-CL-2078	MO/Clinton		
CL-2078#3	5.10.09	778.2527532	778.5571846	39.6262789	-94.48301758	MO-CL-2078	MO/Clinton		
CL-2079#1	5.7.09	779.7656516	779.7956814	39.62393362	-94.45609223	MO-CL-2079.0000	MO/Clinton		
CL-2083#1	5.8.09	780.4705746	780.7626163	39.62277555	-94.44212122	MO-CL-2083	MO/Clinton		
CL-2083#2	5.8.09	780.4705746	780.7626163	39.62253992	-94.43960161	MO-CL-2083	MO/Clinton		
CL-2085#1	5.8.09	780.7778397	781.1434824	39.62250836	-94.43645556	MO-CL-2085	MO/Clinton		
CL-2085#2	5.8.09	780.7778397	781.1434824	39.62229827	-94.43333533	MO-CL-2085	MO/Clinton		
CL-2086#1	5.8.09	781.1556972	781.4139066	39.62227341	-94.43023246	MO-CL-2086	MO/Clinton		
CL-2086#2	5.8.09	781.1556972	781.4139066	39.62232788	-94.42875684	MO-CL-2086	MO/Clinton		
CL-2086#3	5.8.09	781.4201669	781.5874681	39.62197858	-94.42339297	MO-CL-2086	MO/Clinton		
CL-2088#1	5.8.09	782.5303096	782.6281485	39.6190082	-94.40433288	MO-CL-2088	MO/Clinton		
CL-2090#3	5.8.09	783.1473868	783.2447483	39.61869911	-94.39304405	MO-CL-2090	MO/Clinton		
CL-2090#1	5.8.09	783.2424837	783.4724234	39.61844785	-94.38937436	MO-CL-2090	MO/Clinton		
CL-2090#2	5.8.09	783.2424837	783.4724234	39.61854242	-94.3910635	MO-CL-2090	MO/Clinton		
CL-2090#4	5.8.09	783.4934246	783.6447193	39.61825989	-94.38540859	MO-CL-2090	MO/Clinton		
CL-2092#1	5.8.09	783.649685	783.7081759	39.61808641	-94.38399039	MO-CL-2092	MO/Clinton		
CL-2098#1	5.8.09	784.9600798	785.2922782	39.61593107	-94.35855227	MO-CL-2098	MO/Clinton		
CL-2101#1	5.8.09	785.173232	785.4415058	39.61531296	-94.35405804	MO-CL-2101	MO/Clinton		
CL-2101#2	5.8.09	785.4389837	785.684991	39.61457591	-94.34821868	MO-CL-2101	MO/Clinton		
CL-2102#1	5.8.09	785.6953331	785.904047	39.61404868	-94.34413132	MO-CL-2102	MO/Clinton		
CL-2102#2	5.8.09	785.9111306	786.1947385	39.61321051	-94.33771304	MO-CL-2102	MO/Clinton		
CL-2102#3	5.8.09	785.9111306	786.1947385	39.61333034	-94.33938923	MO-CL-2102	MO/Clinton		
CL-2102#4	5.8.09	785.9111306	786.1947385	39.61371922	-94.3419356	MO-CL-2102	MO/Clinton		
CL-2104#1	5.9.09	786.1977453	786.3845206	39.61274247	-94.33530677	MO-CL-2104	MO/Clinton		
CL-2104#2	5.9.09	786.1977453	786.3845206	39.61269468	-94.33452432	MO-CL-2104	MO/Clinton		
CL-2104#5	5.9.09	786.3979331	786.4366139	39.61237711	-94.33331704	MO-CL-2104	MO/Clinton		
CL-2104#3	5.9.09	786.44	786.6125063	39.61261692	-94.33335827	MO-CL-2104	MO/Clinton		
CL-2104#4	5.9.09	786.44	786.6125063	39.61213709	-94.33088466	MO-CL-2104	MO/Clinton		

Keystone Pipeline Summary of Soil Samples with Chromium VI Concentration Above Reporting Limit - May 2009

Samples Collected (ID)	Date Surveyed	From Milepost	To Milepost	Latitude	Longitude	Tract #	State/County	Concentration Above Reporting Limit (mg/kg)	Reporting Limit (mg/kg)
CL-2107#1	5.9.09	787.331621	787.6471833	39.60914352	-94.31749852	MO-CL-2107	MO/Clinton		
CL-2107#2	5.9.09	787.331621	787.6471833	39.60990781	-94.31589119	MO-CL-2107	MO/Clinton		
CL-2107#3	5.9.09	787.331621	787.6471833	39.60968956	-94.31390246	MO-CL-2107	MO/Clinton		
CL-2109.0000#1	5.9.09	787.7698354	787.9029865	39.60831806	-94.30739521	MO-CL-2109	MO/Clinton		
CL-2109.0001#1	5.9.09	787.7698354	787.9029865	39.60831806	-94.30739521	MO-CL-2109.0001	MO/Clinton		
CL-2110#1	5.9.09	787.8857282	788.0245161	39.6076573	-94.30613484	MO-CL-2110	MO/Clinton	0.63	0.5
CL-2116#1	5.9.09	789.8454824	789.9114718	39.60441821	-94.27200994	MO-CL-2116	MO/Clinton		
CL-2118#1	5.9.09	790.611687	790.8575681	39.60280915	-94.25776498	MO-CL-2118	MO/Clinton		
CL-2118#2	5.9.09	790.611687	790.8575681	39.60261425	-94.25573438	MO-CL-2118	MO/Clinton		
CL-2122#3	5.9.09	791.1176754	791.1781995	39.60207962	-94.24588711	MO-CL-2122	MO/Clinton		
CL-2122#1	5.9.09	791.2131885	791.341773	39.60207962	-94.24588711	MO-CL-2122	MO/Clinton		
CL-2122#2	5.9.09	791.2131885	791.341773	39.60209599	-94.24658636	MO-CL-2122	MO/Clinton		
CL-2121#1	5.9.09	791.4074314	791.6117206	39.60171854	-94.24249467	MO-CL-2121	MO/Clinton		
CL-2121#2	5.9.09	791.4074314	791.6117206	39.60130645	-94.24104661	MO-CL-2121	MO/Clinton		
CL-2125#1	5.9.09	792.2011705	792.2380367	39.59952474	-94.22897098	MO-CL-2125	MO/Clinton		
CL-2125#2	5.9.09	792.2522384	792.4010905	39.59943966	-94.22689652	MO-CL-2125	MO/Clinton		
CL-2125#3	5.9.09	792.2522384	792.4010905	39.59933127	-94.22597401	MO-CL-2125	MO/Clinton		
CL-2126#1	5.9.09	793.1114441	793.1494327	39.59907148	-94.21192205	MO-CL-2126	MO/Clinton		
CL-2127#1	5.9.09	793.1580673	793.4469792	39.59900432	-94.21130055	MO-CL-2127	MO/Clinton		
CL-2127#2	5.9.09	793.1580673	793.4469792	39.59889303	-94.20929365	MO-CL-2127	MO/Clinton		
CL-2127#3	5.9.09	793.1580673	793.4469792	39.59863275	-94.20646032	MO-CL-2127	MO/Clinton		
CA-2127#1	5.13.09	793.464649	793.6718377	39.59846032	-94.20544462	MO-CA-2127.0010	MO/Caldwell		
CA-2127#2	5.13.09	793.464649	793.6718377	39.59816215	-94.20405148	MO-CA-2127.0010	MO/Caldwell		
CA-2128#1	5.13.09	793.6839689	793.7591344	39.59777662	-94.20053738	MO-CA-2128	MO/Caldwell		
CA-2128#2	5.13.09	793.7929664	794.0728492	39.59770071	-94.19916032	MO-CA-2128	MO/Caldwell		
CA-2128#3	5.13.09	793.7929664	794.0728492	39.5976188	-94.19737179	MO-CA-2128	MO/Caldwell		
CA-2128#4	5.13.09	793.7929664	794.0728492	39.59757724	-94.19622954	MO-CA-2128	MO/Caldwell		
CA-2128#5	5.13.09	794.1038937	794.2989846	39.59742379	-94.19213077	MO-CA-2128	MO/Caldwell		
CA-2128#6	5.13.09	794.1038937	794.2989846	39.59733162	-94.19088714	MO-CA-2128	MO/Caldwell		
CA-2129#1	5.13.09	794.3033232	794.4063462	39.59723184	-94.18950588	MO-CA-2129	MO/Caldwell		
CA-2129#2	5.13.09	794.4316688	794.8816459	39.59707179	-94.18581538	MO-CA-2129	MO/Caldwell		
CA-2129#3	5.13.09	794.4316688	794.8816459	39.59683893	-94.18250279	MO-CA-2129	MO/Caldwell		
CA-2129#4	5.13.09	794.4316688	794.8816459	39.59666943	-94.18081497	MO-CA-2129	MO/Caldwell		
CA-2134#1	5.13.09	795.9167865	796.1588028	39.59389814	-94.15912494	MO-CA-2134	MO/Caldwell		
CA-2134#2	5.13.09	795.9167865	796.1588028	39.59381194	-94.15728491	MO-CA-2134	MO/Caldwell		
CA-2134#3	5.13.09	796.1653426	796.4121927	39.5936317	-94.154238	MO-CA-2134	MO/Caldwell		
CA-2134#4	5.13.09	796.1653426	796.4121927	39.59357942	-94.15255807	MO-CA-2134	MO/Caldwell		
CA-2144#1	5.13.09	799.9874251	800.1435498	39.58414441	-94.08475603	MO-CA-2144	MO/Caldwell		
CA-2144#2	5.13.09	799.9874251	800.1435498	39.5839568	-94.0835174	MO-CA-2144	MO/Caldwell		
CA-2145#1	5.13.09	800.1654039	800.5059613	39.58333802	-94.07996616	MO-CA-2145	MO/Caldwell		
CA-2145#2	5.13.09	800.1654039	800.5059613	39.58333802	-94.07996616	MO-CA-2145	MO/Caldwell		
CA-2147#1	5.13.09	800.1654039	800.5059613	39.58275364	-94.07809448	MO-CA-2147	MO/Caldwell		
CA-2148#1	5.13.09	800.586412	800.7688144	39.58223521	-94.07478972	MO-CA-2148	MO/Caldwell		
CA-2148#2	5.13.09	800.586412	800.7688144	39.58223521	-94.07478972	MO-CA-2148	MO/Caldwell		
CA-2151#1	5.13.09	801.442884	801.5306453	39.58087222	-94.05760868	MO-CA-2151	MO/Caldwell		
CA-2152#1	5.13.09	801.5503911	801.6668171	39.58075213	-94.05668764	MO-CA-2152	MO/Caldwell		
CA-2153#1	5.13.09	802.1876831	802.297729	39.57936114	-94.0434523	MO-CA-2153	MO/Caldwell		
CA-2153#2	5.13.09	802.3442882	802.4974673	39.57912943	-94.0420896	MO-CA-2153	MO/Caldwell		
CA-2153#3	5.13.09	802.3442882	802.4974673	39.57885321	-94.04054153	MO-CA-2153	MO/Caldwell		
CA-2156#1	5.20.09	803.2580356	803.5050866	39.5768504	-94.0236594	MO-CA-2156	MO/Caldwell		
CA-2156#2	5.14.09	803.2580356	803.5050866	39.57663064	-94.02188539	MO-CA-2156	MO/Caldwell		
CA-2159#1	5.20.09	803.7599034	804.0042684	39.57577613	-94.01407799	MO-CA-2159	MO/Caldwell		
CA-2159#2	5.20.09	803.7599034	804.0042684	39.57557683	-94.01273255	MO-CA-2159	MO/Caldwell		
CA-2162#1	5.14.09	804.253555	804.4145366	39.57473764	-94.00650553	MO-CA-2162	MO/Caldwell		
CA-2162#2	5.14.09	804.253555	804.4145366	39.57457828	-94.00536149	MO-CA-2162	MO/Caldwell		
CA-2163#1	5.14.09	804.5985804	804.7627263	39.57394662	-93.99964158	MO-CA-2163	MO/Caldwell		
CA-2163#2	5.14.09	804.5985804	804.7627263	39.57371991	-93.99823726	MO-CA-2163	MO/Caldwell		
CA-2165#1	5.14.09	804.9318937	805.2824231	39.57317806	-93.99405522	MO-CA-2165	MO/Caldwell		
CA-2165#2	5.20.09	804.9318937	805.2824231	39.57301483	-93.99235258	MO-CA-2165	MO/Caldwell		
CA-2165#3	5.20.09	804.9318937	805.2824231	39.57276358	-93.9886459	MO-CA-2165	MO/Caldwell		
CA-2166#1	5.20.09	805.2835896	805.5240076	39.57269778	-93.9874234	MO-CA-2166	MO/Caldwell		
CA-2166#2	5.19.09	805.2835896	805.5240076	39.57251566	-93.98543685	MO-CA-2166	MO/Caldwell		
CA-2167#1	5.20.09	805.5634366	805.7254005	39.57223381	-93.98153545	MO-CA-2167	MO/Caldwell		
CA-2167#2	5.20.09	805.5634366	805.7254005	39.57215587	-93.98044197	MO-CA-2167	MO/Caldwell		
CA-2167#3	5.20.09	805.7674167	805.9249228	39.5719346	-93.9785683	MO-CA-2167	MO/Caldwell		
CA-2167#4	5.20.09	805.7674167	805.9249228	39.57180444	-93.97697188	MO-CA-2167	MO/Caldwell		
CA-2167#5	5.14.09	805.927462	806.0660379	39.57168321	-93.97552021	MO-CA-2167	MO/Caldwell		
CA-2167#6	5.20.09	805.927462	806.0660379	39.57154853	-93.974283	MO-CA-2167	MO/Caldwell		
CA-2168#1	5.20.09	806.0975619	806.37	39.57146597	-93.97170454	MO-CA-2168	MO/Caldwell		
CA-2168#2	5.20.09	806.0975619	806.37	39.5712376	-93.96996485	MO-CA-2168	MO/Caldwell		
CA-2168#3	5.20.09	806.0975619	806.37	39.57101985	-93.9672367	MO-CA-2168	MO/Caldwell		
CA-2168#4	5.20.09	806.4221057	806.5717073	39.5708714	-93.96543693	MO-CA-2168	MO/Caldwell		
CA-2169#1	5.14.09	806.5763502	806.9340921	39.57066711	-93.96303256	MO-CA-2169	MO/Caldwell		
CA-2170#1	5.14.09	806.5763502	806.9340921	39.57035855	-93.95992766	MO-CA-2170	MO/Caldwell		
CA-2171#1	5.14.09	806.5763502	806.9340921	39.57020349	-93.95807665	MO-CA-2171	MO/Caldwell		
CA-2171#2	5.14.09	806.9180604	807.0762113	39.57004528	-93.95699694	MO-CA-2171	MO/Caldwell		
CA-2171#3	5.20.09	806.9180604	807.0762113	39.56987767	-93.95547273	MO-CA-2171	MO/Caldwell		
CA-2174#1	5.14.09	807.877239	807.9628258	39.56896077	-93.9385946	MO-CA-2174	MO/Caldwell		

Keystone Pipeline Summary of Soil Samples with Chromium VI Concentration Above Reporting Limit - May 2009

Samples Collected (ID)	Date Surveyed	From Milepost	To Milepost	Latitude	Longitude	Tract #	State/County	Concentration Above Reporting Limit (mg/kg)	Reporting Limit (mg/kg)
CA-2174#2	5.14.09	807.9643063	808.0875765	39.56886391	-93.93728516	MO-CA-2174	MO/Caldwell		
CA-2176#1	5.14.09	808.2850532	808.4975178	39.56737377	-93.93183267	MO-CA-2176	MO/Caldwell		
CA-2176#2	5.14.09	808.2850532	808.4975178	39.5671296	-93.93042472	MO-CA-2176	MO/Caldwell		
CA-2176#3	5.20.09	808.5260661	808.6274675	39.56699502	-93.92753014	MO-CA-2176	MO/Caldwell		
CA-2177#1	5.14.09	808.6316825	809.440403	39.56646745	-93.92403443	MO-CA-2177	MO/Caldwell		
CA-2178#1	5.14.09	808.6316825	809.440403	39.56584816	-93.92120648	MO-CA-2178	MO/Caldwell		
CA-2178#2	5.14.09	808.6316825	809.440403	39.56523065	-93.91843582	MO-CA-2178	MO/Caldwell		
CA-2179#1	5.15.09	809.4596394	809.5414885	39.563343	-93.91024595	MO-CA-2179	MO/Caldwell		
CA-2180#1	5.15.09	809.543498	809.6496647	39.56331608	-93.91001369	MO-CA-2180	MO/Caldwell		
CA-2181#1	5.15.09	809.6531648	809.8930394	39.56311582	-93.90776199	MO-CA-2181	MO/Caldwell		
CA-2181#2	5.15.09	809.6531648	809.8930394	39.56289039	-93.90551871	MO-CA-2181	MO/Caldwell		
CA-2183#1	5.15.09	810.1555079	810.5601953	39.56207123	-93.8968946	MO-CA-2183	MO/Caldwell		
CA-2183#2	5.15.09	810.1555079	810.5601953	39.5619697	-93.89563976	MO-CA-2183	MO/Caldwell		
CA-2183#3	5.15.09	810.1555079	810.5601953	39.56152302	-93.8928909	MO-CA-2183	MO/Caldwell		
CA-2183#4	5.15.09	810.5729856	810.6486794	39.56135719	-93.8907334	MO-CA-2183	MO/Caldwell		
CA-2188#1	5.15.09	811.6877177	811.7515281	39.55827067	-93.87050035	MO-CA-2188	MO/Caldwell		
CA-2189#1	5.15.09	812.1285396	812.3271747	39.55751351	-93.8621388	MO-CA-2189	MO/Caldwell		
CA-2190#1	5.15.09	812.1285396	812.3271747	39.55739933	-93.86076191	MO-CA-2190	MO/Caldwell		
CA-2193#1	5.15.09	812.8936116	812.9770573	39.55633132	-93.84839362	MO-CA-2193	MO/Caldwell		
CA-2194#1	5.15.09	812.9805886	813.0803339	39.55639695	-93.84585537	MO-CA-2194	MO/Caldwell		
CA-2194#2	5.15.09	813.0820897	813.1368562	39.55594283	-93.84460709	MO-CA-2194	MO/Caldwell		
CA-2194.0001#1	5.18.09	813.2225734	813.321952	39.55515638	-93.84098904	MO-CA-2194.0001	MO/Caldwell		
CA-2194.0001#2	5.18.09	813.3506673	813.4191723	39.55515464	-93.84009259	MO-CA-2194.0001	MO/Caldwell		
CA-2194.0001#3	5.18.09	813.5365205	813.6774385	39.55525428	-93.83449788	MO-CA-2194.0001	MO/Caldwell		
CA-2195#1	5.18.09	813.6789346	813.8908348	39.55524657	-93.83392353	MO-CA-2195	MO/Caldwell		
CA-2195#2	5.18.09	813.6789346	813.8908348	39.55512871	-93.83174267	MO-CA-2195	MO/Caldwell		
CA-2196#1	5.18.09	813.8753244	813.9680686	39.55453275	-93.82993459	MO-CA-2196	MO/Caldwell		
CA-2196#2	5.18.09	813.979174	814.7351222	39.55435687	-93.82851267	MO-CA-2196	MO/Caldwell		
CA-2197#1	5.18.09	813.979174	814.7351222	39.55418437	-93.82712469	MO-CA-2197	MO/Caldwell		
CA-2197#2	5.18.09	813.979174	814.7351222	39.55314275	-93.81609768	MO-CA-2197	MO/Caldwell		
CA-2198#1	5.18.09	814.7375229	815.2447267	39.55297305	-93.8142535	MO-CA-2198	MO/Caldwell		
CA-2198#2	5.18.09	814.7375229	815.2447267	39.55218452	-93.80849706	MO-CA-2198	MO/Caldwell		
CA-2198#3	5.18.09	814.7375229	815.2447267	39.55171085	-93.80570415	MO-CA-2198	MO/Caldwell		
CA-2200#1	5.18.09	815.3714497	815.4384316	39.55139084	-93.8028615	MO-CA-2200	MO/Caldwell		
CA-2201#1	5.18.09	815.4961916	815.7551066	39.55090152	-93.79899172	MO-CA-2201	MO/Caldwell		
CA-2201#2	5.18.09	815.4961916	815.7551066	39.55061027	-93.79683586	MO-CA-2201	MO/Caldwell	**2.7**	0.47
CA-2202#1	5.18.09	815.7576453	815.9074181	39.55028343	-93.79388873	MO-CA-2202	MO/Caldwell		
CA-2202#2	5.18.09	815.7576453	815.9074181	39.55028343	-93.79388873	MO-CA-2202	MO/Caldwell		

Notes:
mg/kg = milligram per kilogram
Bold = Detected Concentration Above the Laboratory Reporting Limit

St. Joseph SLF
Permit 102102
Buchanan Co.
Enforcement

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director

www.dnr.mo.gov

MEMORANDUM

DATE: May 13, 2009

TO: Mr. Chris Nagel, Chief
Compliance/Enforcement Section
Solid Waste Management Program

FROM: Dan Norris, Environmental Specialist
Solid Waste Management Program

Dan Norris

SUBJECT: Solid Waste File Review, Northwest Missouri Tannery Sludge Investigation

On April 29, 2009, the Solid Waste Management Program (SWMP) initiated a review of information on file that pertains to tannery sludge generated at the Blue Side Companies. The review is in response to an ongoing investigation by both the Department of Natural Resources and the EPA into an alleged increase in tumors in the Cameron, Missouri area. Tannery sludge containing Hexavalent Chromium has been alleged to have been spread across farms in northwest Missouri and has been disposed of in at least 4 landfills in the area. The information below provides a brief summary of the data encountered during the solid waste file review.

Findings of Review

Analytical Data

A lab report in 1973 indicated total Chromium concentration of 8600 mg/kg for the sludge material. A lab report in 1974 indicated total Chromium concentration of the sludge material to be 3333 mg/kg of which 2586 mg/kg was Hexavalent Chromium. In 1975, DNR recommended that the pH of the sludge be raised to reduce the Hexavalent Chromium portion to Trivalent prior to disposal. This, however, was not a requirement. In 1977 analytical results of the sludge filter cake indicate 1.07% total Chromium.

A limited study was conducted regarding sludge disposal from the St. Joseph City Wastewater Treatment Plant (adjacent to the tannery). In 1978 a letter from the University of Missouri-Columbia indicated that they did not have concern about Chromium levels in the City Wastewater Sludge as to plant uptake. However the memo states that other metals which could be in the sludge should be studied in greater detail. We did not locate any analytical results of chromium from the City Wastewater Sludge. The above study appeared to focus on plant

Pre-CERCLIS Site Screening
Reference MDNR, 2009a

toxicity, rather than total metals concentration in the sludge, which would be more relevant with regard to the inhalation pathway we are currently investigating.

In 1975, Blueside hired Research Advisory Service, Inc. Lab to analyze the tannery sludge material. The samples were analyzed by both colorimetric and atomic absorption methods for Hexavalent Chromium. The colorimetric method indicated 0 ppm Hexavalent Chromium, while the atomic absorption method indicated 1780 to 4500 ppm Hexavalent Chromium. The lab stated that they felt the atomic absorption method results were inaccurate.

In 1978 an analysis of the Blueside Filter Cake indicated Chromium concentrations of up to 1.01% total Chromium.

In 1982 an analytical report of chrome tanned shavings indicates the shavings contain 3.68% Cr2O3. This result was used on a Special Waste Disposal Request in September 1982 and the Chromium was identified as Trivalent Chromium.

In 1984, a Special Waste Disposal Request for a Calcium Sulfate and Grease Mixture from the Chromium recovery process indicated a pH of 3.7

A DNR inspection in 1986 at Wheeling Disposal refers to low pH soils in areas where tanning wastes were spread.

1989 analytical data from land application records indicates total Chromium concentrations up to 0.2652%

Tannery Process Changes

In 1978, a letter from Emcon stated that there has been a recent change in the process at the tannery- A chromium recovery system and de-watering system recently became operational. In early 1981 Blueside explained that they were planning to install a Chromium precipitation process to reduce the chromium concentrations in the sludge. A DNR memo in June of 1982 referred to recent process changes at the tannery, but does not specify what they are. A February 1983 DNR memo states that the process has been changed to remove Hexavalent Chromium from the sludge.

Regulatory Changes

Data reviewed in the files indicate that around 1980 the United States Environmental Protection Agency (EPA) drafted a rule change affecting tannery waste. The change de-listed tannery waste from the federal definition of hazardous waste, provided certain criteria were met. Some of the criteria required the tannery waste to contain exclusively (or nearly exclusively) Trivalent Chromium. The Solid Waste Management Program (SWMP) has not researched this rule and does not have additional data regarding possible changes to this rule after 1980.

Wheeling Disposal Landfill, Amazonia, MO

Blueside waste was sent to Wheeling Disposal landfill between (possibly prior to) 1975 and 1984. In 1975, an official DNR permit was issued to Wheeling Disposal to accept Blueside Sludge. Blueside sludge was experimentally blended with soil at the Wheeling Disposal landfill.

This practice resulted in extensive odor problems and DNR terminated the authorization of this practice in 1976. However, Wheeling Disposal continued to land apply sludge at the landfill near Amazonia until approximately 1982. At times, the Blueside waste was stockpiled at the site. In 1986, a DNR inspection referrs to low pH in the soil in areas where tanning waste has been spread as a reason for the site lacking grassy vegetation. In 1988 an inspection of the landfill indicated erosion on the special waste disposal trenches. Wheeling Disposal operated as an industrial waste disposal site for numerous industries and is now a Hazardous Waste Registry site.

Piegon Hill Sanitary Landfill, St. Joseph, MO

The Piegon Hill Sanitary landfill accepted tannery wastes periodically, according to a site characterization (hazardous waste registry site report). No data has been located to know the specific years tannery waste may have been sent to this site. However, this landfill ceased accepting waste around 1977. Piegon Hill accepted a variety of other industrial wastes during its operational life and is now a Hazardous Waste Registry site.

Galloway Enterprises, Inc. Landfill, Bethany, MO

Blueside waste was sent to Galloway Enterprises Landfill from late 1982 to 1985. The landfill was used for disposal of sludge when weather or crop conditions precluded Blueside from using the land application sites. In December 1982, Galloway Enterprises was granted DNR approval to accept up to 150 tons per day of Blueside waste in a separate, dedicated disposal trench. This appears to be due to the fact that the St. Joseph Sanitary Landfill was temporarily denied the ability to accept the special waste, since the City did not have a dedicated sludge disposal area ready at the time. In February 1983, Harrison County officials met with DNR staff. Harrison County was concerned about the sludge going into a landfill in their county. A DNR memo regarding the meeting states that a process change at the tannery has removed the Hexavalent Chromium and that the waste is not considered a hazardous waste.

City of St. Joseph Sanitary Landfill, St. Joseph, MO

Blueside waste was sent to the St. Joseph Sanitary landfill between 1981 and Present. The City of St. Joseph requested permission in 1980 to accept Blueside Tannery Sludge. DNR explained that although the EPA may de-list the material so it is no longer considered hazardous waste, the City must still provide for a plan to manage the sludge as a special waste and provide for a dedicated disposal area. The concept of requiring the sludge to be disposed of in dedicated special waste trenches was for two main reasons: 1) To minimize the possibility of a landfill fire converting Trivalent Chromium to Hexavalent, and 2) To minimize the possibility of the landfill environment creating conditions favorable to create undesirable reactions which could leach metals out of the sludge or cause other problems at the landfill.

In March 1981, DNR granted approval to use a portion of the landfill for Blueside Sludge disposal. This area appears to be the south sludge disposal area, though this has not been confirmed.

In late 1981 DNR received plan sheets for the Blueside disposal area at St. Joseph Sanitary Landfill on the northwest corner of the St. Joseph Sanitary Landfill. DNR denied a special waste disposal request for leather shavings in October 1982, citing odor concerns and again citing the

need for a dedicated disposal area. After 1983 the landfill was primarily used for disposal of a calcium sulfate/grease solution and as a backup disposal site for when weather or crop conditions precluded Blueside from using the land application sites. In 1984, St. Joseph requested permission to add shavings and trimmings to the disposal area to help absorb liquids in the sludge.

In May 1984, DNR issued an approval letter for trench disposal of Blueside waste at the landfill. It is unknown where this cell is. In December 1984, a set of plans was received for the north trench disposal site.

In February 1987 a revised plan was received for the Blueside Landfill in the northwest corner of the St. Joseph Sanitary Landfill. The plan mentions the following quantities of waste generated at Blueside:

Shavings/Trimmings	120,000 pounds/week
Pretreatment Sludge	196,000-406,000 pounds/week
Calcium Sulfate from Cr Recovery	60,000 pounds/week

The plan indicates that normally, pretreatment sludge is hauled to one of several DeKalb and Buchanan County Farms for land application and that 2-3 week stockpiles of sludge may be kept at such farms. The landfill was approved to accept chrome tanned leather shavings, hide trimmings, calcium sulfate and grease from the chromium process. The plans include a special waste leachate pond. The area appears to be part of the north sludge trenches at the landfill. The plan was approved May 1987. The landfill had intermittent problems covering the waste material adequately, as the material was spongy in consistency and could cause excavation equipment to become stuck.

In 1990, DNR approved co-disposal of tannery sludge with normal municipal solid waste at the landfill. Sludge volume is not to exceed 10% of the daily intake of solid waste. It appears the landfill has continued to accept tannery sludge in this manner since this date.

In 1995 there is a brief mention of the Blueside leachate pond overflowing during a DNR inspection. The overflow was repaired before DNR staff left the site.

In 1998 the City requested permission to close the Blueside leachate pond. The City states that the Blueside trenches are no longer used. Approval to close the pond was given by DNR in September 1998. A clay cap was required to be constructed over the former leachate pond.

A cursory review of groundwater monitoring records at the facility did not raise immediate concern about chromium contamination in the groundwater from the landfill or special waste disposal areas.

Land Application Sites (Non-landfill)

There is no information in the file to confirm or deny land application of the sludge material prior to 1973. No data was located prior to 1981 regarding land application of the sludge material on sites other than the above landfills. In 1981, a news article indicated that Blueside would like to make a commercial fertilizer out of the sludge.

On August 17, 1983, the Clean Water Commission of DNR issued an approval letter to allow for land application of Blueside Sludge. The letter approves application of 5-8 dry tons/year/acre. The letter established limits for the following parameters:

Total Nitrogen	4.6-5.3%
Total Cadmium	0.7504 mg/kg
Total Chromium	3379-7685 mg/kg
Total Solids	24%

A DNR letter from October 1983 approves three proposed sludge storage sites as follows:

Jack Pierce Farm:	E 1/2, Sec. 29, Bloomington Twp., Buchanan County, Missouri
Peterson Farms:	Sec. 3, Sherman Twp., DeKalb County, Missouri
Peterson Farms:	Sec. 12, Sherman Twp., DeKalb County, Missouri

In December 1985, a complaint was received from Ms. Crockett regarding one of the land application sites. The site is described as the N ½ of the SE ¼ and the SE ¼ of the NE ¼ of Sec. 16, Township 56, Range 36, Buchanan County, Missouri. Ms. Crockett alleges odors, family allergies, and eye problems both with family and livestock, all of which she attributes to the sludge spreading. Ms. Crockett explained that she felt Blueside had added lime to the batch of sludge which was spread for the DNR in an effort to reduce odors. No violation was noted from the inspection.

In April 1986, a complaint was received from Mr. McQueen. He alleges that farmers are receiving $125/acre to land apply the Blueside Sludge. Mr. McQueen is unhappy with the State response and feels the State is not addressing problems he alleges the Blueside Sludge land application is causing. An EPA letter in November 1986 responds to another citizen complaint (Mr. Taylor) about the land farming practice. The letter acknowledges that tannery wastes are not considered hazardous wastes and states that Blueside pretreatment sludge is land farmed.

A 1987 plan indicates that normally, pretreatment sludge is hauled to one of several DeKalb and Buchanan County Farms for land application and that 2-3 week stockpiles of sludge may be kept at such farms. Normally generated quantities of waste can be found under the St. Joseph Sanitary Landfill heading above.

In 1993 a letter from Blueside indicated their desire to blend sludge from another facility "Worm Farm" with their own sludge. The sludge would be land applied along with the Blueside sludge. Analytical data from Blueside indicates the other sludge passed TCLP testing.

City of St. Joseph Airport Property

No data suggest that tannery waste was directly applied at this property. However, sludge from the City's Wastewater Treatment Plant was to be applied on this property, according to a 1979 news article. If high metal levels were present in the wastewater or sediments flowing into the treatment plant, sludge from the plant may have contained elevated levels of those metals. It is unknown if any other properties were utilized by the city for land application of its wastewater treatment plant sludge.

Questions Compiled From Review

- Does St. Joseph SLF use any kind of Alternative Daily Cover (ADC)? The potential for blowing dust from the tannery sludge should be investigated if it is determined the sludge poses a risk from becoming airborne.
- Should a field investigation be conducted at the special waste disposal areas at any of the 4 St. Joseph area landfills to ensure the cap is in good condition in order to minimize risk of blowing dust from sites?
- Wheeling Disposal used tannery sludge as a cover material. Did the City of St. Joseph ever use the sludge or a sludge mixture as ADC?
- Does St. Joseph City test wastewater sludge and did they in the past? Where is St. Joseph WWTP sludge disposed of? Is there a possibility it could contain elevated levels of metals from tannery wastewater?
- Should testing of the soil/sludge be conducted at the airport, land application sites, or landfills?
- Is any information available to indicate sludge land application on farm fields prior to the process changes at the tannery in the early 1980's?

DN/lt

Missouri
Department of
Natural Resources

Inspection and Sampling Summary Report

St. Joseph Sanitary Landfill
Permit #0102102

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and
DeKalb Counties, Missouri
Pre-CERCLIS Site Screening
Reference MDNR, 2009c

Inspection/Sampling Date: May 21, 2009 *(Inspection and sampling events were conducted simultaneously and began at 7:45 a.m. with a site meeting and concluded at 9:00 p.m. with completion of sampling.)*

Weather: Sunny, approximately 80° Fahrenheit

Operator:	City of St. Joseph
Facility Contact Names:	Bruce Woody and Bill Blacketer
Telephone #:	(816) 253-9025
Address:	9431 50th Rd. S.E.
City, State, ZIP:	St. Joseph, MO 64507
County:	Buchanan
Location:	9431 SE 50th Rd., 7 miles south and 4 miles east of St. Joseph, MO
Regional Office:	Kansas City Regional Office (KCRO)
Program Offices:	Environmental Services Program (ESP) and Solid Waste Management Program (SWMP)

Inspectors/Samplers Names: Dennis Mullins (KCRO-solid waste), Jody Mayes (KCRO-water pollution), Alan Cortvrient (ESP), Ken Hannon (ESP), Pam Bos (ESP), Todd McVicker, (ESP), Sean Counihan (ESP), Carter Tharp (ESP), Dan Norris (SWMP) and Chris Nagel (SWMP)

Landfill Staff Assisting/Interviewed During Inspection and Sampling Event: Bill Blacketer and Delbert "Gene" Thorton

Background:

Due to recent health and environmental concerns over the proper management of tanning wastes generated by National Beef Leathers (formerly Prime Tanning and Blue Side Company), the Department conducted a multimedia inspection and sampling event at the St. Joseph Sanitary Landfill. The St. Joseph Sanitary Landfill is an active sanitary landfill that is currently receiving tanning wastes from National Beef Leathers. The landfill started accepting tanning wastes in 1981. This inspection and sampling event was conducted as a joint effort between the Department's KCRO, ESP and SWMP staff.

Activities:

Inspection- A routine quarterly sanitary landfill inspection and a routine water pollution inspection were conducted by Department staff and followed standard inspection procedures, using established checklists and forms. The inspectors observed daily operations for compliance with water and solid waste laws and regulation related to the overall operation of the landfill as well as interviewed landfill staff and reviewed landfill records and documentation related to the current and historical acceptance, handling and processing of tanning wastes (tanning water treatment sludge and hide shavings consisting of scrapings, hair, grease, oil and fat). The facility is currently filling in phase (cell) 5.

The facility is working through the landfill permitting process to expand the landfill footprint between the current landfill boundary (phases/cells 1 and 3) and the Free Property to the south. If this expansion permit is approved, facility staff have indicated that it is their intent to pursue the removal of the waste in both the Wire Rope landfill and the South Sludge Disposal Area and to place that waste into the new landfill cell(s) that would be developed.

The following are findings from the discussions with landfill staff:

Mr. Blacketer indicated that the only other types of waste received by the landfill that may have contained chromium were the Mead Flex-o-Ink sludge and Wire Rope Corporation sludge that were previously disposed of in dedicated disposal areas. Mr. Blacketer was not aware of any other sources of chromium waste received by the landfill. Mr. Blacketer indicated that he was not aware of any changes over the years in the tanning sludge or hide shaving waste's physical or chemical composition. Mr. Blacketer also indicated that the St. Joseph landfill never used the sludge, a sludge mixture or hide shaving waste as alternative daily cover at the landfill. The landfill currently receives two to three loads of tanning sludge per day. Prior to the recent halting of land application by National Beef Leathers of tanning sludge on local farm land, the landfill received very little tanning sludge (none in 2006). However, the landfill has consistently received hide shaving waste for many years. Review of the landfills records revealed that the landfill is receiving less than 10% of its total daily intake of solid waste from the sludge waste as conditioned in the Department's June 13, 1990, letter that outlined the special waste approval requirements.

Discussions with Mr. Blacketer revealed that the Blue Side sludge cell (noted as the South Sludge Disposal Area on attached documents) started at a depth of approximately 16 to 18 feet deep and then day lighted towards the end of the hill (west side of the cell with an east to west fill progression). For the trench fill area (noted as the North Sludge Disposal Area on attached documents), the trenches started at depths of approximately 25-30 feet and then day lighted to the east ends of the trenches with a west to east fill progression. These depths were confirmed through the Department's Geoprobe soil/sludge sampling. As described by Mr. Blacketer, both the South and North Sludge Disposal Areas were usually covered daily with soil. Mr. Blacketer indicated that an old leachate basin that was used for the North Sludge Disposal Area was previously closed out and the former location is currently under the facility's parking lot near the maintenance building. When the basin was in operation, the water was routinely used to irrigate the side slopes of the landfill using a sprinkler system.

Tanning Sludge and Hide Shaving Waste Tonnage by Year					
Year	**2005**	**2006**	**2007**	**2008**	**2009** (through May 21)
Sludge (tons)	58.50	0	22.99	94.14	783.91
Hide Shavings (tons)	2869.43	2410.32	2893.97	2574.13	417.18

*Information obtained from the on site facility operating records

The visual inspections of the landfill were conducting by traveling the access roads of the landfill in a counter clockwise direction starting on the northwest side of the landfill near the scale house and then proceeding to the southern boundary, then east to the eastern boundary and then to the northeast boundary and back to the northwest boundary. The landfill's infrastructure (gas monitoring and extraction wells, ground water monitoring wells, storm water control structures, leachate management

structures, etc.) and waste disposal cells and soil borrow area were inspected. The findings from the inspections are contained in the attached water pollution and solid waste landfill inspection reports and attached aerial photos with captions. Below is a general summary of those findings:

Unsatisfactory Features / Required Actions Needed

- Storm water from the Blue Side North Sludge Disposal Area, the citizen drop/off area and yard waste/mulch area must discharge to a permitted outfall (Areas must be modified or relocated to regain compliance with water pollution outfall requirements)
- All disturbed and active areas within the landfill footprint must also drain to a sediment basin
- Re-grade slopes and water courses as necessary to control surface water runoff so as to reduce excessive erosion
- Repair existing erosion rills and install rock check dams in water courses as needed
- Remove excess sediment from all sediment basins
- Properly manage all sediment removed from the basins
- Remove all trees growing within the sediment basins or on the basins berms
- Several areas around road ways, water let down structures and outfalls need the soil stabilized and permanent vegetation established to control erosion
- A Storm Water Pollution Prevention Plan me be prepared for the site and followed
- A separate land disturbance permit (Missouri State Operating Permit) is required for the construction of new cells and the soil borrow areas as these areas are not covered under the existing storm water permit
- Best Management Practices (BMPs) must be implemented in land disturbance areas
- Remove trees on the berm of the old clay lined leachate basin west of Outfall #1
- Continue efforts to address migrating methane (currently working with the SWMP Compliance/Enforcement Section)
- Leachate, believed to originate from the Wire Rope disposal area is entering the creek on the south side of the facility (Outfall #1, Area #1). (The facility must work with the SWMP Engineering Section to install an acceptable control structure to eliminate the discharge)
- Route storm water from the Wire Rope and Blue Side South Sludge Disposal Areas to a storm water basin

General Comments

- Vegetation on North Sludge Disposal Area is comprised of annuals along with some tree saplings (the area must be mowed to maintain a healthy stand of perennial grass)
- Soil testing should be implemented to ensure a healthy stand for vegetation on all non active areas
- The South Sludge Disposal Area has several trees growing on or near the cell (area must be mowed to maintain a healthy stand of perennial grass)
- Small erosion rills noted on North Sludge Disposal Area (repair as necessary)
- Both the North and South Sludge Disposal Areas have small areas with marginal cover (repair as necessary)
- It appears that rock piles and a haul road could have been placed over a small portion of the South Sludge Disposal Area (Exact borders of the cell are unclear, the disposal area should be managed to reduced damage to the cap)
- Remove trees and brush from the banks/berms and surrounding areas of all the leachate and sediment basins

- Remove trees next to gas extraction wells on the western slope of the landfill
- Re-grade and reseed landfill slopes as necessary to reduce erosion and obtain a healthy stand of perennial grass
- Continue work to establish a healthy stand of perennial grass around the sediment basins to reduce erosion and sediment deposition into the basins
- Gas probe GP-4 needs the soil sedimentation removed from the surface completion
- Work on the Free Property (south of the landfill footprint) will require a sediment basin as it appears greater than 10 acres is disturbed
- Facility should consider adding shot rock around the sediment basin riser pipes to reduce clogging of the risers
- Access roads around the landfill boundary should be crowned for better flow and control of storm water
- Rock should be used for surface water let down structures or some other engineered design should be used to reduce the significant erosion that is occurring
- Outfalls should be lined with rock as needed to reduce the significant cuts that are forming on the back side of several of the outfalls

Sampling- Sampling was conducted by staff from the Department's ESP, Field Services Unit and EER Section following approved Department sampling procedures and protocol. Sample boring locations were documented through the use of GPS using Department approved location data (UTM), photographs of the location and sample chain of custody forms (see attached sampling report and supporting documents). Ground water samples were documented through the use of the existing ground water well identification numbers, photographs and sample chain of custody forms (see attached sampling report and supporting documents).

The following sampling was conducted:

Ground Water- Grab samples were taken from the facility's ground water wells nearest to the North and South Sludge Disposal Areas (GW #s 201, 203, 309, 320, 323, 324, 326 and 327). Attempts were made to sample well 202 but the well contained insufficient water to take a sample. The ground water samples were analyzed for both total chromium and hexavalent chromium (see attached results). The results appear to be in consensus with previous ground water sampling reports. Sample results were non-detect for hexavalent chromium in all ground water monitoring well samples taken during this sampling event. Total chromium levels were at trace levels near the practical quantitation limit.

Sludge- Stratified samples of the buried sludge in the North and South Sludge Disposal Areas (two separate cell areas) were taken at the approximate upper 1/3, middle 1/3 and lower 1/3 of the vertical strata. The total sludge depth for each boring was determined through probing and recorded. Sludge samples were analyzed for total chromium and hexavalent chromium (see attached results). A total of four Geoprobe borings were taken per fill area (four borings in each of the North and South Sludge Disposal Areas). Grab samples were taken at each of the three strata mentioned above. Each grab sample was analyzed separately. The exact location of the trenches was confirmed on site through discussions with St. Joseph Sanitary Landfill staff and the use of an excavator. Overall, the sample results for the sludge revealed hexavalent chromium at levels of up to 24 parts per million (ppm) down to non-detect. The total chromium levels varied from a high of 20,000 ppm down to 18.7 ppm. The variation in results does not appear to be related to a particular strata level or disposal area.

- A grab sample of tanning sludge was taken at approximately 11:15 a.m. from an Osborne Trucking tractor trailer that delivered a load of sludge from National Beef Leathers. The material was spongy and the odor from the sludge was very noticeable. See sample result #0914003. The sample analysis revealed 494 ppm for total chromium and 29 ppm for hexavalent chromium. All tanning sludge and hide trimming waste were reported to be mixed with municipal solid waste at the working face as soon as the load is delivered. The material is very heavy due to moisture content and slick. Landfill equipment operators move the material in small quantities to avoid sliding and the creation of soft spots in the landfill waste mass. Mr. Blacketer indicated that during very wet periods, the landfill often times will refuse to accept tanning sludge as the material becomes very difficult to manage during wet weather conditions.

Leachate- A water sample was taken from the landfill's leachate collection system (standpipe in area 3, sample # 0913592). The sample was analyzed for total chromium and hexavalent chromium. The hexavalent chromium and total chromium results showed trace quantities very near the practical quantitative limits.

-An additional water sample was taken from the creek (at Outfall #1, south of Area #1) where it appeared that leachate from the Wire Rope disposal area was impacting the creek (see sample #0913594). The results of the analysis of the water sample from the creek do not appear to indicate a violation of the primary standards under the Missouri Clean Water Law related to metals (results were non detect for most of the tested metals including Hexavalent Chromium). However, there may be a violation of a secondary standard related to water color.

Conclusion

Overall, the inspection revealed some areas needing improvement related to the use of storm water controls, overall management of erosion control, and the need to modify the North Sludge Disposal Area, citizen drop off area and mulching area so they are located within a permitted outfall, as well as proper management of leachate that was discharging into the creek south of Area #1. The facility is currently working with the SWMP Compliance/Enforcement Section to correct the facilities methane gas migration. Daily operations of the landfill appeared to be satisfactory. The landfill needs to continue with routine maintenance related to soil and vegetative cover on side slopes and non-active areas as well as make repairs and keep up on maintenance related to siltation and trees in the sediment basins and erosion control on water control structures.

The findings of the sampling and inspections do not reveal any concerns as related to the disposal of tanning sludge and hide trimming waste in the current Subtitle D landfill. Sampling results also do not reveal any apparent impact to the ground water sampled down gradient of the North and South Sludge Disposal Areas. Leachate sampled from the landfill does not reveal high levels of chromium or hexavalent chromium.

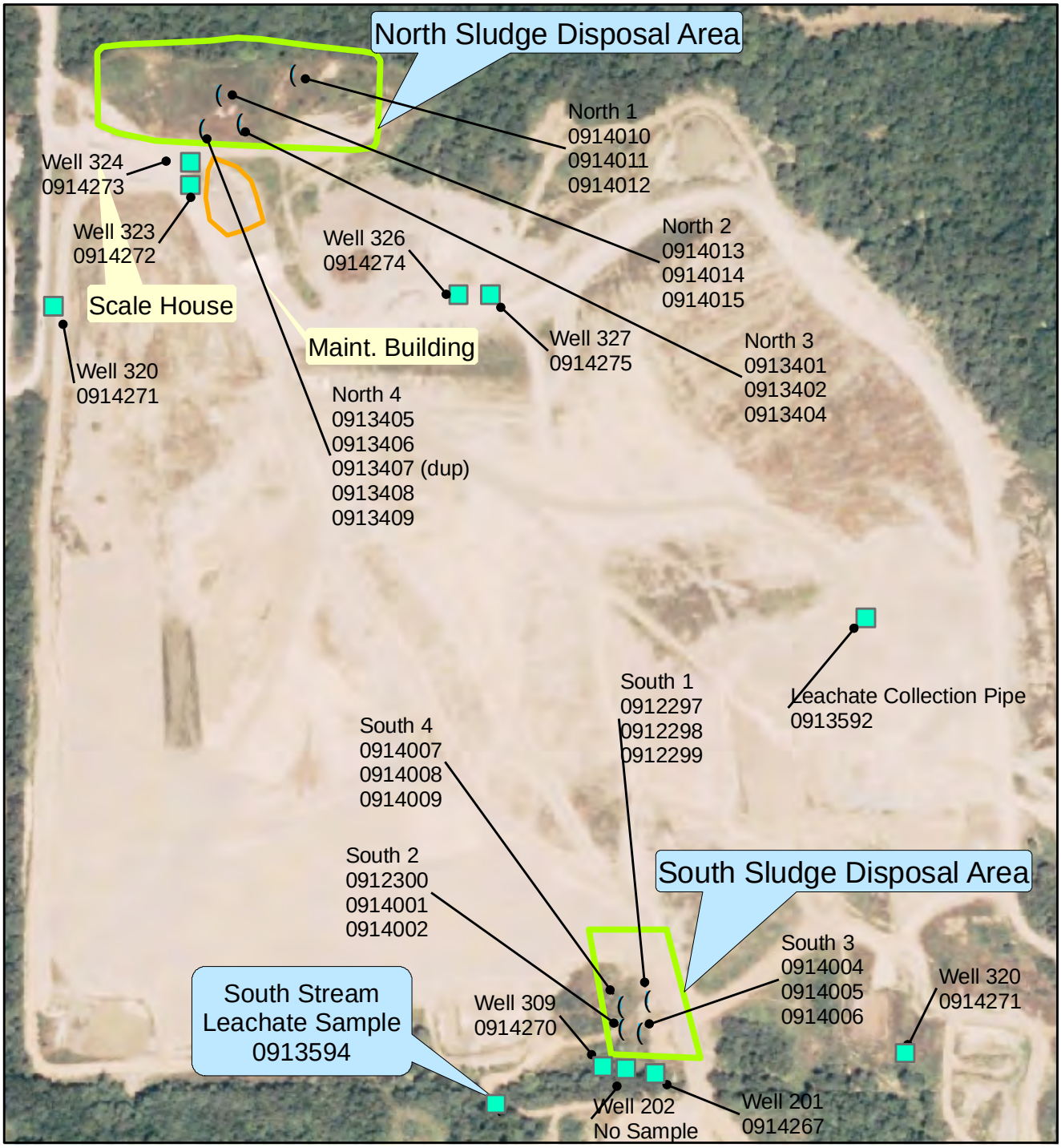
Summary Report Submitted and Prepared by: Chris Nagel 7/31/09.

Compliance/Enforcement Section Chief Date
Solid Waste Management Program

Attachments

- ✓ Active Sanitary Landfill Inspection Report and cover letter dated June 16, 2009
- ✓ Water Pollution Inspection Report
- ✓ Site Sampling Investigation Report, cover page dated May 21, 2009
  - Appendix A- Site Maps
  - Appendix B
    - Department Sample Analysis report (sludge samples) dated June 10, 2009
    - Department Sample Analysis report (ground water and water samples) dated June 25, 2009
  - Appendix C
    - Field Notes and Chain of Custody Reports
  - Table 1- Soil/Sediment Sample Descriptions
  - Table 2- Water Sample Descriptions
- ✓ Aerial photo with data overlay showing St. Joseph SLF facility layout dated May 21, 2009
- ✓ Aerial photo depicting South Sludge Disposal Area sampling locations dated May 21, 2009
- ✓ Aerial photo depicting areas of concern related to South Sludge Disposal Area dated May 21, 2009
- ✓ Aerial photo depicting North Sludge Disposal Area sampling locations dated May 21, 2009
- ✓ Aerial photo depicting areas of concern related to North Sludge Disposal Area dated May 21, 2009

St. Joseph Sanitary Landfill, Permit 102102
Tannery Sludge Sampling
May 21, 2009



Last Revision 6/5/09 DFN

Note: Locations of water samples based on data provided by Ken Hannon of the Department's Environmental Services Program and reflect approximate locations only.

Legend

- (Sludge Sample Location
- Water Sample Location
- Approx. Area of Former Sludge Disposal
- Approx. Area of Former Blueside Leachate Pond

0 150 300 600 900 1,200 Feet

Missouri Department of Natural Resources
Division of Environmental Quality
Solid Waste Management Program

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

Missouri Department of Natural Resources

Environmental Services Program

Order ID: 090522002 **Program, Contact:** SWMP, Eric Gramlich

Report Date: 6/10/2009 **LDPR:** FESWS/NJ09STJS

Order Comment:

POSTED 6/12/09

Received JUN 12 2009 SWMP

Sample: 090522002-01 **Facility ID:** **Site:** St Joseph SLF

Customer # : 0912297 **County:** Buchanan **Sample Reference ID:** **Collect Date:** 5/21/2009

Collector: Kenneth Hannon **Affiliation:** ESP **Collect Time:** 9:50 AM

Matrix: Soils **Sample Comment:** South Sludge pit, hole #1, NE quadrant. 4.75 to 5.25 ft deep.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	16200000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	69.0	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	21.9		%		Not Applicable

Sample: 090522002-02 **Facility ID:** **Site:** St Joseph SLF

Customer # : 0912298 **County:** Buchanan **Sample Reference ID:** **Collect Date:** 5/21/2009

Collector: Kenneth Hannon **Affiliation:** ESP **Collect Time:** 10:05 AM

Matrix: Soils **Sample Comment:** South sludge pit, hole #1, NE quadrant. 8.75 to 9.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	18900000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	100	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	52.1		%		Not Applicable

Sample: 090522002-03 **Facility ID:** **Site:** St Joseph SLF

Customer # : 0912299 **County:** Buchanan **Sample Reference ID:** **Collect Date:** 5/21/2009

Collector: Kenneth Hannon **Affiliation:** ESP **Collect Time:** 10:15 AM

Matrix: Soils **Sample Comment:** South sludge pit, hole #1, NE quadrant, 14.75 to 15.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	24800	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	63.0	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	20.0		%		Not Applicable

Sample: 090522002-04 | Facility ID: | Site: St Joseph SLF

Customer # : 0912300 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 10:28 AM

Matrix: Soils | Sample Comment: South sludge pit, hole #2, NW quadrant, 5.75 to 6.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	10500000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	67.0	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	30.2		%		Not Applicable

Sample: 090522002-05 | Facility ID: | Site: St Joseph SLF

Customer # : 0913402 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 7:20 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #3, 9.75 to 10.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	16700000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	1300	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	57.0		%		Not Applicable

Sample: 090522002-06 | Facility ID: | Site: St Joseph SLF

Customer # : 0912403 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time:

Matrix: Soils | Sample Comment: Blind duplicate.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	23200000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	800	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	53.6		%		Not Applicable

Date Printed: 6/10/2009

Sample: 090522002-07 | Facility ID: | Site: St Joseph SLF

Customer # : 0913404 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 7:35 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #3, 23.75 to 24.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	3920000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	1400	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	26.0		%		Not Applicable

Sample: 090522002-08 | Facility ID: | Site: St Joseph SLF

Customer # : 0913405 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 8:10 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #4, 4.25 to 4.75 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	1580000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	370	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	24.2		%		Not Applicable

Sample: 090522002-09 | Facility ID: | Site: St Joseph SLF

Customer # : 0913406 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 8:20 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #4, 17.75 to 18.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	18300000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	5800	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	53.2		%		Not Applicable

Sample: 090522002-10

Customer # : 0913407

Facility ID: | **Site:** St Joseph SLF

County: Buchanan | **Sample Reference ID:** | **Collect Date:** 5/21/2009

Collector: Kenneth Hannon | **Affiliation:** ESP | **Collect Time:**

Matrix: Soils | **Sample Comment:** Blind duplicate

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	20600000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	4600	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	53.9		%		Not Applicable

Sample: 090522002-11

Customer # : 0913408

Facility ID: | **Site:** St Joseph SLF

County: Buchanan | **Sample Reference ID:** | **Collect Date:** 5/21/2009

Collector: Kenneth Hannon | **Affiliation:** ESP | **Collect Time:** 8:30 PM

Matrix: Soils | **Sample Comment:** North sludge pit, hole #4, 24.75 to 25.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	20000000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	11000	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	57.9		%		Not Applicable

Sample: 090522002-12

Customer # : 0913409

Facility ID: | **Site:** St Joseph SLF

County: Buchanan | **Sample Reference ID:** | **Collect Date:** 5/21/2009

Collector: Kenneth Hannon | **Affiliation:** ESP | **Collect Time:** 8:40 PM

Matrix: Soils | **Sample Comment:** North sludge pit, hole #4, 30.75 to 31.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	2230000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	8800	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	26.2		%		Not Applicable

Date Printed: 6/10/2009

Sample: 090522002-13 | Facility ID: | Site: St Joseph SLF

Customer # : 0914001 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 10:57 AM

Matrix: Soils | Sample Comment: South sludge pit, hole #2, NW quadrant. 10.75 to 11.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	571000	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	2800	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	27.6		%		Not Applicable

Sample: 090522002-14 | Facility ID: | Site: St Joseph SLF

Customer # : 0914002 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 11:20 AM

Matrix: Soils | Sample Comment: South sludge pit, hole #2, NW quadrant. 16.0 to 18.0 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	5730000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3300	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	49.0		%		Not Applicable

Sample: 090522002-15 | Facility ID: | Site: St Joseph SLF

Customer # : 0914003 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 11:40 AM

Matrix: Soils | Sample Comment: Sludge delivery truck from National Beef Leathers to active landfill.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	494000	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	29000	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	73.2		%		Not Applicable

Date Printed: 6/10/2009

Sample: 090522002-16 | Facility ID: | Site: St Joseph SLF

Customer # : 0914004 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 12:00 PM

Matrix: Soils | Sample Comment: South sludge pit, SW quadrant hole #3, 3.0 to 4.0 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	21600	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	5200	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	23.0		%		Not Applicable

Sample: 090522002-17 | Facility ID: | Site: St Joseph SLF

Customer # : 0914005 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 12:11 PM

Matrix: Soils | Sample Comment: South sludge pit, hole #3, SW quadrant. Composite of 4 to 8 ft core.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	18700	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	2400	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	20.1		%		Not Applicable

Sample: 090522002-18 | Facility ID: | Site: St Joseph SLF

Customer # : 0914006 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 12:20 PM

Matrix: Soils | Sample Comment: South sludge pit, hole #3, SW quadrant, 9.0 to 9.5 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	15500	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	2400	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	18.2		%		Not Applicable

Date Printed: 6/10/2009

Sample: 090522002-19 | Facility ID: | Site: St Joseph SLF

Customer # : 0914007 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 12:59 PM

Matrix: Soils | Sample Comment: South sludge pit, hole #4, SE quadrant, 4.0 to 6.0 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	3030000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3900	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	23.7		%		Not Applicable

Sample: 090522002-20 | Facility ID: | Site: St Joseph SLF

Customer # : 0914008 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 1:35 PM

Matrix: Soils | Sample Comment: South sludge pit, hole #4, SE quadrant, 13.75 to 14.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	31700	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	2600	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	20.9		%		Not Applicable

Sample: 090522002-21 | Facility ID: | Site: St Joseph SLF

Customer # : 0914009 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 1:40 PM

Matrix: Soils | Sample Comment: South sludge pit, hole #4, SE quadrant, 18.75 to 19.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	347000	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	480	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	16.0		%		Not Applicable

Sample: 090522002-22

Customer # : 0914010

Matrix: Soils

Facility ID:
Site: St Joseph SLF
County: Buchanan
Sample Reference ID:
Collect Date: 5/21/2009
Collector: Kenneth Hannon
Affiliation: ESP
Collect Time: 4:45 PM
Sample Comment: North sludge pit, hole #1, 0.75 to 1.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	15000000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3900	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	60.5		%		Not Applicable

Sample: 090522002-23

Customer # : 0914011

Matrix: Soils

Facility ID:
Site: St Joseph SLF
County: Buchanan
Sample Reference ID:
Collect Date: 5/21/2009
Collector: Kenneth Hannon
Affiliation: ESP
Collect Time: 4:50 PM
Sample Comment: North sludge pit, hole #1, 5.0 to .6.0 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	16000000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3800	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	54.4		%		Not Applicable

Sample: 090522002-24

Customer # : 0914012

Matrix: Soils

Facility ID:
Site: St Joseph SLF
County: Buchanan
Sample Reference ID:
Collect Date: 5/21/2009
Collector: Kenneth Hannon
Affiliation: ESP
Collect Time: 5:05 PM
Sample Comment: North sludge pit, hole #1, 13.0 to 14.0 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	144000	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	4900	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	18.3		%		Not Applicable

Date Printed: 6/10/2009

Sample: 090522002-25 | Facility ID: | Site: St Joseph SLF

Customer # : 0914013 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 5:30 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #2, 1.75 to 2.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	6720000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	2600	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	29.9		%		Not Applicable

Sample: 090522002-26 | Facility ID: | Site: St Joseph SLF

Customer # : 0914014 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 5:45 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #2, 8.75 to 9.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	8360000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3400	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	37.8		%		Not Applicable

Sample: 090522002-27 | Facility ID: | Site: St Joseph SLF

Customer # : 0914015 | County: Buchanan | Sample Reference ID: | Collect Date: 5/21/2009

Collector: Kenneth Hannon | Affiliation: ESP | Collect Time: 6:00 PM

Matrix: Soils | Sample Comment: North sludge pit, hole #2, 18.75 to 19.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	293000	17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	4400	17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	22.7		%		Not Applicable

Sample: 090522002-28

Customer # : 0913401

Matrix: Soils

Facility ID:

County: Buchanan

Collector: Kenneth Hannon

Site: St Joseph SLF

Sample Reference ID:

Affiliation: ESP

Collect Date: 5/21/2009

Collect Time: 7:00 PM

Sample Comment: North sludge pit, hole #3, 4.75 to 5.25 ft depth.

Test	Parameter	Result	Qualifier	Units	QC BatchID	Method
Chromium-Total	Chromium	2420000	09,17	ug/kg		SW 846 6010B (ICP)
Hexavalent Chromium	Hexavalent Chromium	3400	ND,17,04	ug/kg		SW 846 7196A
Percent Moisture	Percent Moisture	35.5		%		Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Chris Boldt

Chris Boldt, Laboratory Manager
Environmental Services Program
Field Services Division

Qualifier Descriptions

01	Improper collection method	02	Improper preservation
03	Exceeded holding time	04	Analyzed by Contract Laboratory
05	Estimated value, detected below PQL	06	Estimated value, QC data outside limits
07	Estimated value, analyte outside calibration range	08	Analyte present in blank at > 1/2 reported value
09	Sample was diluted during analysis	10	Laboratory error
11	Estimated value, matrix interference	12	Insufficient quantity
13	Estimated value, true result is > reported value	14	Estimated value, non-homogeneous sample
15	No Result - Failed Quality Controls Requirements	16	Not analyzed - related analyte not detected
17	Results in dry weight	18	Sample pH is outside the acceptable range
19	Estimated value	20	Not analyzed - Instrument failure
21	No result - spectral interference	22	pH was performed at the Laboratory
ND	Not detected at reported value		

Date Printed: 6/10/2009

MEMORANDUM

DATE: August 13, 2010

TO: Michael Stroh, Environmental Specialist,
Hazardous Waste Program,
Division of Environmental Quality (DEQ)

FROM: Peter Bachle, Geologist
Geological Survey Program,
Division of Geology and Land Survey (DGLS)

SUBJECT: Geohydrologic Summary of Tannery Sludge Farm Fields Site

LOCATION: Portions of Andrew, Buchanan, Clinton, and DeKalb Counties, Missouri

The Tannery Sludge site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age cyclothems of shale, limestone, and sandstone. The glacial till is drained by dendritic streams and rivers that empty toward the south into the Missouri River.

Surface water impoundments and alluvial aquifers are the primary drinking water sources as the bedrock groundwater is mostly non-potable.

The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. This unit seldom produces more than a few gallons per minute and has a slow recovery rate. The primary recharge for this unit is from rain infiltration. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

REFERENCES

Bettis, E.A., Muhs, D.R., Roberts, H.M., Wintle, A.G., 2003, Last Glacial loess in the conterminous USA, US Geological Survey, 41 p.

Lockridge, E.D., 1989, Soil Survey of Buchanan County, Missouri: United States Department of Agriculture, 143 p., 12 maps.

Logmain, 2010, Well logs from DGLS Logmain database.

MEGA 2007, Missouri Environmental Geology Atlas, MDNR/DGLS.

Missouri Water Atlas, 1986, Missouri Department of Natural Resources, Division of Geology and Land Survey, 100 p.

Thompson, T.L., 1995, The Stratigraphic Succession in Missouri: Missouri Department of Natural Resources, Volume 40 (2nd Series) Revised, 190 p.

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and
DeKalb Counties, Missouri
Pre-CERCLIS Site Screening
Reference USEPA, 2009a

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0439	440	2368	[redacted]				257-05	8-05A	NW	22	58N	32W	-	
0440	0	2368					257-05	8-05A	NW	22	58N	32W	-	
0223	0	3431					176	25-99B	SW	20	59N	31W	--	
0224	0	3356					172	25-99A	NE	30	59N	31W	--	
0009	0	1573					143	25-98	SW	12	60N	34W	-	
0285	0	1774					Pasture	170.92	S	31	Washington 58N	32	-	
0454	0	9881					W	91.88	SE	31	57N	34W	0	0
0539	0	11808					W	59-86	SE	31	56N	34W	-	-
0540	0	13492					N	60-86	N	6	56N	34W	-	-
0556	0	13492					N	1-B-85	N	6	56N	34W	0	0
0611	0	13454/13316/13494					S	1-S	N	6	56N	34W	-	-
0612	0	9881					E	1-B	SE	31	57N	34W	-	-
613	0	882/9883/9884/9906					NW	2WP	SE	31	57N	34W	-	-
0627	-	13492					S Field	1-S	N	6	56N	34W	-	-
0628	-	36950/36951/36952					E Field	1-B	SE	31	57N	34W	-	-
0629	-	36950/36951/36952					NW	2WP	SE	31	57N	34W	-	-
754	0	2377					283-07	16-07A	NWM	20	57W	32W	-	-
755	0	2377					283B-07	16-07C	NWM	20	57W	32W	-	-
756	0	2377					283C-07	16-07B	NE	20	57N	32W	-	-
0431	0	2645					245-05	6-05B	SW	10	58N	32W	-	-
432	0	2535					246-05	6-05A	NW	15	58N	32W	-	-
0529	0	2645					245	6-04B	SW	10	58N	32W	-	-
0530	0	2645					246	6-04A	SW	10	58N	32W	-	-
735	0	2645					245A-07	10-07A	SW	10	58N	32W	-	-
736	0	2535					246-07	0	NW	15	58N	32W	-	-
786	0	2645					245-08	0	SW	10	58N	32W	0	0
787	0	2535					246-08	0	NW	15	58N	32W	0	0
0441	0	2480					258-05	9-05A	NW	15	58N	32W	-	-
0664		4364					117	-	W	26	60N	32W	-	-
0355	0	2042					274-06	18-06A	NE	22	59N	36W	-	-
0063	0	2208					173	8-02A	SE	21	58N	32W	39 04.9	-94 03.0
0081	0	2062					236	17-02A	NW	29	58N	32W	39 48.9	-94 21.1
0082	0	2061					237	17-02B	NE	29	58N	32W	39 48.8	-94 31.1
0083	0	2039					237A	17-02C	NE	29	58N	32W	39 48.7	-94 31.1
0225	0	2208					173	26-99	SW	21	58N	32W	--	--
591	0	2208					173-03	7-03A	SW	21	58N	32W	-	-
0214	0	4573					158	36-98/15-99	SE	23	60N	33W	--	--
0215	0	4564/4567/4521					161	22-99C	SE	22	60N	33W	--	--
0216	0	4564/4567/4521					160	22-99B	SE	22	60N	33W	--	--
0217	0	567/4521/4661/4660					159	22-99A	E	22	60N	33W	--	--
0651	0	4724					129	80A	SE	15	60N	33W	-	-
0271	0	2441					N Corn	190.93	SE	25	57	32	0	0

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
286	0	2411/2447	[redacted]				SW	176.92	SE, NE	25,36	57N	32	-	-
0541	0	6155					E	57-86	SW	24	56N	35W	-	-
0557	0	6155					E	32-85	SW	24	56N	35W	0	0
741	0	1218/1217					270-07	11-07A	NW	18	57N	32W	-	-
742	0	1418					271-07	11-07B	SW	7	57N	32W	-	-
0002	0	1671/1612					67E	01-98	SW	1	57N	33W	-	-
0003	0	1579					139	19-98	SW	2	57N	33W	-	-
0004	0	1543					138	20-98	SE	2	57N	33W	-	-
0005	0	1499					137	22-98	NE	11	57N	33W	-	-
0022	0	1811					131	02-98	SW	31	58N	32W	-	-
0120	0	1671/1612					067E	24-00A	SW	1	57N	33W	39 46.9	-94 33.2
0123	0	1666					124A	23-00D	W	6	57N	33W	39 47.4	-94 32.6
0124	0	1666					124B	23-00E	W	6	57N	33W	39 46.8	-94 32.5
129	0	1751					131	23-00C	W	31	58N	32W	39 47.5	-94 32.7
0169	0	1816					213	21-00B	W	36	58N	33W	39 47.6	-94 33.2
0226	0	1814					175	27-99A	NE	36	58N	33W	--	--
0227	0	1811					131	27-99	SW	31	58N	32W	--	--
253	0	1522/1528/1537					126	11-97	NE	3	57N	33W	-	-
0254	0	1670					67F	14-97	N	1	57N	33W	-	-
0255	0	1671					67E	15-97E	North Side	1	57N	33W	-	-
0256	0	1816					67A	6-97-50	NE	36	58N	33W	-	-
0257	0	1816					67A	12-97N	NE	36	58N	33W	-	-
0258	0	1493					129	8-97HP	SE	11	57N	33W	-	-
0259	0	1661/1571					124	9-97	NW, SW	6	57N	32W	-	-
260	0	1612					67D	13-97SE	SE	1	57N	33W	-	-
0261	0	1669/1711					67B, 67C	0	SE, NE	36, 1	57, 58N	33W	-	-
0262	0	1669					67C	16-97E	NE	1	57N	33W	-	-
0263	0	1711					67B	16-97E	SE	36	58N	33W	-	-
0272	0	1506/1518					Corn	183.93	NW, SW	10, 3	57N	33W	0	0
0273	0	1671/1816/1669					CRP	184.93	W, N, S	1	57N	33W	0	0
0274	0	1506/1518					W Corn	191.93	NW, SW	10, 3	57N	33W	0	0
0275	0	1816					Hay	193.93	S	36	58N	33W	0	0
0276	0	1905					40 Acres	194.93	N	36	58N	33W	0	0
0287	0	1816/1671/1612					S, W	151.91/92	CTR	36, 1	57, 58N	33	-	-
0288	0	5296/1506					W Beans	161.91/92	SW, NW	3, 10	57, 58N	33	-	-
0305	0	1816/1671/1612					S, W	151.91	CTR	36, 1	58N, 57	33	0	0
306	0	1711/1669					[redacted]	158.91	SE, NE		58N, 57	33, 32	0	0
0307	0	1670					W 40	160.91	CTR	1	58N, 57	33, 32	0	0
0308	0	1550/1505					W Beans	161.91	SW, NW	3, 10	58N, 57	33, 32	0	0
346	347	1218					270-06	13-06B	NW	18	57N	32W	-	-
0348	0	1356					271-06	13-06A	SW	7	57N	32W	-	-
0362	363	1671					67E-06	14-06A	NW	1	57N	33W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0365	0	1671	[redacted]				NE Hay	138.90	NE, N	1	57N	33W	-	-
0366	0	1612/1816					SE Hay	139.90	S, W	1	58N	32	-	-
0652	0	1671					67E	160A	SW	1	57N	33W	-	-
0653	0	1671					67E	40A	E	1	57N	33W	-	-
0654	0	1666/1483					124	177A	N	6,7	57N	32W	-	-
0665		1816					97	-	N	36	58N	33W	-	-
0694	695	522/1528/1537/1549					125	-	S	3	57, 58N	33, 32W	-	-
0696	0	1669					67F	-	N	1	57, 58N	33, 32W	-	-
0697	699	1505/1550					80	-	W	3	57, 58N	33, 32W	-	-
0698	0	1671					67E	-	SW	1	57, 58N	33, 32W	-	-
0700	0	1816					67A	-	C	36	57, 58N	33, 32W	-	-
0701	0	1666					124	-	CN	6	57, 58N	33, 32W	-	-
0702	0	1711					67B	-	SE	36	57, 58N	33, 32W	-	-
0703	0	1711/1669					67B&C	-	SE & NE	1 & 36	57, 58N	33, 32W	-	-
0704	0	1671/1612					67D	-	C	1	57, 58N	33, 32W	-	-
0712	0	1549					126	-	SE	3	57, 58N	33, 32W	-	-
715	0	1670/1671					067C-07	17-07C	NW	1	57N	33W	-	-
761	762	1671					67E-07	15-07A	SM	1	57N	33W	-	-
791	0	1218					270-08	0	NW	18	57N	32W	0	0
792	0	1218					270-08	0	NW	18	57N	32W	0	0
793	0	1356					271-08	0	SW	7	57N	32W	0	0
794	0	1356					271-08	0	SW	7	57N	32W	0	0
805	0	2217					296-08	0	S	24	58N	33W	0	0
806	0	1917					297-08	0	NW	34	58N	33W	0	0
807	0	1917					297-08	0	NW	34	58N	33W	0	0
808	0	1670					67E-08b	0	NW	1	57N	33W	0	0
814		1670/1671					067F-07	-	NW	1	57N	33W	-	-
0252	0	1573					98	5-97	SW	6	57N	32W	-	-
0277	0	1573					Hay	180.92	CTR	6	57N	32W	0	0
0278	0	1903					North	181.93	N	36	58N	33W	0	0
0279	0	1680					West	182.93	NE	3	57N	33W	0	0
0280	0	1766/1754					CRP	187.93	CTR	36	58N	33W	0	0
0281	0	1573					[redacted]	188.93	SW	6	57N	32W	0	0
0282	0	1903					N Corn	195.93	CTR	36	58N	33W	0	0
0655	0	1573					98	-	SW	6	57, 58N	33, 32W	-	-
0666		5341					104	-	NE	7	57N	32W	-	-
0667		1573					98	-	SW	6	57N	32W	-	-
0668		1754/1766					99	-	CTR	36	58N	33W	-	-
0669		1724/1680/1675					100	-	NE, SE	3, 34	57, 58N	33, 32W	-	-
0671		1903					99	-	N	36	58N	33W	-	-
0705	0	1766/1754					101	-	E	36	57, 58N	33, 32W	-	-
0713	0	1573					98	-	SW	6	57, 58N	33, 32W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
813		1754/1766	[redacted]				101	-	E	36	58N	33W	-	-
0309	0	12527					E	152.91	SW	33	58N, 57	36	0	0
0310	0	12830					W	153.91	S	32	58N, 57	36	0	0
0367	0	12557					[redacted]	127.90	SW	33	57, 58N	36	-	-
0368	0	12828/12829						128.90	NE	32	57, 58N	36	-	-
0369	0	12830					S 70	135.90	SW	32	57, 58N	36	-	-
0387	0	12827					NW	116.89	NE	32	57-58	36W	0	0
0388	0	12831					S 70	117.89	SW	32	57-58	36W	0	0
0389	0	12827					Bally	118.89	SW	3	56N	36W	0	0
0609	0	2939					244-03	11-03A	NE	6	58N	31W	39 52.5	-94 24.8
60	0	6491					165A-02	16-02A	S	5	57N	33W	-	-
0061	0	6491					156B-02	2-03A	SE	5	57N	33W	39 47.0	-09 43.7
0062	0	6491					165B-03	14-02B	S	5	57N	33W	-	-
0097	0	6491					165B-01	6-01A	E	5	57N	33W	-	-
0144	0	6491					165A	3-00A		5	57N	33W	-	-
0145	0	6491					165B	3-00B	SE	5	57N	33W	-	-
0221	0	6491					165	23-99	W	5	57N	33W	--	--
0222	0	1729					166	24-99	SE	31	58N	32W	--	--
0504	0	6491					165B-04	3-04B	S	5	57N	33W	-	-
726	0	6491					165A-07	6-07A	SW	5	57	33	-	-
0242	0	1195					183	31-99A	NW	32	58N	34W	--	--
0390	0	3903					W	115.89	NW	34	56N	37W	0	0
0339	0	2683					247A-06	8-06B	SW	11	58N	32W	-	-
0340	341	2683					247B-06	8-06A	SW	11	58N	32W	-	-
0342	0	2442					259-006	8-06C	SE	14	58N	32W	-	-
433	0	2683					247-05	11-05A	NW	11	58N	32W	-	-
0442	443	2442					259-05	11-05B	SE	14	58N	32W	-	-
0531	0	2683					247-04	8-04A	SW	11	58N	32W	39 51.0	-94 28.0
737	0	2683					247A-07	9-07A	NW	11	58N	32W	-	-
788	0	2638					247A-08	0	W	11	58N	32W	0	0
0006	0	4558					78B	10-98	SW	24	60N	33W	-	-
0007	0	4558					78A	11-98	SW	24	60N	33W	-	-
0118	0	4559					78A-01	7-01A	SE	23	60N	33W	-	-
0213	0	4559					79A	13-98	SE	23	60N	33W	--	--
0610	0	4559					78A-03	2-03A	SE	23	60N	33W	39 59.7	-94 34.1
0437	438	4917					256-05	4-05A	SE	5	56N	33W	-	-
0001	0	6487					102A	38-98	NE	5	57N	33W	-	-
0038	0	6487					102A	1-04A	NE	5	57N	33W	39 04.7	-09 40.3
0049	0	38618					153A-02	1-02B	N	5	57N	33W	39 47.1	-94 37.7
0050	0	6493					153A-03	13-02B	N	5	57N	33W	-94 37.7	-
51	0	3342/3343					154-02	1-02D	NE	29	58N	33W	39 48.6	-94 37.5
0052	0	3354					154A	1-02C	SE	29	58N	33W	39 48.7	-94 37.4

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0053	0	3328/3329	[redacted]				154B	1-02E	NW	28	58N	33W	39 48.7	-94 36.7
0057	0	6487					156A-02	13-02A	NE	5	57N	33W	-	-
0058	0	3383					163-02	1-02F	SE	31	58N	33W	39 04.7	-09 40.3
0059	0	3383					163A-02	18-02B	SE	31	58N	33W	39 04.7	-94 38.4
0066	0	3364					205-02	1-02G	SW	32	58N	33W	39 47.6	-94 38.3
0090	0	38618					153A01	4-01C	N	5	57N	33W	39 47.1	-94 37.7
0091	0	3354					154-01	4-01D	SE	29	58N	33W	-	-
0094	0	6487/6493					156A-01	4-01A	NE	5	57N	33W	-	-
0095	0	3383					162-01	4-01G	SE	31	58N	33W	-	-
0096	0	3383					163	4-01H	SE	31	58N	33W	39 47.6	-94 38.3
0111	0	3364					221	4-01B	SW	32	58N	33W	-	-
0137	0	3354/3330					154	1-00A	SE, SW	29, 28	58N	33W	-	-
0140	0	6487					156A	1-00B	NE	5	57N	33W	39 47.4	-94 37.6
0141	0	3383					162	1-00F	S	31	58N	33W	-	-
0142	0	3383					162A	1-00E	SW	31	58N	33W	39 47.5	-94 38.0
0143	0	3383					163A	0	SE	31	58N	33W	39 47.6	-94 38.4
0151	0	3363					199	-	NE	32	58N	33W	-	-
0160	0	3364					205	-	SW	32	58N	33W	-	-
0174	0	6487					156	6-99	NE	5	57N	33W	--	--
0175	0	3355/3328					154	5-99	SE, NW	29, 28	58N	33W	--	--
0176	0	6493					153	41-98/2-99	SE	5	57N	33W	--	--
0177	0	6501					150	40-98/1-99	E	5	57N	33W	--	--
0178	0	3383					163	13-99A	SE	31	58N	33W	--	--
0179	0	6477					162	13-99C	SE	31	58N	33W	--	--
0183	0	6496					176	10-99A	E. Center	32	58N	33W	--	--
0184	0	1570					157	10-99	NW	8	57N	33W	--	--
0251	0	6487					153A	1-00C	E	5	57N	33W	--	--
0322	0	6487					153-06	3-06C	NE	5	57N	33W	-	-
0323	0	38/38618/6491/6501					153A-06	3-06D	NW	5	57N	33W	-	-
0326	327	6487					156-06	3-06A	NE	5	57N	33W	-	-
0328	0	3383					163A-06	3-06E	SE	31	58N	33W	-	-
0329	0	3364					205-06	3-06B	SW	32	58N	33W	-	-
0494	0	6487					102A-04	1-04A	NE	5	57N	33W	-	-
0502	0	3383					163-04	1-04D	SE	31	58N	33W	-	-
0503	0	3383					163A-04	1-04C	SE	31	58N	33W	-	-
0509	0	3364/3370					205-04	1-04B	SW	32	58N	33W	-	-
0588	0	3383					162-03	18-02C	S	31	58N	33W	-	-
0592	0	3364					205-03	18-02A	SW	32	58N	33W	-	-
724	0	6493/6487					156-07	4-07A	NE	5	57	33	-	-
725	0	3384/3385/3383					163-07	0	SE	31	58	33	-	-
0283	0	6487					Corn	185.93	NE	5	57	33	0	0
168	0	4887					212	18-00A	SE	32	56N	33W	39 37.4	-94 37.6

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0064	0	1087	[redacted]				201-02	11-04C	NW	12	55N	34W	39 36.0	-94 40.3
0065	0	1086					201B-02	11-02A	NE	12	55N	34W	39 35.9	-94 39.6
0070	0	1771					226A-02	11-02B	SE	1	55N	34W	-	-
0071	0	1771					226B-02	11-02B	SE	1	55N	34W	-	-
0072	0	6641					228	14-01F	SE	25	56N	34W	39 38.2	-94 40.6
0080	0	6221					235	11-02D	NW	36	56N	34W	39 37.4	-94 40.4
0101	0	1087					201-01	14-01B	NW	12	55N	34W	39 36.0	-94 40.3
0103	0	1086					210-01	14-01D	NE	12	55N	34W	39 35.9	-94 39.6
0108	0	12474					218	3-01A	SW	36	56N	34W	39 37.0	-94 40.4
0110	0	11962/11964/11965					220	8-00F	NE	35	56N	34W	39 37.4	-94 40.3
0116	0	1771					226	14-01E	SE	1	55N	34W	39 36.2	-94 39.8
0152	0	4771					200	8-00A	SW	1	55N	34W	-	-
0153	0	1087					201	8-00B	N	12	55N	34W	-	-
0154	0	1087					201A	8-00C	N	12	55N	34W	39 36.2	-94 39.8
165	0	1086					210	8-00D	NE	12	55N	34W	-	-
0335	336	6221/6223/11962					220-06	20-06C	NW	36	56N	34W	-	-
0337	0	6641/12574					228-06	24-05B	SW	25	56N	34W	-	-
0338	0	6641/12574					228A-06	20-06E	SW	25	56N	34W	-	-
0436	0	2678/2680/2679					255-05	2-05A	NE	12	56N	33W	-	-
0505	0	1087					201-04	11-04C	SW	12	55N	34W	-	-
0506	0	1086/1087					201A-04	11-04B	NE	12	55N	34W	-	-
0507	0	1086/1087					201B-04	14-03A	NE	12	55N	34W	-	-
510	0	1771					210-04	11-04B	SE	1	55N	34W	-	-
515	0	12474					218-04	18-04A	SW	36	56N	34W	-	-
0516	0	6221/6223					220-04	18-04B	MW	36	56N	34W	-	-
0518	0	6641/6632					228-03	14-03B	NW	25	56N	34W	-	-
0535	0	2765					251-04	15-04A	SE	14	55N	34W	-	-
0597	0	6632					228-03	0	NW	25	56N	34W	-	-
733	0	12574					228A-07	20-07A	SE	26	56N	34W	-	-
758	0	6641					285-07	20-07B	SW	25	56N	34W	-	-
759	0	11962					286-07	20-07C	NE	35	56N	34W	-	-
0037	0	1774					85	21-98	SE	31	58N	32W	-	-
170	0	4420					214	16-00A	SW	33	57N	33W	39 42.6	-94 36.5
0212	0	1774					85	17-99	S	31	58N	32W	--	--
809	0	1774					85-08	0	SE	31	58N	32W	0	0
0391	0	9221/1653					[redacted]	124.89	SE	31	57N	34W	0	0
0656	0	1763/1717					121	-	SE, SW	34, 35	58N	33W	-	-
0657	0	5339					122	-	NE	35	58N	33W	-	-
0706	0	1717					121	-	SW	35	57, 58N	33, 32W	-	-
0707	0	1800/5339					122	-	NE	35	57, 58N	33, 32W	-	-
0708	0	1762					123	-	E	35	57, 58N	33, 32W	-	-
0370	0	7573					30 A	144.90	N	36	58N	35	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0166	0	3190	[redacted]				211	15-00B	N	5	55N	33W	39 36.9	-94 37.5
0167	0	3188					211A	15-00A	E	5	55N	33W	39 36.9	-94 37.0
0330	331	3189/3191/3190					211B-06	1-06A	NE	5	55N	33W	-	-
0416	0	191/3267/3190/3189					211B-05	20-04B	E	5	55N	33W	-	-
0435	0	3187					253-05	3-05C	NW	5	55N	33W	-	-
0511	0	3189/3190/3191					211-04	20-04A	NE	5	55N	33W	-	-
0161	0	8244/8239					206A	14-00A	SO	25	59N	33W	39 53.9	-09 43.9
0243	0	1676					188	30-99D	W	13	59N	34W	--	--
0244	0	2431					187	30-99C	SE	12	59N	33/34W	--	--
0245	0	259					189	30-99E	NW	31	59N	33/34W	--	--
0246	0	203					185	30-99A	N, NE	32	59N	33/34W	--	--
0247	0	1676					188A	30-99F	Mid W	13	59N	34W	--	--
0354	0	8133					273-06	16-06A	SW	1	58N	36W	-	-
0113	0	4105					223	10-01A	SE	32	60N	31W	-	-
0289	0	238					[redacted]	171.92	SW	6	Rochester 59	33	-	-
0290	0	225					E Pasture	172.92	NE	5	59N	33	-	-
0371	0	4689					SE	133.90	SW	32	60N	33	-	-
0372	0	225					S 20	134.90	NW	5	59N	33	-	-
0672		225					88	-	NE	5	59N	33W	-	-
0067	0	3051					224-02	10-02B	NW	2	55N	34W	-	-
0068	0	3051					225-02	10-02C	NW	2	55N	34W	-	-
0069	0	3051					225A-02	10-02D	NW	2	55N	34W	-	-
0104	0	18970					215B	13-01C	SW	35	56N	34W	-	-
0105	0	38338					216	6-00F	SW	26	56N	34W	-	-
0106	0	38338					216A	0	SW	26	56N	34W	39 38.0	-94 41.3
0114	0	3051					224	13-01A	NW	2	55N	34W	39 36.7	-09 44.4
0115	0	3051					225	0	NW	2	55N	34W	39 36.7	-94 41.4
0117	0	12484					227	13-01D	SE	24	56N	34W	39 39.1	-94 39.7
0157	0	3051/4462					203	6-00A	S,E,W	34 - 2	56 - 55N	34 - 34W	-	-
0171	0	18970					215	6-00C	W	35	56N	34W	39 37.4	-94 41.3
0172	0	18970					215A	6-00D	N	35	56N	34W	39 37.7	-94 41.2
0173	0	7888					216	6-00F	W	26	56N	34W	-	-
0332	0	18970					215-06	21-06A	SW	35	56N	34W	-	-
0333	334	38338					216A-06	22-06A	SW	26	56N	34W	-	-
0360	0	6228					278-06	21-06B	SW	27	56N	34W	-	-
0417	0	18970					215B-05	09-05C	SW	35	56N	34W	-	-
418	0	3051					224-05	16-04F	NW	2	55N	34W	-	-
0419	420	3051					224-05-2	19-05B	NW	2	55N	34W	-	-
0421	0	3051					224A-05	19-05A	NW	2	55N	34W	-	-
422	423	12484					227-05	20-05B	SE	24	56N	34W	-	-
0451	0	6228					265-05	21-05A	SW	27	56N	34W	-	-
0508	0	4462					203-04	16-04E	SE	34	56N	34W	-	-

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0512	0	18970	[redacted]				215-04	16-04A	NW	35	56N	34W	-	-
0513	0	38338					216-04	16-04C	SW	26	56N	34W	-	-
514	0	38338					216A-04	16-04A	SW	26	56N	34W	-	-
0517	0	3214					225A-04	12-03A	NE	2	55N	34W	-	-
0593	0	18970					215-03	12-03C	NW	35	56N	34W	-	-
0594	0	18970					215A-03	12-03D	NW	35	56N	34W	-	-
0595	0	38338					216-03	12-03E	SW	26	56N	34W	-	-
0596	0	38338					216A-03	12-03F	SW	26	56N	34W	-	-
731	0	18970					215-07	22-07A	NW	35	56N	34W	-	-
732	0	18970					215A-07	12-03D	NW	35	56N	34W	-	-
748	749	6228					278A-07	21-07D	SW	27	56N	34W	-	-
760	0	38058/38057/38059					287-07	21-07C	SE	16	55N	34W	-	-
780	0	38338					216-08	4-08EVA	SW	26	56N	34W	0	0
781	0782	38338					216A-08	6-08EVC	SW	26	56N	34W	0	0
812	0	4462					203-09	3-08EVB	SE	34	56N	34W	-	-
815	0	12484					227-07	-	SE	24	56N	34W	-	-
0430	0	2369					243-05	7-05A	NE	21	58N	32W	-	-
0523	0	2406					232A-04	14-04A	SE	15	58N	32W	-	-
0528	0	2369					243-04	7-04A	NE	21	58N	32W	39 50.4	-94 29.6
0608	0	2369					243	8-03A	NE	21	58N	32W	-	-
784	0	2369					243-08	0	NE	21	58N	32W	0	0
785	0	2369					243-08	0	NE	21	58N	32W	0	0
816		2444					295	0	SE	15	58N	32W	-	-
0149	0	6476					197	4-00A	NW	4	57N	33W	39 47.4	-94 37.0
0150	0	3334					198	4-00B	SE	33	58N	33W	39 47.5	-94 36.7
0558	0	3973					E	40-85	Center	10	56N	36W	0	0
0373	0	3438					N Milo	143.90	SE	23	58, 59N	32, 31	-	-
0392	0	1247					W	114.89	NE	28	57-58	34W	0	0
0455	0	1246					[redacted]	95.88	SW	27	58N	34W	0	0
0361	0	11964					279-06	24-06A	SE	35	56N	34W	-	-
0079	0	2298					234	6-01A	NE	21	58N	32W	39 04.9	-94 02.9
0032	0	6488					89A	17-98	N	5	57N	33W	-	-
0033	0	6488					89B	18-98	N	5	57N	33W	-	-
0034	0	6488					89A	37-98	NW	5	57N	33W	-	-
0054	0	6632					155-02	12-02A	NW	25	56N	34W	39 38.6	-94 40.0
0055	0	6632					155A-02	12-02B	NW	25	56N	34W	-	-
0056	0	6632					155B-02	15-01A	NW	25	56N	34W	39 38.6	-94 40.1
0084	0	6488					89A-02	15-02A	NW	5	57N	33W	-	-
0085	0	6488					89B-02	2-02B	NW	5	57N	33W	39 47.1	-09 43.7
0086	0	6488					89B-03	15-02B	NW	5	57N	33W	-	-
0092	0	6632					155A-01	2-01A	NW	25	56N	34W	39 38.6	-94 40.1
0093	0	6632					155B-01	7-00C	NW	25	56N	34W	39 38.6	-94 40.1

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0119	0	6488	[redacted]				89B-01	5-01B	N	5	57N	33W	-	-
0121	0	6488					089A	2-00A	NW	5	57N	33W	39 47.4	-94 38.1
0122	0	6488					089B	2-00B	NW	5	57N	33W	39 47.4	-94 37.9
0138	0	6632					155A	7-00B	NW	25	56N	34W	-	-
0139	0	6632					155B	7-00A	NW	25	56N	34W	-	-
0182	0	3363					155	47-99/11-99	NW	25	56N	34W	--	--
0291	0	6488					Hay	168.92	NW	5	57N	33	-	-
0324	0	6632					155-06	25-05A	NW	25	56N	34W	-	-
325	0	6632					155A-06	25-05B	NW	25	56N	34W	-	-
0364	0	6488					89A-06	2-06A	NW	5	57N	33W	-	-
0500	0	6632					155-04	19-04A	NW	25	56N	34W	-	-
0501	0	6632					155B-04	19-04B	NW	25	56N	34W	-	-
0537	0	6488					89A-04	2-04A	NW	5	57N	33W	-	-
0538	0	6488					89B-04	2-04B	NW	5	57N	33W	-	-
0585	0	6632					155-03	13-03A	NW	25	56N	34W	-	-
0586	0	6632					155A-03	13-03C	NW	25	56N	34W	-	-
0587	0	6632					155B-03	13-03B	NW	25	56N	34W	-	-
722	0	6632					155-07	25-06B	SW	25	56	34	-	-
723	0	6632					155A-07	25-06A	SW	25	56	34	-	-
763	764	6488					89A-07	5-07A	NW	5	57N	33W	-	-
765	0	6488					89B-07	5-07B	NW	5	57N	33W	-	-
766	0	6488					089A-08	13-08A	NW	5	57N	33W	0	0
778	0	6632					155A-08	14-08A	NW	25	56N	34W	0	0
779	0	6632					155B-08	14-08B	NW	25	56N	34W	0	0
810	0	6488					89B-08	13-08B	NW	5	57N	33W	0	0
0024	0	1570					141	23-98	SE	12	60N	34W	-	-
0025	0	1570					140	24-98	SE	12	60N	34W	-	-
0026	0	1570					142	26-98	S	12	60N	34W	-	-
0027	0	1570					149	33-98	NW,NE,SE	12	60N	34W	-	-
0185	0	1570					149B	32-99B	NE, SE	12	60N	34W	--	--
0186	0	1570					149C	32-99C	Middle	12	60N	34W	--	--
0187	0	1570					149A	32-99A	Mid-East	12	60N	34W	--	--
0188	0	1570					149	33-98	NW, NE, SE	12	60N	34W	--	--
0102	0	38621					204-01	12-01D	SE	32	56N	33W	39 37.0	-94 37.8
0107	0	5008					217	1-01A	NE	30	56N	33W	-	-
0109	0	4879/4880					219	1-01B	NW	30	56N	33W	39 38.6	-94 38.9
155	0	4870					202	10-A	SW	30	56N	33W	-	-
0156	0	4870					202A	10-B	SW	30	56N	33W	-	-
0158	0	38621					204	-	S	32	56N	33W	-	-
0159	0	38621					204A	10-00F	S	32	56N	33W	39 37.1	-94 37.7
0162	0	38621					207A	10-00D	SW	32	56N	33W	39 37.3	-94 37.8
0163	0	38623/4878					208	10-00G	N	32	56N	33W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0164	0	2789/2790/2796	[redacted]				209	10-00E	W	25	56N	33W	39 38.6	-94 33.8
0292	0	3931					S Pasture	173.92	SE	32	60N	33	-	-
0293	0	3931					NW Corn	174.92	CTR	32	60N	33	-	-
0374	0	3931					Pasture	132.90	SE	32	60N	33	-	-
0393	0	3931					40 A	108.89	SE	32	60N	33 W	0	0
0673		3931					63	-	SE	32	60N	33W	-	-
0474	0	3048					40 W	80.87	NW	18	56N	32	0	0
0475	0	3037/3041					[redacted]	79.87	SW	8	56N	32	0	0
0542	0	4111					SE	63-86	Center	15	56N	36W	-	-
0543	0	4111					N	64-86	Center	15	56N	36W	-	-
0559	0	4111					S	29-85	Center	15	56N	36W	0	0
0560	0	4111					N	46-85	Center	15	56N	36W	0	0
614	0	4111					S	29	Center	15	56N	36W	-	-
615	0	4111					N	30	Center	15	56N	36W	-	-
0078	0	2448					233	5-01A	SW	16	58N	32W	39 03.0	-94 03.0
0429	0	2448					233-05	10-05A	SW	16	58N	32W	-	-
0524	0	2448					233-04	5-04A	SW	16	58N	32W	-	-
0602	0	2248					233-03	6-03A	SW	16	58N	32W	39 03.0	-94 03.0
0073	0	2371					229	4-02B	NW	21	58N	32W	39 04.9	-09 40.3
74	0	2371					229A	4-02C	NW	21	58N	32W	39 05.0	-09 40.3
0075	0	2482					230	4-02D	NE	16	58N	32W	39 05.0	-09 40.2
0076	0	2445					231	4-02E	SW	15	58N	32W	39 05.0	-09 40.2
0077	0	2482					232	4-02A	SE	16	58N	32W	39 30.1	-09 40.2
0424	0	2371					229-05	5-05A	NW	21	58N	32W	-	-
0425	0	2371					229A-05	5-05C	NW	21	58N	32W	-	-
0426	0	2482					230A-05	5-05B	SE	16	58N	32W	-	-
427	428	2445					231-05	5-05D	SW	15	58N	32W	-	-
0519	0	2371					229A-04	4-04D	NW	21	58N	32W	-	-
520	0	2371					229B-04	4-04C	NW	21	58N	32W	-	-
521	0	2482					230A-04	3-05A	SE	16	58N	32W	-	-
0522	0	2445					231-04	3-05B	SW	15	58N	32W	-	-
0598	0	2371					229-03	5-03B	NW	21	58N	32W	39 49.7	-94 30.0
0599	0	2371					229A-03	5-03A	NW	21	58N	32W	39 49.9	-94 30.5
0600	0	2482					230-03	5-03C	SE	16	58N	32W	39 05.0	-09 40.2
0601	0	2445					231-03	5-03D	SW	15	58N	32W	39 05.0	-09 40.2
0023	0	2629					148	30-98	SE	9	58N	31W	-	-
0028	0	2247					133	05-98	SW	20	58N	31W	-	-
0029	0	2247					135	06-98	SW	20	58N	31W	-	-
0030	0	2630					146	28-98	SE	9	58N	31W	-	-
0031	0	2517					147	29-98	NE	16	58N	31W	-	-
43	0	2247					133-03	9-02C	SW	20	58N	31W	0	0
0044	0	2246					133A-02	9-02C	SW	20	58N	31W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0046	0	2630	[redacted]				146A-02	9-02E	SE	9	58N	31W	-	-
0047	0	2630					146B-02	9-02D	SE	9	58N	31W	-	-
48	0	2517					147F-02	9-02B	NE	16	58N	31W	-	-
0089	0	2630					146A-01	11-01A	SE	9	58N	31W	39 50.9	-94 23.4
0098	0	2517					171A-01	11-01A	NE	16	58N	31W	39 50.6	-94 23.1
0099	0	2517					171C-01	11-01E	NE	16	58N	31W	39 50.9	-94 22.7
0131	0	2247					133A	13-00E	SW	20	58N	31W	39 49.4	-94 24.8
0133	0	2630					146A	18-99M	S, E	9	58N	31W	-	-
0134	0	2630					146B	13-00C	S	9	58N	31W	-	-
0146	0	3660					171A	13-00A	N, E	16	59N	31W	39 50.8	-94 23.1
0147	0	3660					171B	13-00B	NE	16	59N	31W	39 50.9	-94 22.0
0148	0	3660					171C	13-00D	NE	16	59N	31W	39 50.9	-94 22.7
0201	0	2247					135B	18-99L	SW	20	58N	31W	--	--
0202	0	2517					147F	18-99H	NE	16	58N	33W	--	--
0203	0	5267					146B	18-99K	NE	9	58N	31W	--	--
0204	0	2517					147E	18-99G	NE	16	58N	31W	--	--
0205	0	2517					147A	18-99F	NE	16	58N	31W	--	--
0206	0	2517					147D	18-99E	Middle E.	16	58N	31W	--	--
0207	0	2517					147C	18-99D	Middle E.	16	58N	31W	--	--
0208	0	2517					147B	18-99C	NE	16	58N	31W	--	--
0209	0	2517					171	18-99B	NE	16	58N	31W	--	--
0210	0	2517					169	18-99A	NE	16	58N	31W	--	--
0211	0	2247					135	18-99	SW	20	58N	31W	--	--
0228	0	5267					174	18-99i	NE	9	58N	31W	--	--
0579	0	2247					133-03	10-03A	SW	20	58N	31W	-	-
0580	0	2247					133A-03	10-03B	SW	20	58N	31W	-	-
0582	0	2630					146A-03	10-03G	SE	9	58N	31W	-	-
0583	0	2630					146B-03	10-03E	SE	9	58N	31W	-	-
0584	0	2517					147-03	10-03C	NE	16	58N	31W	-	-
589	0	2517					171A-03	10-03F	NE	16	58N	31W	-	-
0590	0	2517					171B-03	10-03D	NE	16	58N	31W	-	-
0294	0	0					55A	166.92	SE	31	57, 58N	33, 32	0	0
0295	0	2660					W	179.92	CTR	34	57N	33	-	-
0008	0	9611					115	20-97	NW	25	60N	34W	-	-
0229	0	9611					115	28-99E	NW	25	60N	33, 34W	--	--
0230	0	3193					192	28-99B	SE, SW	7, 8	60N	33W	--	--
0231	0	8940					113A	28-99A	SE	23	60N	33, 34W	--	--
0264	0	4997					130	1-97	NW	10	60N	33W	-	-
0265	0	8940/5180					113	10-97HP	CTR, South	26, 23	60N	31W	-	-
266	0	9611					115	20-97	NW	25	60N	33W	-	-
0320	321	5181					118A-06	6-06A	NW	26	60N	34W	-	-
0658	0	5180/8940					113	180A	S,N	23, 26	60N	33, 34W	-	-

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0659	0	9611	[redacted]				115	160	E	25	60N	33, 34W	-	-
0674		9082					110	-	SW	13	60N	34W	-	-
0675		4698/9009					111	-	SW, NW	19, 30	60N	33W	-	-
0676		5180					112	-	NW	26	60N	34W	-	-
0677		5180/8940					113	-	SE, CTR	23, 26	60N	34W	-	-
0678		9611					115	-	NW	25	60N	34W	-	-
0679		147/9611/9612					116	-	N	25	60N	34W	-	-
0681		5180/8940					118	-	SW, SE	23, 26	60N	34W	-	-
0709	0	9611					115	-	NW	25	60N	34W	-	-
0710	0	8940					113	-	S	23 & 26	60N	34W	-	-
0714	0	9076					116	-	S	24	60N	33, 34W	-	-
716	0	8940					113-07	5-07B	S	23	60	34	-	-
717	0	9611					115-07	2-07A	NW	25	60	34	-	-
718	719	8940					118-07	2-07C	SW	23	60	34	-	-
727	728	3196					192-07	2-07B	SW	8	60	33	-	-
729	730	3196					192A-07	2-07E	SW	8	60	33	-	-
767	0	8940					113A-08	2-08C	SE	23	60N	34W	0	0
768	0	5180					118-08	2-08B	NW	26	60N	34W	0	0
769	0	5180					118A-08	2-08A	NW	26	60N	34W	0	0
803	0	6015					293-08	4-08A	SW	9	60N	33W	0	0
0311	0	12828/12829					[redacted]	150.91	CTR	32	57N	36	0	0
0375	0	12831					W	136.90	S	32	57N	36	-	-
0394	0	3912					E	94.88-89	SE	27	56 N	37W	0	0
0456	0	3914					E	94.88	SE	27	56N	37W	0	0
0476	0	12831					SW	72.87	SW	32	57N	36W	0	0
0477	0	12823					NW	73.87	NW	29	57N	36W	0	0
0312	0	799					Homeplace E	154.91	SE	33	56N	34	0	0
0313	0	1626/1625					Homeplace	155.91	SW	16	55N	34	0	0
0376	0	741					R & B	129.90	NE	9	55N	34	-	-
0377	0	3084/3067					Boding	131.90	NE, NW	8, 9	55N	34	-	-
0378	0	591/1626/1625					NW	145.90	E, W	17, 16	55N	34	-	-
0379	0	38046					E	146.90	SE	9	55N	34	-	-
0457	0	591					W	98.88	SE	17	55N	34W	0	0
0458	0	1626/1625					Homeplace	102.88	SW	16	55N	34W	0	0
783	0	5121					241-08	6-08A	NW	8	60N	33W	0	0
0604	0	8445					239	3-03C	SW	33	61N	34W	39 59.7	-94 34.1
0606	0	3198/5122					241	3-03A	NW	8	60N	33W	40 20.3	-94 37.6
0607	0	8452					242	3-03B	SE	31	61N	33W	-	-
0525	0	8445					239-04	10-04B	SW	33	61N	33W	-	-
0526	0	3198					241-04	10-04A	NE	8	60N	33W	-	-
0527	0	8452					242-04	10-04E	SE	31	61N	33W	-	-
0532	0	7874					248-04	10-04C	SE	32	61N	33W	-	-

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734	0	3198/5122	[redacted]				241-07	3-07A	NW	8	60	33	-	-
0478	0	4248					S 35	65.86	NE	16	56N	36W	0	0
0544	0	4112					S 80	62-86	NE	16	56N	36W	-	-
0545	0	4248					S 35	65-86	NE	16	56N	36W	-	-
0561	0	4112					S	48-85	NE	15	56N	36W	0	0
562	0	4248					N 30	49-85	NE	16	56N	36W	0	0
0296	0	41/43/44						177.92	SW	30	55N	35	-	-
0297	0	1720/2547						178.92	SE, NE	24, 25	55N	36	-	-
0298	0	166						175.92	NE	33	55N	36	-	-
0314	0	260						147.91	NW	27	55N	35	0	0
0315	0	2473						148.91	SE	29	55N	36	0	0
0316	0	2583						149.91	S	8	55N	36	0	0
0317	0	2581/2583						156.91	SW	8	55N	36	0	0
0318	0	1736						157.91	SW	9	55N	36	0	0
0319	0	2473						159.91	NE	29	55N	36	0	0
0380	0	2473						123.89, 90	SE	29	55N	36	-	-
0381	0	2492						126.90	NE	29	55N	36	-	-
0382	0	260						147.90	NW	27	55N	35	-	-
0395	0	2547						119.89	SE	24	55N	36W	0	0
0396	0	1833						120.89	NW	20	55N	35W	0	0
0397	0	2499						121.89	NE	17	55N	36W	0	0
0398	0	2499						122.89	NE	17	55N	36W	0	0
0399	0	2473					Peal S	123.89	SE	29	55N	36W	0	0
0546	0	2473					E. Corn	NEC-86	SE	29	55N	36W	-	-
0563	0	2473					1 SW Corner	34-84	SE	29	55N	36W	0	0
0564	0	2473					3 NEB		SE	29	55N	36W	0	0
616	0	2473					1 SW Corner	31	SE	29	55N	36W	-	-
0617	0	902/900/38569/899						33	SW	22	55N	36W	-	-
0618	0	1833						35	NW	20	55N	35W	-	-
0633	-	166						17	NE	33	55N	36W	-	-
634	-	2473					3 N.E.B.	2	SE	29	55N	36W	-	-
811	-	2473					3N.E.B.	2	SE	29	55N	36W	-	-
0400	0	3955					W	96.88-89	NE	5	56N	36W	0	0
0401	0	3957					Center	104.88-89	NE	5	56N	36W	0	0
0402	0	3977					E	113.89	NW	4	56N	36W	0	0
0459	0	3977					E	83.87	NW	5	56N	36W	0	0
0460	0	3955					W	96.88	NE	5	56N	36W	0	0
0461	0	4861/4860						97.88	NW	30	56N	36W	0	0
0462	0	3955						104.88	NE	5	56N	36W	0	0
0479	0	3955						67.86	NW	5	56N	36W	0	0
0480	0	3977						83.87	NW	5	56N	36W	0	0
0481	0	4862						78.87	NW	30	56N	36W	0	0

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0482	0	3955	[redacted]				W 60	82.87	NW	5	56N	36W	0	0
0343	0	4468	[redacted]				267-06	4-06A	NE	28	60N	32W	-	-
0344	0	4141	[redacted]				268-06	4-06C	SW	31	60N	31W	-	-
0345	0	4141	[redacted]				269-06	4-06B	SE	31	60N	31W	-	-
804	0	7697	[redacted]				294-08	5-04A	NW	17	60N	33W	0	0
0547	0	3954	[redacted]				W 46	55-86	SW	5	56N	36W	-	-
0565	0	3954/3894/3979	[redacted]				[redacted]	39	SE	4	56N	36W	0	0
0566	0	3954/3894	[redacted]				[redacted]	43-85	Center	5	56N	36W	0	0
0619	0	3895/3896/585	[redacted]				[redacted]	26-84	SE	5	56N	36W	-	-
0620	0	3895/3896/585	[redacted]				[redacted]	39	SE	5	56N	36W	-	-
0635	-	595/3895	[redacted]				[redacted]	26	SE	5	56N	36W	-	-
0636	-	3895	[redacted]				[redacted]	23	SW	5	56N	35W	-	-
0637	-	38529	[redacted]				[redacted]	22	NW	21	57N	36W	-	-
0638	-	12819	[redacted]				[redacted]	3	NE	21	57N	36W	-	-
0639	-	12808/12807	[redacted]				[redacted]	1	SW	34	57N	36W	-	-
0356	0	1766	[redacted]				275-06	19-06A	NE	20	55N	34W	-	-
0357	0	1761	[redacted]				276-06	19-06B	SE	17	55N	34W	-	-
0358	0	1761	[redacted]				276-07	0	SE	17	55N	34W	-	-
0359	0	38052	[redacted]				277-06	19-06C	NE	10	55N	34W	-	-
746	0	1766/1764	[redacted]				275-07	19-07A	NE	20	55	34	-	-
747	0	1164/1762/1763/591	[redacted]				276-07	19-07C	SE	17	55N	34W	-	-
757	0	298	[redacted]				284-07	19-07B	NE	19	55N	34W	-	-
0112	0	1795	[redacted]				222	9-01A	SE	2	56N	36W	-	-
0446	447	2439	[redacted]				262-05	17-05A	SE	18	58N	31W	-	-
0452	453	2441	[redacted]				266-05	23-05A	SE	13	58N	32W	-	-
0349	350	8131	[redacted]				272A-06	15-06B	W	1	58N	36W	-	-
0351	0	6242	[redacted]				272B-06	15-06A	SE	2	58N	36W	-	-
0352	353	6242	[redacted]				272C-06	15-06C	SE	2	58N	36W	-	-
743	0	6242	[redacted]				272A-07	15-06B	SE	26	58	36	-	-
744	0	6242	[redacted]				272B-07	18-07B	SE	26	56	36	-	-
745	0	6242	[redacted]				272C-07	18-07D	SE	26	58	36	-	-
750	0	8131	[redacted]				280-07	1-07B	W	1	58	36	-	-
751	0	6242	[redacted]				281-07	1-07A	SE	2	58	36	-	-
752	753	9949	[redacted]				282-07	1-07D	NW	12	58	36	-	-
795	0	8131	[redacted]				272A-08	16-08A	NW	1	58N	36W	0	0
796	0	9949	[redacted]				282-08	1-08D	NW	12	58N	36W	0	0
797	0	8131	[redacted]				288-08	25-07A	NW	1	58N	36W	0	0
798	0	8131	[redacted]				289-08	1-08A	NW	1	58N	36W	0	0
799	0	8131	[redacted]				290-08	1-08B	NW	1	58N	36W	0	0
800	0	6242	[redacted]				291-08	1-08C	SW	2	58N	36W	0	0
0248	0	5022/5004/5021	[redacted]				193	35-99A	SE	25	60N	33W	--	--
0299	0	3056	[redacted]				N 72	162.92	SE	5	55N	34	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0218	0	475	[redacted]				167	21-99F	E	29	60N	33W	--	--
0219	0	475					168	21-99D	S	29	60N	33W	--	--
0220	0	799/8246					164	21-99A	SW	33	60N	33W	--	--
0536	0	11965					252-04	17-04A	NW	35	56N	34W	-	-
0444	0	1777/1849					260-05	16-05A	NW	31	58N	31W	-	-
0445	0	1731					261-05	16-05B	SW	31	58N	31W	-	-
738	0	1777/1849					260A-07	8-07A	NW	31	58N	31W	-	-
739	0	1777/1849					260B-07	8-07B	NW	31	58N	31W	-	-
740	0	1777/1849					260C-07	16-05A	NW	31	58N	31W	-	-
789	0	1849					260A-08	0	NW	31	58N	31W	0	0
790	0	1849					261-08	0	NW	31	58N	31W	0	0
0300	0	2481					SE	167.92	SE	28	57N	32	-	-
0301	0	2485/2467					SW	169.92	SW, NE	28, 33	57N	32	-	-
0383	0	90/3413/1560/38688					W 130	130.90	S	17	55N	38, 37	-	-
0463	0	799					N	89.88	SE	33	56N	34W	0	0
0464	0	4975						76.87	SW	4	55N	34W	0	0
0465	0	38046						99.88	SE	9	55N	34W	0	0
0466	0	1760/255						101.88	NE	17	55N	34W	0	0
0467	0	2954/375						103.88	SE	4	55N	34W	0	0
0483	0	3061/425						77.87	N	4	55N	34W	0	0
0484	0	4975						76.87	SW	4	55N	34W	0	0
0485	0	38049						75.87	SW	10	55N	34W	0	0
0434	0	4053					249-05	14-05A	NW	5	59N	31W	-	-
0448	449	4102					263-05	14-05B	SW	32	60N	31W	-	-
0012	0	2734					132	03-98	NW	9	58N	31W	-	-
0013	0	2731					127J	04-98	NE	8	58N	31W	-	-
0014	0	3556					136	07-98	NE	21	59N	31W	-	-
0015	0	2731					127B	09-98	NW	8	58N	31W	-	-
0016	0	3556					145	14-98	NE	21	59N	31W	-	-
0017	0	2799					128B	15-98	SW	5	58N	31W	-	-
0018	0	2731					127F	16-98	NE	8	58N	31W	-	-
0019	0	3556					144	27-98	NE	21	59N	31W	-	-
0020	0	2731					127L	03-97	SW	8	58N	31W	-	-
0021	0	2731					127K	03-97	SW	8	58N	31W	-	-
0039	0	2731					127G-02	7-02C	NW	8	58N	31W	39 51.7	-94 24.7
0040	0	2731					127I-02	7-02B	NE	8	58N	31W	39 51.6	-94 23.7
0041	0	2731					127O-02	7-02E	SW	8	58N	31W	39 51.0	-94 24.4
42	0	2734					132-02	7-02A	NW	9	58N	31W	-	-
0045	0	3356					136A-02	0	NE	21	59N	31W	-	-
0087	0	2731					127I-01	8-01B	NE	8	58N	31W	39 51.6	-94 23.7
0088	0	3556					136	8-01C	NE	21	58N	31W	-	-
0100	0	2734					196-01	8-01A	NW	9	58N	31W	39 51.6	-94 23.7

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0125	0	2731	[redacted]				127G	8-99J	NW	8	58N	31W	39 51.6	-94 24.8
0126	0	2731					127H	12-00E	NW	8	58N	31W	-	-
0127	0	2731					127J	12-00A	E	8	58N	31W	-	-
0128	0	2731					127O	12-00C	S, E	8	58N	31W	-	-
0130	0	2734					132A	12-00B	N, W	9	58N	31W	39 51.7	-94 23.4
0132	0	3556					136A	12-00D	E	21	59N	31W	-	-
0189	0	2731					127K	8-99O	SW	8	58N	31W	--	--
0190	0	2731					127M	8-99N	SW	8	58N	31W	--	--
0191	0	2731					127N	8-99M	SW	8	58N	33W	--	--
0192	0	2731					127L	8-99L	SW	8	58N	33W	--	--
0193	0	2731					127C	8-99H	NW	8	58N	31W	--	--
0194	0	2731					127I	8-99F	N. Middle	8	58N	31W	--	--
0195	0	2731					127F	8-99E	NE	8	58N	31W	--	--
0196	0	2731					127J	8-99D	NE	8	58N	31W	--	--
0197	0	3556					136	8-99C	NE	21	59N	31W	--	--
0198	0	2799					128B	8-99A	SW	5	58N	33W	--	--
0199	0	2734					196 (132)	8-99	NW	9	58N	33W	--	--
267	0	2731					127	3-97	NW	8	58N	31W	-	-
0268	0	2800					128A	0	SE	6	58N	31W	-	-
0269	0	2731					128A	4-97	SE	80	58N	31W	-	-
0408	0	2731					127H-05	13-05D	NW	8	58N	31W	-	-
0409	0	2731					127I-05	13-05F	NE	8	58N	31W	-	-
0410	411	2731					127K-05	13-05A	SW	8	58N	31W	-	-
0412	413	2734					132-05	13-05C	NW	9	58N	31W	-	-
0414	0	3556					136A-05	13-05E	NE	21	59N	31W	-	-
0495	0	2731					127H-04	9-04E	NW	8	58N	31W	-	-
0496	0	2731					127I-04	9-04C	NE	8	58N	31W	-	-
0497	0	2731					127K-04	9-04D	SW	8	58N	31W	-	-
0498	0	2734					132-04	9-04B	NW	9	58N	31W	-	-
499	0	3556					136A-04	9-04A	NE	21	59N	31W	-	-
0533	0	4053					249-04	12-04A	NE	5	59N	31W	-	-
0534	0	4102					250-04	13-04A	SW	32	60N	31W	-	-
0575	0	2731					127I-03	9-03C	NE	8	58N	31W	-	-
0576	0	2731					127K-03	9-03B	SW	8	58N	31W	-	-
0577	0	2731					127O-03	9-03E	S	8	58N	31W	-	-
0578	0	2734					132-03	9-03B	NW	9	58N	31W	-	-
0581	0	3556					136-03	9-03A	NE	21	59N	31W	-	-
0660	0	2731					127	158A	S	8	58N	31W	-	-
0661	0	2731					127B	317A	N	8	58N	31W	-	-
0662	0	2800/2799					128	140A	SE, SW	5, 6	58N	31W	-	-
0711	0	2731					127	-	C	8	58, 59N	31W	-	-
720	721	2731					127K-07	7-07A	SW	8	58N	31W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
770	0	2731	[redacted]				127H-08	0	NW	8	58N	31W	0	0
771	0	2731					127H-08	0	NW	8	58N	31W	0	0
772	773	2731					127I-08	0	NW	8	58N	31W	0	0
774	0	2799					127K-08	0	SW	5	58N	31W	0	0
775	0	2799					127K-08B	0	SW	5	58N	31W	0	0
776	0	2799					127K-08B	0	SW	5	58N	31W	0	0
777	0	2731					132-08	0	NE	8	58N	31W	0	0
0682		3930					119	-	N	10	59N	33W	-	-
0249	0	3162					195	36-99A	W	34	59N	33W	--	--
0250	0	3276/3234					195A	36-99B	SW	27	59N	33W	--	--
0035	0	2191					134	08-98	SW	20	58N	31W	-	-
0200	0	2191					170 (134)	16-99	SW	20	58N	31W	--	--
0403	0	6453					N Levee	105.89	SE	13	58N	36, 35W	0	0
0404	0	6452						106.89	SE	13	58N	36, 35W	0	0
0405	0	3467/1409						107.89	SW	27	58N	37, 36, 35W	0	0
0468	0	9949						86.88	SE	13	58N	36W	0	0
0469	0	9949						84.88	SE	13	58N	36W	0	0
0470	0	9949/8133						85.88	SW, NW	1, 12	58N	36, 35W	0	0
0471	0	3467						87.88	SW	27	59N	36W	0	0
486	0	6453/3168						74.87	SE	13	58N	36, 35W	0	0
0487	0	425						61.86	SW	19	59N	35W	0	0
0488	0	3467						71.87	SW	27	59N	37, 36, 35W	0	0
0489	0	7657						69.87	S	35	59N	37, 36, 35W	0	0
0490	0	9949						68.86	NW	12	58N	35W	0	0
0491	0	6453						84.88	SE	13	58N	36, 35W	0	0
0548	0	9949						54-86	NW	12	58N	36W	-	-
0549	0	425						61-86	SW	19	59N	36W	-	-
0550	0	9949						68-86	NW	12	58N	35W	-	-
0406	0	4449						109.89	SW	32	56N	35W	0	0
0407	0	4449						110.89	SW	32	56N	35W	0	0
0472	0	4446/4448/4447						88.88	SE	32	56N	35W	0	0
0473	0	5949						100.88	NE	33	56N	35W	0	0
492	0	5949						70.87	NE	33	56N	35W	0	0
0493	0	4449						81.87	SW	32	56N	35W	0	0
0551	0	4861						52-86	SW	30	56N	36W	-	-
0552	0	4859						51-86	SW	30	56N	36W	-	-
0553	0	4859						53-86	NW	30	56N	36W	-	-
554	0	6332						44-85	SW	32	56N	35W	-	-
0555	0	38315						47-85	SE	27	56N	35W	-	-
0567	0	4861						37-86	SW	30	56N	36W	0	0
0568	0	4449						38-84	SW	32	56N	35W	0	0
0569	0	5949						12-84	NW	33	56N	35W	0	0

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
0570	0	4862	[redacted]					36	NW	30	56N	36W	0	0
0571	0	4446						44-85	SE	32	56N	35W	0	0
572	0	38315						47-85	SE	27	56N	35W	0	0
0573	0	4859						50-86	SW	30	56N	36W	0	0
0574	0	4859						51-86	SW	30	56N	36W	0	0
0621	0	4859/4862/4863						28	SW	30	56N	36W	-	-
0622	0	4449						16	SW	32	56N	35W	-	-
0623	0	6332						11-84	SW	32	56N	35W	-	-
0624	0	2844/2846/2845						12-84	NW	33	56N	35W	-	-
0625	0	4859/4862/4863						36-84	SW	30	56N	36W	-	-
0626	0	4859/4862/4863						37-84	SW	30	56N	36W	-	-
0640	-	4862						28	SW	30	56N	36W	-	-
0641	-	4859/4862/4863						27	SW	30	56N	36W	-	-
642	-	4449/6332						15	SW	32	56N	35W	-	-
643	-	4449/6332						21	SW	32	56N	35W	-	-
0644	-	4449						16	SW	32	56N	35W	-	-
645	-	35/2836/2833/38221						14	SE	27	56N	35W	-	-
0646	-	38315/5589/5588						13	SE	27	56N	35W	-	-
0647	-	5949						12	NE	33	56N	35W	-	-
0648	-	6332						11	SW	32	56N	35W	-	-
0649	-	4859/4862						1-SW	SW	30	56N	36W	-	-
0010	0	4480					106	32-98	NW	25	60N	33W	-	-
0011	0	5008					109	34-98	NW	24	60N	33W	-	-
0036	0	4482					108B	31-98	NE	26	60N	33W	-	-
0239	0	4482					194	33-99A	NE	26	60N	33W	--	--
0240	0	4036					191	33-99B	NE	2	59N	33W	--	--
0241	0	4662					190C	33-99C	NE	21	60N	33W	--	--
0302	0	4559					NW	163.92	SE	23	60N	33	-	-
0303	0	4036					S	164.92	CTR	2	59N	33	-	-
0304	0	4558					NE	165.92	SW	24	60N	33	-	-
384	0	4036					S 20 A	137.90	NE	2	59N	33, 32	-	-
0385	0	4558/4503					N 100	141.90	SW	24	60N	33, 32	-	-
0386	0	4559/4456					S 40	142.90	SE, NW	23, 25	60N	33, 32	-	-
0415	0	4662					190C-05	22-05A	NE	21	60N	33W	-	-
0603	0	567/4521/4564/4570					238	1-03A	S	22	60N	33W	39 59.7	-94 34.1
0605	0	3737					240	4-03B	NW	14	59N	33W	39 55.9	-94 35.0
0683		4036					77	-	CTR	2	59, 60N	33, 32W	-	-
0684		4480					106	-	CTR	25	59, 60N	33, 32W	-	-
0685		4595					109	-	CTR	24	60N	33W	-	-
0686		4573					78	-	SE, SW	23, 24	59, 60N	33, 32W	-	-
0687		4365					114	-	S	27	60N	32W	-	-
0688		4482					108	-	N	26	59, 60N	33, 32W	-	-

Application_ID	Alt_Application_ID	Parcel_ID	Owner_First	Owner_Last	Farmer_First	Farmer_Last	Site_No	Sample_No	Quarter	Section	Township	Range	Coord_N	Coord_W
801	0802	3194	[redacted]				292-08	3-08A	SE	8	60N	33W	0	0
0232	0	3651/3756					177	29-99A	SE	18	59N	32W	--	--
0233	0	3748					178	26-99B	NW	16	59N	32W	--	--
0234	0	5070					179	29-99C	NE	8	59N	32W	--	--
0235	0	5070					180	29-99D	SW	8	59N	32W	--	--
0236	0	5070					181E	29-99E	SW	8	59N	32W	--	--
0237	0	5070					181F	29-99F	Mid S	8	59N	32W	--	--
0238	0	3818					179B	29-99G	SW	9	59N	32W	--	--
0135	0	6477					151	5-00B	NW	4	57N	33W	39 47.2	-94 37.0
0136	0	3335					152A	5-00A	SW	33	58N	33W	-	-
0180	0	3335/3369					151	48-98/3-99	SW	4	57N	33W	--	--
0181	0	6632					152	49-98/4-99	SW, NE	32, 33	58N	33W	--	--
0284	0	1234/1579/1580					N Corn	186.93	NW	36	58	34	0	0
450	0	3979					264-05	15-05A	SE	6	59N	31W	-	-
270	0	4648					107	2-97	NE	23	60N	33W	-	-
663	0	656/4657/5008/4621					107	286A	N	23, 24	60N	33W	-	-

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Dekalb	175	2/25/2005	3/9/2005	1584	443.28	2.53	2.53	15.7	0.67	0	16	Soybeans	Milo
Dekalb	175	3/1/2005	3/9/2005	1120	313.38	1.790743	1.79	15.7	0.49	0	16	Soybeans	Milo
Dekalb	20	8/2/1999	8/5/1999	363.66	144.3	7.22	7.22	18.7	12.83	--	--	Grass/Hay	Grass/Hay
Dekalb	70	5/15/1999	5/24/1999	911.34	367.91	5.26	5.26	15.3	6.31	--	--	Pasture	Grass/Hay
Andrew	15	9/15/1998	9/16/1998	143	68.78	4.585333	4.59	22	22.47	0	0	Pasture	s Pasture
Dekalb	86	8/3/1992	8/6/1992	525	193.78	2.25	-	15.8	4.05	0	0	-	Pasture
Buchanan	60	4/11/1988	5/2/1988	1064	356.76	5.95		14.6	17.85	0	0	0	Milo
Buchanan	20	5/21/1986	5/27/1986	234	90.25	4.51		11.2	21.65	0	0		Corn
Buchanan	25	5/28/1986	6/2/1986	162	59.84	2.39		10.5	11.47	0	0		Corn
Buchanan	25	4/17/1985	4/26/1985	230	65.64	2.63		0	7.36	0	0		Corn
Buchanan	15	3/12/1984	4/24/1984	260	77.69	5.18			102.56	0	0		Milo
Buchanan	20	4/17/1984	4/18/1984	85.5	26	1.3			25.34	0	0		Milo
Buchanan	24	4/6/1984	5/14/1984	620.5	181.25	7.25			143.55	0	0		Milo
Buchanan	15	4/29/1983	3/30/1984	640	226	7.02		17.48	251.81	0	0		Milo
Buchanan	20	4/29/1983	4/17/1984	617	415	5.32		16.28	141.64	0	0		Milo
Buchanan	25	4/29/1983	6/3/1983	887	265	6.38		15.77	188.86	0	0		Milo
Clinton	50	7/31/2007	8/14/2007	267.6	87.08	1.74	6.64	15.3	0.2	89.2	0	Grass	Grass
Clinton	30	8/14/2007	8/18/2007	423.7	0	0	0	18.5	0	0	0	Grass	Grass
Clinton	50	8/6/2007	8/11/2007	735.9	212.6	4.25	4.25	15	1.31	22.3	0	Grass	Grass
Dekalb	28	4/9/2005	4/12/2005	374.64	103.66	3.702143	9.84	22.9	1.02	0	15.61	Brome	Brome
Dekalb	30	4/6/2005	4/8/2005	452.69	125.26	4.175333	9.59	19.1	1.15	0	15.61	Brome	Brome
Dekalb	20	4/16/2004	4/19/2004	432.15	122.86	6.143	6.14	13.9	0.17	24.51	16.77	Brome	Brome
Dekalb	25	4/20/2004	4/23/2004	476.01	135.33	5.4132	5.41	13.4	0.15	24.51	16.77	Brome	Brome
DeKalb	35	5/26/2007	5/31/2007	560.4	168.51	4.81	4.81	15.8	1.18	23.35	0	Brome	Brome
DeKalb	31	6/1/2007	6/4/2007	514.14	155.53	5.02	14.61	13.5	1.26	23.37	0	Brome	0
DeKalb	25	8/7/2008	8/9/2008	310.7	93.4	3.74	13.58	20.9	3.09	23.9	0	Grass	0
DeKalb	25	8/2/2008	8/7/2008	382.4	114.95	4.6	19	21	3.81	23.9	0	Brome	0
Dekalb	40	4/1/2005	4/5/2005	620.49	171.69	4.29225	4.29	19.1	1.19	0	15.91	Grass Hay	Grass Hay
Dekalb	30	7/5/1994	7/5/1994	208	91.29	3.043	3.04	17.2	3.1	0	0	Hay	Brome
Andrew	19	9/5/2006	9/8/2006	347.85	99.76	5.250526	5.25	14.7	1.16	23.19	0	Grass Pastu	ass Pastu
Dekalb	33	5/14/2002	5/18/2002	416	119.81	3.630606	10.22	15.1	0.56	0	16	GR_Pasture	GR Hay
Dekalb	33	12/9/2002	12/13/2002	748.68	193.38	5.86	5.86	12.2	0.74	25.11	15.97	Soybeans	Soybeans
Dekalb	36	12/14/2002	12/19/2002	803.52	207.55	5.765278	5.77	12.1	0.72	25.11	0	Soybeans	Soybeans
Dekalb	8	12/20/2002	12/21/2002	225.99	58.37	7.29625	7.3	13.8	0.92	25.11	0	Brome	Brome
Dekalb	30	6/9/1999	6/14/1999	523.2	197.77	6.59	6.59	14.5	10.51	--	--	Grass/Hay	Grass/Hay
Dekalb	35	4/24/2003	4/29/2003	622.44	169.12	4.832	15.05	13.4	1.63	0	15.96	Grass Pasture	s Pasture
Dekalb	52	2/22/1999	2/27/1999	429.3	179.53	3.45	3.45	12.2	7.11	--	--	CRP	Corn
Dekalb	23	3/3/1999	3/4/1999	244.46	90.94	3.95	3.95	15.6	9.25	--	--	Grass/Hay	Grass/Hay
Dekalb	17	3/2/1999	3/3/1999	172.56	64.19	3.78	3.78	15.4	8.84	--	--	Corn	Corn
Dekalb	16.7	3/1/1999	3/1/1999	215.7	80.24	4.8	4.8	15.8	11.24	--	--	Corn	Corn
Dekalb	80	10/10/1996	11/12/1996	1157	444.29	5.553625	5.55	17.9	4.6	0	0	Hay	s Pasture
Clinton	160	10/4/1993	11/23/1993	2015	1026.84	6.42	8.14	14.4	15.41	0	0	Corn	Beans

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Clinton	240	9/29/1992	10/9/1992	945	412.59	1.72	-	13.1	2.06	0	0	-	Wheat
Buchanan	16	4/11/1986	5/20/1986	279	101.33	6.33		13.8	48.11	0	0		Milo
Buchanan	16	4/8/1985	4/16/1985	300	84.99	5.31		14.13	14.84	0	0		Milo
DeKalb	120	6/11/2007	6/27/2007	1916.34	579.69	4.83	4.83	6.6	1.21	23.37	0	Grass	Grass
DeKalb	47	7/9/2007	7/16/2007	758.2	246.72	5.25	5.25	18.1	0.61	22.3	0	Grass	Grass
Dekalb	405	1/28/1998	2/2/1998	598	196.86	0.486074	29.22	20.6	1.49	0	0	So_Corn	Corn
Dekalb	15	6/23/1998	6/25/1998	143	64.91	4.33	4.33	11.7	25.62	0	0	Grass_Pasture	s Pasture
Dekalb	7.3	5/6/1998	6/25/1998	221	101.3	13.88	13.88	14.1	74.24	0	0	Pasture	s Pasture
Dekalb	30	6/11/1998	6/29/1998	299	135.72	4.523667	4.52	16.2	26.78	0	0	Grass_Pasture	s Pasture
Dekalb	95	2/3/1998	6/1/1998	4056	168.08	17.75	17.75	14.4	46.22	0	0	North_Farm	Soybeans
Dekalb	60	11/10/2000	12/6/2000	1301.82	359.11	5.99	34.08	21.2	12.54	0	16.69	Brome Hay	rome Hay
Dekalb	80	10/23/2000	11/3/2000	1669	391.88	4.9	15.15	16.6	10.68	0	16.69	Brome Hay	rome Hay
Dekalb	40	11/4/2000	11/9/2000	634.22	146.7	3.67	13.92	16.6	11.37	0	16.69	Corn	Corn
Dekalb	79	11/20/2000	12/4/2000	1752.45	483.41	6.12	26.17	14.4	12.82	0	16.69	Grass Hay	Grass Hay
Dekalb	150	9/26/2000	10/21/2000	2731.45	655.27	4.37	4.37	17.4	6.19	23.75	16.73	Soybeans	Soybeans
Dekalb	22	7/6/1999	7/9/1999	209.99	86.94	3.95	3.95	15.7	9.01	--	--	Alfalfa	Alfalfa
Dekalb	23	7/5/1999	7/6/1999	362.71	150.16	6.53	6.53	18.2	14.89	--	--	Grass/Hay	Grass/Hay
Dekalb	75	4/3/1997	5/1/1997	1196	446.11	5.95	12.95	20.2	7.82	0	0	Corn	Milo
Dekalb	39.4	2/24/1997	3/4/1997	572	219.99	5.58	28.19	16.9	8.82	0	0	Hay/Homeplace	Grass
Dekalb	100	2/18/1997	3/26/1997	884	339.99	3.4	30.26	14.5	4.14	0	0	CPR-East	Grass
Dekalb	70	2/3/1997	3/19/1997	1287	494.98	7.07	26.37	13.9	8.35	0	0	Corn-S-East	Corn
Dekalb	50	3/27/1997	4/2/1997	364	137.3	2.74	22.04	13	3.59	0	0	North Corn	Corn
Dekalb	105	9/22/1997	10/21/1997	2440	944.28	8.77	14.32	16.2	17.41	0	0	South Homeplace	Grass
Dekalb	141.3	8/14/1997	9/19/1997	2587	1042.3	7.38	10.25	18.7	13.18	0	0	CRP	Grass
Dekalb	150	3/5/1997	3/11/1997	494	187.87	1.25	21.28	18.3	1.54	0	0	East Corn	Corn
Dekalb	199	1/6/1997	2/17/1997	2886	1107.65	5.57	19.41	20.5	6.8	0	0	East Pasture	Corn
Dekalb	77	4/14/1997	4/21/1997	780	291.88	3.79	20.31	14.7	5.26	0	0	CRP-East	Soybeans
Dekalb	77	4/22/1997	4/25/1997	325	121.62	1.58	22.57	14.7	2.19	0	0	CRP-N of House	Soybeans
Dekalb	80	2/22/1993	3/1/1993	1020	374.95	4.69	17.81	11.4	5.18	0	0	Corn	0
Dekalb	728	2/17/1993	10/1/1993	8960	3440.64	4.73	16.52	15.1	8.4	0	0	CRP	0
Dekalb	80	11/9/1993	12/1/1993	923	405.47	5.07	17.81	12.6	10.14	0	0	Corn	0
Dekalb	50	12/20/1993	12/20/1993	156	59.31	1.19	16.52	20.9	2.14	0	0	Hay	0
Dekalb	40	12/6/1993	12/9/1993	494	193.15	4.83	4.83	10.4	7.73	0	0	0	0
Dekalb	565	1/6/1992	2/21/1992	2850	1250.58	2.21	-	18.6	1.77	0	0	-	Grass
Dekalb	80	1/3/1992	1/4/1992	225	105.64	1.32	-	16.7	1.06	0	0	-	Grass
Dekalb	565	5/8/1991	12/31/1991	3565	1459.15	2.58		18.6	4.64	0	0	0	Grass
Dekalb	240	11/5/1991	11/15/1991	1560	593.42	2.47		17.1	2.96	0	0	0	Hay
Dekalb	40	12/17/1991	12/17/1991	180	69.16	1.73		16.9	3.81	0	0	0	Hay
Dekalb	80	12/2/1991	12/23/1991	1515	538.58	6.73		16.7	18.84	0	0	0	Grass
Dekalb	111	5/23/2006	6/12/2006	2149	602.39	5.43	5.43	16.1	1.31	24.5	14	Clover	Clover
Dekalb	33	6/12/2006	6/19/2006	797.94	224.7	6.809091	6.81	16.1	1.63	24.18	0	Clover	Clover
Dekalb	150	6/20/2006	7/29/2006	3240.12	917.93	6.12	40.2	17.6	1.4	24.18	0	Brome Hay	rome Hay

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Dekalb	137.8	8/19/1990	8/19/1990	144	48.2	0.35		18.3	1.89	0	0	0	Hay
Dekalb	505	8/20/1990	9/4/1990	2043	634.76	1.26		14.7	5.8	0	0	0	Hay
Dekalb	160	9/19/1996	9/30/1996	650	244.27	1.526688	23.1	9.8	2.67	0	0	CRP	Corn
Dekalb	40	7/22/1996	7/26/1996	390	150.38	3.7595	26.86	18.3	10.23	0	0	Alfalfa	Alfalfa
Dekalb	177	7/29/1996	8/14/1996	975	371.18	2.097062	2.87	18.3	4.48	0	0	South Hay	s Pasture
Dekalb	40	11/16/1994	11/22/1994	572	196.42	4.9105	9.74	13.5	7.1	0	0	Not Identified	Corn
Dekalb	45	3/3/1995	11/27/1995	1183	448.16	9.961333	17	15.6	10.84	0	0	Soybeans	Corn
Dekalb	40	12/11/1995	12/22/1995	637	243.65	6.09125	22.61	18	6.97	0	0	Idle	rome Hay
Dekalb	80	2/13/1995	11/20/1995	2370	913.22	11.41525	53.43	17	13.63	0	0	W Corn	ss (Corn)
Dekalb	150	7/24/1995	8/22/1995	1937	757.37	5.049133	5.05	16.8	7.13	0	0	Corn	Corn
Dekalb	70	11/13/1995	11/20/1995	481	194.32	2.776	19.2	12.9	3.13	0	0	Brome Hay	rome Hay
Dekalb	141.3	2/28/1995	3/7/1995	286	109.48	0.776454	0.77	15.7	0.76	0	0	Brome Hay	rome Hay
Dekalb	77	1/11/1995	2/27/1995	897	344.54	4.474545	20.97	16.5	4.64	0	0	Brome	rome Hay
Dekalb	177	6/26/1995	12/15/1995	871	344.13	1.944237	.46, 22.93	18	2.4	0	0	CRP	Grass
Dekalb	160	9/27/1995	11/3/1995	1469	562.19	3.513688	20.03	13.6	6.48	0	0	Brome	rome Hay
Dekalb	35	11/28/1995	12/7/1995	624	245.36	7.010286	7.01	13.1	7.96	0	0	Soybeans	Corn
DeKalb	25	8/20/2007	8/23/2007	312.2	90.19	3.61	3.61	16.9	1.11	22.3	0	Grass Hay	Grass Hay
DeKalb	91.5	6/28/2007	7/27/2007	1471.8	462.07	5.05	5.05	16	0.92	22.3	0	Grass	Grass
DeKalb	110	5/19/2008	1/0/1900	1671.7	512.21	4.66	14.92	20.6	1.36	22.9	0	Brome	0
DeKalb	110	6/3/2008	6/4/2008	160.3	48.76	0.44	10.7	20.6	0.13	22.9	0	Brome	0
DeKalb	50	5/28/2008	1/0/1900	595.4	182.43	3.65	15.71	19.9	1.07	22.9	0	Grass Hay	0
DeKalb	50	6/2/2008	6/2/2008	229	69.66	1.39	13.45	19.9	0.41	22.9	0	Grass Hay	0
DeKalb	80	7/17/2008	7/28/2008	1266.7	378.24	4.73	4.73	15.9	2.23	23.9	0	Wheat	0
DeKalb	32	7/28/2008	1/0/1900	382.4	114.18	3.57	3.57	20.1	1.74	23.9	0	Wheat	0
DeKalb	32	8/1/2008	8/1/2008	95.6	28.74	0.9	0.9	20.1	0.74	23.9	0	Wheat	0
DeKalb	36	6/5/2008	6/12/2008	526.7	160.22	4.45	49.7	20.3	1.29	22.9	0	Grass	0
Dekalb	86.8	7/21/2007	8/20/2007	1204.2	387.78	4.47	4.47	14.6	0.95	0	0	Brome Hay	rome Hay
Dekalb	112	10/23/1997	12/12/1997	2440	910.63	8.13	26.32	17.5	13.75	0	0	Homeplace	Corn
Dekalb	50	12/24/1992	2/1/1993	1020	368.83	7.38	10.47	15.1	4.43	0	0	Hay	0
Dekalb	79	1/13/1993	1/25/1993	1560	606.84	7.68	10.14	9.9	2.61	0	0	0	0
Dekalb	78	1/26/1993	2/9/1993	1200	413.04	5.29	5.29	16.6	3.15	0	0	0	0
Dekalb	76	10/20/1993	10/29/1993	1157	504.91	6.64	6.64	16.4	20.98	0	0	CRP	0
Dekalb	112	12/24/1992	2/15/1993	858	346.55	3.09	10.47	15.9	10.51	0	0	0	0
Dekalb	79	12/10/1993	12/16/1993	585	194.1	2.46	10.14	10.6	5.41	0	0	Corn	0
Dekalb	112	1/2/1996	1/25/1996	1703	633.01	5.651875	18.19	22.4	6.94	0	0	Corn	Corn
Dekalb	80	1/10/1994	1/13/1994	416	174.01	2.175125	2.18	17.5	7.27	0	0	Brome	Brome
Dekalb	112	1/5/1994	1/7/1994	208	87.01	0.776875	2.59	15.9	2.59	0	0	Grass	Grass
Dekalb	79	1/3/1994	1/4/1994	195	81.57	1.032532	11.17	10.6	3.45	0	0	Soybeans	Corn
Dekalb	102	1/14/1994	12/14/1994	2496	935.24	9.173627	19.77	20.1	20.32	0	0	Soybeans	Corn
Dekalb	79	11/1/1994	11/15/1994	1261	433.03	5.481392	16.87	13.2	7.93	0	0	Not Identified	Corn
Dekalb	76	1/2/1995	1/10/1995	650	241.74	3.180789	12.69	13.1	3.8	0	0	Hay	Hay
Dekalb	112	12/26/1995	12/29/1995	377	144.2	1.2875	12.54	22.4	1.47	0	0	Brome Hay	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Dekalb	76	12/22/1994	12/30/1994	598	217.91	2.87	9.51	13.1	4.93	0	0	Hay	Hay
Buchanan	65	7/9/1991	7/19/1991	705	334.73	5.15		13.9	10.3	0	0	0	b (Wheat)
Buchanan	92	7/22/1991	8/16/1991	1695	734.1	7.98		19	12.77	0	0	0	b (Wheat)
Buchanan	65	1/24/1990	2/19/1990	887	262.73	4.04		11.7	7.27	0	0	0	b (Beans)
Buchanan	100	2/20/1990	3/16/1990	1447	441.19	4.41		12	9.7	0	0	0	n (Beans)
Buchanan	70	7/10/1990	7/31/1990	1040	335.82	4.8		12.7	15.36	0	0	0	Wheat
Buchanan	100	5/19/1989	6/9/1989	1141	340.47	3.4		13.4	14.28	0	0	0	ns (Corn)
Buchanan	70	7/12/1989	7/26/1989	864	261.96	3.74		7.3	10.47	0	0	0	Wheat
Buchanan	92	7/31/1989	8/7/1989	576	192.56	2.09		16	8.78	0	0	0	Wheat
Dekalb	90	9/17/2003	9/30/2003	1432.32	370.54	4.117111	4.12	18.8	0.44	24.39	16.59	Brome	Brome
Buchanan	44	11/30/2002	12/2/2002	477.09	126.48	2.874545	8.09	15.7	0.63	25.11	0	Soybeans	Corn
Buchanan	23	2/18/2002	2/22/2002	533.94	156.82	6.818261	22.53	14.3	0.9	0	16.18	Brome_Hay	ome_Hay
Buchanan	4	12/3/2002	12/3/2002	100.44	25.94	6.485	29.02	13.3	0.81	25.11	0	Brome	Brome
Buchanan	12	3/19/2001	3/20/2001	281.86	77.34	6.45	15.71	14.1	5.81	0	16.58	Brome Hay	rome Hay
Buchanan	40	1/22/2000	1/25/2000	492.8	208.75	5.22	5.22	14.5	4.2	0	17.6	Soybeans	Corn
Buchanan	15	3/3/2000	3/4/2000	299.2	138.83	9.26	9.26	14.4	3.98	0	17.6	Brome Hay	rome Hay
Buchanan	18	4/7/1999	4/7/1999	90	35.95	2	2	12	2.89	--	--	Grass/Pasture	s/Pasture
Dekalb	50	4/8/1999	4/9/1999	230.08	91.89	1.84	1.84	15.4	2.66	--	--	Grass/Hay	Grass/Hay
Buchanan	20	2/23/2004	2/26/2004	483.14	134.12	6.706	35.73	13.3	0.82	0	16.66	Brome	Brome
Buchanan	30	4/7/2007	4/11/2007	502.04	150.01	5	13.09	14.2	1.17	22.82	0	Soybeans	Corn
Buchanan	6	9/8/1999	9/9/1999	133.05	54.82	9.14	9.14	15.4	14.44	--	--	Hay	Hay
Buchanan	60	5/10/1989	6/20/1989	696	205.18	3.42		17	13	0	0	0	Wheat
Dekalb	30	5/9/2006	5/13/2006	541.44	151.33	5.044333	14.96	16.6	1.22	24.8	14.98	Grass Hay	Grass Hay
Dekalb	55	4/27/2006	5/8/2006	1165.6	326.75	5.94	20.9	17.6	1.44	24.8	0	Grass Hay	Grass Hay
Dekalb	30	5/16/2006	5/22/2006	630.32	176.17	5.872333	10.6	6.7	1.42	24.8	14.98	Grass Hay	Grass Hay
Dekalb	92	4/13/2005	4/25/2005	1467.34	406.01	4.413152	9.92	15.6	1.22	0	15.61	Grass	Grass
Dekalb	52	4/26/2005	5/4/2005	889.77	246.2	4.73	4.73	17.1	1.31	0	15.61	Grass	Grass
Dekalb	73	4/23/2004	5/6/2004	1415.19	402.48	5.513425	5.51	13.6	0.27	24.49	16.91	Grass Hay	Grass Hay
DeKalb	80	5/14/2007	5/25/2007	1330	400.22	5	5	12.5	1.22	23.35	0	Grass	Grass
DeKalb	71.6	3/17/2008	3/22/2008	1133.1	333.24	4.65	9.7	21.8	1.26	25.18	0	Grass	0
Dekalb	20	8/4/1998	8/6/1998	247	111.89	5.5945	13.29	13.3	31.44	0	0	Grass	son Grass
Dekalb	120	7/31/1998	8/22/1998	1157	498.03	4.15	11.85	12.05	16.47	0	0	Grass	son Grass
Dekalb	135.4	4/2/2001	4/4/2001	431.31	115.85	0.86	12.71	15.2	0.94	23.04	16.59	CRP	CRP
Dekalb	22	2/27/1999	2/27/1999	42.6	17.82	0.81	13.71	12	1.67	--	--	CRP	Grass
Dekalb	165	2/19/2003	2/22/2003	546.92	158.28	0.959273	13.67	15.7	0.22	24.86	0	C.R.P.	C.R.P.
Buchanan	45	1/29/2005	2/12/2005	713.46	199.31	4.43	4.43	21.9	1.12	0	15.18	Soybeans	Corn
Buchanan	56.2	12/9/1998	12/14/1998	572	226.51	4.030427	16.73	12	7.1	0	0	Corn	oybeans)
Buchanan	56	2/7/2002	2/18/2002	1035.52	304.13	5.430893	22.16	16.1	0.72	0	16.18	Corn	Corn
Buchanan	38	2/1/2002	2/7/2002	695.74	204.34	5.377368	13.03	13.2	0.71	0	16.18	Corn	Corn
Buchanan	38	11/18/2002	11/21/2002	427.89	116.34	3.061579	16.09	12.9	0.95	25.17	0	Corn	Corn
Buchanan	21	1/29/2002	1/31/2002	359.92	95.41	4.543333	16.74	11	2.41	0	16.36	Soybeans	Soybeans
Buchanan	49	1/19/2002	1/25/2002	834.36	221.19	4.514082	25.82	14	2.39	0	16.36	Corn	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	19	1/26/2002	1/28/2002	327.2	86.74	4.565263	21.31	21.9	2.42	0	16.36	Soybeans	Soybeans
Buchanan	56	11/21/2002	11/27/2002	704.76	191.62	3.421786	13.3	11.4	1.07	25.17	0	Corn	Corn
Buchanan	40	3/6/2002	3/9/2002	369.38	108.49	2.71225	12.44	16.7	0.36	0	16.06	Soybeans	Soybeans
Buchanan	42	12/23/2002	12/27/2002	621.5	160.53	3.822143	13.77	14	0.48	24.86	0	Corn	Corn
Buchanan	34	2/27/2002	3/5/2002	728.1	213.84	6.289412	15.52	14.8	0.83	0	16.18	Corn	Corn
Buchanan	22	3/13/2001	3/14/2001	381.34	104.64	4.76	7.65	15.6	4.29	0	16.58	Soybeans	Corn
Buchanan	16	3/29/2001	3/30/2001	298.44	81.89	5.12	12.2	12.2	4.62	0	16.58	Corn	Corn
Buchanan	16	3/21/2001	3/23/2001	281.86	77.34	4.83	9.88	10.5	4.36	0	15.58	Corn	Corn
Buchanan	50	3/3/2001	3/19/2001	1144.02	313.92	6.28	13.71	10.3	5.66	0	16.58	Brome Hay	rome Hay
Buchanan	40	3/5/2001	3/8/2001	696.36	191.08	4.78	9.73	19.2	4.31	0	16.58	Corn	Soybeans
Buchanan	33.8	3/24/2001	3/28/2001	569.88	163.78	4.85	9.23	14.6	4.37	0	16.58	Soybeans	Corn
Buchanan	89	1/11/2000	1/17/2000	665	281.69	3.17	7.08	18.2	2.54	0	17.5	Corn	Corn
Buchanan	90	1/4/2000	1/11/2000	688.8	283.3	3.15	5.05	17.3	2.53	0	17.6	Corn	Corn
Buchanan	50	2/26/2000	2/29/2000	651.2	288.29	5.77	7.43	13.3	3.11	0	17.6	Brome Pasture	e Pasture
Buchanan	16	1/17/2000	1/18/2000	227.5	96.37	6.02	7.68	11	4.84	0	17.5	Alfalfa	Alfalfa
Buchanan	40	1/18/2000	1/22/2000	472.5	200.15	5	9.95	11	4.02	0	17.5	Soybeans	Corn
Buchanan	20	2/23/2000	2/25/2000	281.6	124.66	6.23	6.23	16.3	3.37	0	17.6	Grass Hay	Grass Hay
Buchanan	33.8	4/25/2000	4/26/2000	384.34	148.05	4.38	4.38	12.7	4.59	0	17.47	Corn	Soybeans
Buchanan	41.3	2/18/1999	2/19/1999	187.33	78.34	1.9	1.9	12.6	3.91	--	--	Corn	Corn
Buchanan	80.5	1/29/1999	2/6/1999	803.04	314.47	3.91	3.91	12	6.62	--	--	Corn	Corn
Buchanan	19	1/12/1999	1/13/1999	169	61.69	3.25	3.25	9.6	4.32	--	--	Corn	Corn
Buchanan	17	1/11/1999	1/11/1999	169	61.69	3.63	3.63	10.8	4.83	--	--	Corn	Corn
Buchanan	40	3/9/1999	3/13/1999	532.06	197.93	4.95	4.95	16.2	11.58	--	--	Corn	Corn
Buchanan	90	3/5/1999	3/9/1999	402.64	149.78	1.66	1.66	9.8	3.89	--	--	Pasture	Pasture
Buchanan	19.5	6/8/1999	6/9/1999	153	57.83	2.97	2.97	13.6	4.73	--	--	Pasture	Pasture
Buchanan	126	2/19/1999	6/9/1999	1844.48	727.2	5.77	5.77	14	9.98	--	--	Corn	Corn
Buchanan	37	12/31/1999	1/4/2000	299.2	106.75	2.89	2.89	14.3	7.21	--	--	Corn	Soybeans
Buchanan	14	2/18/2006	2/22/2006	469.12	129.24	9.231429	12.48	6.8	2.21	0	14.66	Corn	Corn
Buchanan	15	2/14/2006	2/18/2006	454.46	125.2	8.346667	24.44	15.1	2	0	14.66	Corn	Corn
Buchanan	50	2/23/2006	3/6/2006	1348.72	373.71	7.47	9.37	17.5	1.68	0	14.66	Corn	Corn
Buchanan	40	3/13/2006	3/20/2006	826.21	230.18	5.7545	23.5	20.8	1.21	23.24	14.63	Corn	Corn
Buchanan	28	3/7/2006	3/13/2006	703.68	196.05	7.001786	31.35	15.2	1.47	0	14.66	Corn	Corn
Buchanan	94	2/2/2004	2/12/2004	1487.19	412.84	4.391915	26.55	15.7	0.53	0	16.71	Corn	Corn
Buchanan	33	3/8/2004	3/11/2004	549.78	147.62	4.473333	16.91	13.6	1.46	0	16.66	Brome/Fesc	ome/Fesc
Buchanan	40	2/27/2004	3/2/2004	583.1	159.22	3.9805	17.75	17.2	0.89	0	16.66	Corn	Corn
Buchanan	30	3/3/2004	3/6/2004	483.14	129.72	4.324	24.35	13.3	1.41	0	16.66	Corn	Corn
Buchanan	57	12/28/2002	1/14/2003	1001.5	265.75	4.66	18.37	13.7	1.13	24.86	15.98	Brome	Brome
Buchanan	33	1/6/2003	1/9/2003	546.92	148.98	4.514545	20.03	10.5	1.62	24.86	0	Corn	Corn
Buchanan	50	3/17/2007	3/24/2007	820.04	242.49	4.85	14.22	23.2	1.2	24.28	14.52	Corn	Corn
Buchanan	40	3/24/2007	3/30/2007	679.84	201.03	5.03	21.94	15.4	1.24	24.28	0	Corn	0
Buchanan	105	3/25/1993	5/4/1993	3402	1336.99	12.7	12.7	14.1	11.19	0	0	Corn	Corn
Buchanan	25	9/18/2000	9/23/2000	502.5	121.35	4.85	4.85	13.6	7.64	0	16.75	Clover Grass	ver Grass

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	48	10/15/2002	10/19/2002	373.95	100.44	2.0925	14.68	14.8	0.66	24.93	0	Pasture	Pasture
Buchanan	40	10/8/2002	10/14/2002	623.25	167.4	4.185	4.19	14.2	1.32	24.93	0	Pasture	Pasture
Buchanan	48	10/21/2002	10/26/2002	734	197.15	4.107292	11.67	18.3	1.3	25	15.9	Pasture	Pasture
Buchanan	40	10/28/2002	10/31/2002	634	170.29	4.25725	7.56	17.2	1.34	0	15.85	Pasture	Pasture
Buchanan	183	12/6/2001	1/5/2002	329.6	87.38	0.477486	4.31	14.3	0.25	0	16.48	Soybeans	Corn
Buchanan	17	11/1/2002	11/2/2002	221.9	60.33	3.548824	3.55	18.8	1.11	0	15.85	Pasture	Pasture
Buchanan	26	10/23/2001	11/2/2001	819.3	199.87	7.69	12.59	14.8	6.63	23.9	16.6	Clover Grass	ver Grass
Buchanan	45	9/4/2001	9/22/2001	1038.24	247.2	5.49	9.79	17.3	0.6	0	16.48	GR/Pasture	R/Pasture
Buchanan	58	2/7/2001	2/14/2001	913.55	237.16	4.09	4.09	13.1	2.17	0	16.61	Soybeans	Corn
Buchanan	133	2/14/2001	3/2/2001	2292.18	612.01	4.6	4.6	15	2.58	0	16.61	Soybeans	Corn
Buchanan	107	9/24/2001	10/22/2001	1449.5	353.32	3.3	3.3	14.7	1.9	23.9	16.6	Grass Pasture	s Pasture
Buchanan	6.3	3/28/2000	3/28/2000	105.6	49	7.78	7.78	14.4	3.34	0	17.6	Alfalfa	Alfalfa
Buchanan	90.8	3/29/2000	4/6/2000	1048.2	445.07	4.9	4.9	13.5	3.62	0	17.47	Brome Hay	rome Hay
Buchanan	100	8/11/2000	9/1/2000	1596.95	382.63	3.83	3.83	13.8	5.61	0	16.81	Grass Hay	Grass Hay
Buchanan	40	8/18/2000	8/22/2000	722.83	171.82	4.3	4.3	14.6	5.82	0	16.81	Grass Pasture	s Pasture
Buchanan	131	10/31/2006	11/20/2006	2325.76	677.13	5.17	14.88	14.8	1.26	25.28	0	Soybeans	Corn
Buchanan	150	1/6/2006	1/27/2006	2899.2	794.67	5.2978	15.16	15.6	1.29	0	15.1	Soybeans	Corn
Buchanan	50	10/11/2006	10/20/2006	906.36	260.85	5.217	20.38	19	1.14	23.24	0	Soybeans	Corn
Buchanan	19	1/27/2005	1/28/2005	303.6	84.64	4.454737	4.45	17.5	1.13	0	15.18	Soybeans	Corn
Buchanan	21	8/31/2004	9/2/2004	400.32	107.29	5.109048	19.79	12.5	5.23	0	16.68	Brome	Brome
Buchanan	30	9/3/2004	9/9/2004	650.52	169.79	5.659667	9.47	15.1	5.66	0	16.68	Brome	Brome
Buchanan	55	1/12/2004	1/19/2004	1002.6	286.74	5.213455	9.4	19.7	1.67	0	16.71	Soybeans	Corn
Buchanan	60	9/10/2004	9/20/2004	1155.21	301.51	5.025167	14.82	15.3	5.03	24.21	16.68	Brome	Brome
Buchanan	40	12/3/2004	12/8/2004	747.45	208.24	5.206	9.3	15.3	0.84	0	16.61	Soybeans	Corn
Buchanan	140	11/12/2004	12/11/2004	2491.43	714.92	5.106571	5.11	17.5	0.85	23.24	16.61	Soybeans	Corn
Buchanan	157	12/11/2003	1/10/2004	3183.97	871.13	5.55	9.86	18.3	1.29	0	16.67	Soybeans	Corn
Buchanan	30	9/21/2004	9/25/2004	561.04	146.43	4.881	4.88	24.2	4.88	23.85	16.63	Brome	Brome
Buchanan	157	12/11/2003	1/10/2003	3183.97	871.13	5.55	9.86	18.3	1.29	0	16.67	Soybeans	Corn
Buchanan	64	10/1/2007	10/9/2007	1052.42	336.04	5.25	5.25	20.7	1.46	22.93	14.5	Corn	Corn
Buchanan	75	10/10/2007	10/22/2007	1195.5	381.72	5.09	5.09	21.4	1.42	23.91	0	Soybeans	Corn
Buchanan	18	10/25/2007	10/27/2007	286.92	91.61	5.09	5.09	22.7	1.42	23.91	0	Soybeans	Corn
Dekalb	86	7/23/1998	7/30/1998	520	212	2.465116	4.72	13.1	5.72	0	0	Season_Grass	son Grass
Buchanan	205	7/19/2000	7/22/2000	372.68	89.26	0.44	0.44	13.2	0.28	0	16.94	Grass Legumes	Legumes
Dekalb	35	4/10/1999	4/16/1999	186.94	74.66	2.13	6.85	14.9	3.09	--	--	CRP	Grass
DeKalb	30	6/9/2008	6/11/2008	435.1	132.36	4.41	11.25	16.6	1.28	22.9	0	Brome Hay	0
Buchanan	60	11/27/1989	12/26/1989	1340	384.04	6.4		11.4	19.2	0	0	0	lo (Beans
Dekalb	80.7	2/8/1996	2/16/1996	741	301.59	3.737175	12.41	11	2.29	0	0	Corn	Corn
Dekalb	120	1/26/1996	2/7/1996	624	242.99	2.024917	3.05	16.8	1.87	0	0	NE Corn	Corn
Dekalb	34	1/23/1995	1/31/1995	793	294.92	8.674118	8.67	14.1	10.36	0	0	Soybeans	Corn
Dekalb	120	2/1/1995	2/6/1995	312	123.61	1.030083	1.03	16.8	0.91	0	0	Soybeans	Corn
Dekalb	35	2/7/1995	2/10/1995	494	195.72	5.592	5.59	13.4	4.93	0	0	Soybeans	Corn
Andrew	40	12/18/1990	12/21/1990	495	153.8	3.84		13.2	10.75	0	0	0	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	12	9/2/2000	9/6/2000	386.4	93.32	7.78	7.78	11.2	12.24	0	16.8	Clover Grass	ver Grass
Buchanan	70	9/7/2000	9/16/2000	954.75	230.57	3.29	3.29	15.8	5.18	0	16.75	Alfalfa Grass	alfa Grass
Buchanan	55	1/28/2006	2/4/2006	890.9	244.82	4.45	8.89	16.9	1.07	0	15.1	Soybeans	Corn
Buchanan	64	1/10/2005	1/17/2005	1020	284.38	4.443438	4.44	14.8	1.13	0	15	Soybeans	Corn
Buchanan	60	1/18/2005	1/26/2005	986.7	275.09	4.584833	4.58	16.4	1.17	0	15.18	Soybeans	Corn
Buchanan	85	12/22/2004	1/8/2005	1530	426.26	5.01	5.01	15.8	0.81	0	15	Soybeans	Corn
Andrew	100	6/23/2000	7/2/2000	2288.44	629.21	6.29	6.29	16	5.72	25	17.48	Corn	er Wheat
Andrew	10.5	9/10/1999	9/11/1999	177.4	73.09	6.96	6.96	16.4	11	--	--	Hay/Pasture	s/Pasture
Andrew	22	9/23/1999	9/25/1999	228.15	94	4.27	4.27	15.1	6.75	--	--	Soybeans	Soybeans
Andrew	27	9/18/1999	9/21/1999	487.95	201.04	7.45	7.45	12.3	11.76	--	--	Hay/Pasture	y/Pasture
Andrew	28	9/22/1999	9/22/1999	76.05	31.33	1.12	1.12	12.6	1.77	--	--	Grass	Grass
Andrew	49	12/27/1999	12/31/1999	440	156.99	3.2	3.2	13.5	8.01	--	--	Corn	Corn
Andrew	43	8/17/2006	8/25/2006	912.6	260.82	6.065581	6.07	9.2	1.32	23.4	0	Winter Whe	Soybeans
Dekalb	4	4/5/2001	4/5/2001	85.71	23.02	5.76	5.76	14.1	6.33	23.04	16.59	Grass Hay	Grass Hay
Andrew	30	8/7/1992	8/11/1992	375	143.81	4.79	-	16.2	6.71	0	0	-	ver/Grass
Andrew	187	8/12/1992	8/28/1992	1215	484.91	2.59	-	17.2	2.59	0	0	-	Pasture
Andrew	80	5/21/1990	5/23/1990	364	109.67	1.37		17.9	5.84	0	0	0	n (Beans)
Andrew	190	5/29/1990	6/22/1990	1014	299.64	1.58		17.2	4.74	0	0	0	n (Beans)
Andrew	45	7/22/1994	7/26/1994	273	119.82	2.66	5.25	17.9	2.72	0	0	Brome	Brome
Buchanan	58	9/18/2002	9/27/2002	941.7	277.52	4.784828	11.37	12.4	1.67	24.9	15.96	Brome	Brome
Buchanan	25	9/16/2002	9/18/2002	296.4	87.35	3.49	8.93	13.3	1.22	24.7	16	Brome	Brome
Buchanan	40	9/28/2002	10/7/2002	922.41	259.8	6.49	6.49	17.2	2.16	24.93	0	Brome	Brome
Buchanan	59	8/6/2001	9/1/2001	1928.16	463.53	7.86	7.86	12.8	10.9	0	16.48	Brome Hay	rome Hay
Buchanan	38.1	12/28/2000	1/3/2001	751.05	210.07	5.51	5.51	15.2	13.86	0	16.69	Soybeans	Corn
Buchanan	75	1/4/2001	1/12/2001	1264.64	302.25	4.03	4.03	16.5	15.87	0	16.64	Corn	Soybeans
Buchanan	75	7/5/2001	7/28/2001	2156.26	494	6.59	6.59	12.8	7.69	0	16.46	Brome Hay	rome Hay
Buchanan	25	7/30/2001	8/4/2001	576.8	136.07	5.44	5.44	11.4	7.35	0	16.48	Brome Hay	rome Hay
Buchanan	165	11/3/2001	12/5/2001	2892.9	701.53	4.25	4.25	15.7	2.88	23.9	16.6	Soybeans	Corn
Buchanan	211.7	3/13/2000	4/18/2000	2428.33	1031.07	4.87	4.07	15.3	3.6	0	17.47	Brome Hay	rome Hay
Buchanan	45	12/7/2000	12/13/2000	867.88	278.07	6.18	6.18	12.4	6.74	0	16.69	Soybeans	Soybeans
Buchanan	90	12/14/2000	12/28/2000	1685.69	540.1	6	6	12.5	6.54	0	16.69	Corn	Corn
Buchanan	38.1	12/28/2000	1/3/2001	751.05	210.07	5.51	5.51	15.2	13.86	0	16.69	Corn	Corn
Buchanan	45	10/21/2006	10/30/2006	766.92	220.72	4.904889	22.29	15.6	1.07	23.24	0	Soybeans	Corn
Buchanan	119	11/20/2006	12/9/2006	2094.6	613.08	5.15	19.32	19.8	1.4	23.64	14.98	Soybeans	Corn
Buchanan	59	12/11/2006	12/18/2006	1134.72	333.15	5.64661	5.65	15.2	1.54	23.64	0	Soybeans	Corn
Buchanan	60	9/16/2005	9/27/2005	1074.5	298.71	4.9785	12.84	12.7	1.41	0	15.35	Brome	Brome
Buchanan	70	2/1/2005	2/7/2005	1045.84	292.73	4.181857	15.55	16.2	1.06	0	15.38	Brome	Brome
Buchanan	60	9/28/2005	10/7/2005	1013.1	281.79	4.696	20.25	14.5	1.35	0	15.35	Brome	Brome
Buchanan	40	10/8/2005	10/13/2005	598.65	166.6	4.165	4.17	14.3	1.21	0	15.35	Brome	Brome
Buchanan	120	10/22/2005	11/9/2005	2112.18	585.48	4.879	9.13	17.6	1.43	0	14.98	Soybeans	Corn
Buchanan	55	10/14/2005	10/21/2005	823.9	229.29	4.168909	4.17	13	1.22	0	14.98	Soybeans	Corn
Buchanan	95	10/20/2004	11/9/2004	1635.34	482.75	5.081579	9.95	14.5	1.21	23.35	16.58	Soybeans	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	45	10/13/2004	10/19/2004	774.44	228.54	5.078667	17.39	13.6	1.54	23.75	16.63	Soybeans	Corn
Buchanan	25	9/27/2004	9/29/2004	520.56	135.87	5.4348	16.01	16.2	5.43	23.85	16.63	Corn	Soybeans
Buchanan	80	9/30/2004	10/13/2004	1570.24	436.61	5.457625	14.17	17.9	3.56	23.75	16.63	Corn	Soybeans
Buchanan	46	1/20/2004	1/31/2004	1402.17	401.02	8.717826	15.21	13	2.79	24.33	16.71	Brome	Brome
Buchanan	75	10/1/2003	10/17/2003	1830.92	459.38	6.125067	12.31	12.6	1.22	24.32	16.79	Brome	Brome
Buchanan	57	11/11/2003	11/21/2003	1135.2	294.92	5.174035	11.17	11.8	2.1	24.17	16.67	Soybeans	Corn
Buchanan	25	10/20/2003	10/23/2003	504.92	126.68	5.0672	10.58	13.7	1.01	24.32	16.79	Soybeans	Corn
Buchanan	96	10/24/2003	11/10/2003	1760.2	449.47	4.681979	8.71	13.7	1.42	24.32	16.79	Soybeans	Corn
Buchanan	45	11/12/2007	11/19/2007	697.19	210.13	4.67	4.67	21.2	1.39	22.49	0	Corn	Corn
Buchanan	46	11/6/2007	11/12/2007	719.68	216.91	4.72	4.72	19.1	1.4	22.49	0	Soybeans	Corn
Buchanan	55	10/29/2007	11/5/2007	832.13	258.05	4.69	4.69	16.4	1.35	22.49	0	Corn	Soybeans
Buchanan	40	11/19/2007	11/28/2007	517.27	155.91	3.9	3.9	12.4	1.16	22.49	0	Soybeans	Corn
Buchanan	22	10/9/2008	10/29/2009	387	101.24	4.6	20.61	14.7	17.37	21.5	0	Soybeans	Corn
Buchanan	122	10/15/2008	11/26/2008	2069.1	185.89	1.52	20.84	15.5	5.75	20.9	0	Soybeans	Corn
Buchanan	150	12/1/2008	12/30/2009	1743	247.11	1.65	1.65	16.7	1.71	21	0	Soybeans	Corn
Buchanan	125	11/29/2007	12/17/2007	1892.6	33.94	0.27	0.27	17.5	0.8	0	0	Soybeans	Corn
Dekalb	80	3/10/2005	3/21/2005	1414.21	395.7	4.94625	15.96	23.7	1.36	0	15.89	Grass Hay	Grass Hay
Dekalb	40	8/25/2004	8/30/2004	716.67	197.08	4.927	9.37	17.4	5.16	24.51	16.68	Grass Hay	Grass Hay
Dekalb	50	4/7/2004	4/15/2004	950.73	270.29	5.4058	11.01	14.1	0.15	24.51	16.77	Grass Hay	Grass Hay
Dekalb	20	4/30/2003	5/3/2003	416	112.01	5.6005	5.6	12.8	1.46	0	16	Grs Hay	Grs Hay
DeKalb	83	6/30/2008	1/0/1900	142.2	43.26	0.52	16.48	16.2	0.15	23.7	0	Brome	0
DeKalb	83	7/2/2008	7/17/2008	1137.6	339.69	4.09	20.05	16.2	1.99	23.7	0	Brome	0
Dekalb	35	6/25/2008	7/1/2008	572.5	173.6	4.96	4.96	14.2	1.93	0	0	Brome	Brome
Buchanan	72	1/25/2000	2/1/2000	980	424.49	5.9	5.9	11.5	3.96	0	17.5	Soybeans	Soybeans
Buchanan	60	2/2/2000	2/7/2000	651.2	288.29	4.8	4.8	12.1	2.59	0	17.6	Corn	Soybeans
Buchanan	100	3/6/1985	5/6/1985	940	281.46	2.81		12.37	64.04	0	0		Milo
Dekalb	78	11/13/1990	11/20/1990	720	227.59	2.92		15.4	6.42	0	0	0	orn (Milo)
Buchanan	80	4/12/1989	4/27/1989	1023	276.01	3.45		20.5	7.59	0	0	0	Corn
Buchanan	80	6/21/1988	6/27/1988	437	126.82	1.59		15.4	5.41	0	0	0	Wheat
Buchanan	55	12/18/2006	12/26/2006	711.72	208.96	3.799273	3.8	18.9	1.04	23.26	16.63	Soybeans	Corn
Dekalb	16	5/11/2002	5/13/2002	224	64.51	4.031875	4.03	18.2	0.62	0	16	GR_Pasture	R_Pasture
Buchanan	70	6/2/1998	6/30/1998	1066	483.85	6.912143	8.81	14.4	40.92	0	0	Milo	Milo
Buchanan	25.1	6/8/1998	6/22/1998	325	147.52	5.88	5.88	13.2	34.79	0	0	Pasture	s Pasture
Buchanan	70	12/14/1998	12/15/1998	169	66.92	0.956	9.77	13.1	1.68	0	0	Milo	Milo
Buchanan	68	11/4/2002	11/9/2002	788.25	214.33	3.151912	9.04	16.4	0.98	25	15.85	Soybeans	Corn
Buchanan	24	11/11/2002	11/12/2002	340.2	92.5	3.854167	20.83	13.9	1.2	25	15.85	Pasture	Pasture
Buchanan	75	1/7/2002	1/18/2002	1302.87	345.39	4.6052	20.75	16.7	2.44	23.91	16.48	Soybeans	Soybeans
Buchanan	46	11/13/2002	11/18/2002	528.57	143.72	3.124348	15.23	11.8	0.97	25.17	0	Corn	Corn
Buchanan	23	2/23/2002	2/26/2002	404.5	118.8	5.165217	23.99	12.8	0.68	0	16.18	Brome Hay	rome Hay
Buchanan	20	12/4/2002	12/7/2002	502.2	129.72	6.486	30.48	10.1	0.81	25.11	0	Brome	Brome
Buchanan	24	7/2/2001	7/3/2001	427.96	98.05	4.09	16.98	13.3	4.77	0	16.46	Grass Pasture	s Pasture
Buchanan	69.1	1/13/2001	1/22/2001	1181.44	282.36	4.09	16.14	16.4	16.09	0	16.64	Soybeans	Soybeans

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	10	3/22/2001	3/31/2001	215.54	59.14	5.91	18.81	11.5	5.33	0	16.58	Brome Hay	rome Hay
Buchanan	42	2/16/2000	2/17/2000	221.91	98.24	2.34	12.11	14.4	1.26	0	17.07	Milo	Milo
Buchanan	22	3/1/2000	3/3/2000	299.2	138.83	6.31	12.91	13	2.71	0	17.6	Grass Hay	Grass Hay
Buchanan	14	3/10/2000	3/11/2000	211.2	98	7	12.89	13.9	3.01	0	17.6	Grass Hay	Grass Hay
Buchanan	65	3/6/2000	3/10/2000	862.4	400.15	6.16	12.05	20.5	2.65	0	17.6	Soybeans	Soybeans
Buchanan	62.5	2/8/1999	2/15/1999	879.78	367.92	5.89	5.89	13.3	12.13	--	--	Corn	Corn
Buchanan	91	7/7/1992	7/15/1992	390	172.19	1.89	-	12.4	2.65	0	0	-	Hay
Buchanan	45	12/26/2005	1/2/2006	837.65	231.17	5.14	22.49	19.1	1.39	0	15.23	Soybeans	Corn
Buchanan	20	12/30/2005	1/5/2006	487.36	133.68	6.68	32.3	15.5	1.8	0	15.23	Corn	Soybeans
Buchanan	40	2/6/2006	2/13/2006	898.53	247.55	6.18875	24.4	18.1	1.48	0	14.73	Soybeans	Corn
Buchanan	30	12/18/2004	12/22/2004	512.12	142.68	4.756	17.35	16.9	0.77	0	16.52	Soybeans	Corn
Buchanan	40	12/13/2004	12/17/2004	677.32	188.7	4.7175	30.04	19	0.76	0	16.52	Corn	Soybeans
Buchanan	45	2/13/2004	2/17/2004	483.14	134.12	2.980444	18.21	14.2	0.36	0	16.66	Corn	Corn
Buchanan	25	2/17/2004	2/21/2004	666.4	184.99	7.3996	37.88	12.3	0.9	0	16.66	Brome	Brome
Buchanan	49	11/24/2003	12/2/2003	668.44	174.13	3.553673	12.59	17	0.98	24.17	16.67	Soybeans	Soybeans
Buchanan	20	12/8/2003	12/9/2003	366.74	95.79	4.7895	25.62	17.8	0.69	0	16.67	Grass	Grass
Buchanan	20	12/3/2003	12/5/2003	350.07	91.44	4.572	25.32	16.3	0.65	0	16.67	Corn	Soybeans
Buchanan	40	1/2/2007	1/8/2007	699.12	208.41	5.21	27.7	17.1	1.36	24.28	14.52	Corn	Soybeans
Buchanan	40	12/27/2006	1/6/2007	607	93.38	2.35	34.63	15.5	0.63	24.28	0	Soybeans	Corn
Buchanan	45	3/31/2007	4/6/2007	730.24	217.91	4.84	29.24	18	1.17	22.82	0	Corn	Soybeans
Buchanan	21	4/12/2007	4/14/2007	342.3	102.28	4.87	42.75	14.7	1.14	22.82	0	Brome Hay	rome Hay
Buchanan	45	5/2/2008	5/7/2008	732.8	224.53	4.99	34.23	18.2	1.46	22.9	0	Soybeans	Corn
Buchanan	40	5/12/2008	5/15/2008	641.2	196.46	4.91	39.54	15.9	1.44	22.9	0	Corn	Soybeans
Buchanan	20	5/16/2008	5/17/2008	274.8	84.2	4.21	34.25	15.4	1.23	22.9	0	Grass Hay	Grass Hay
Buchanan	30	5/7/2008	5/10/2008	480.9	147.35	4.91	47.86	15.9	1.44	22.9	0	Brome Hay	rome Hay
Andrew	35	9/8/1998	9/14/1998	468	225.1	6.431429	6.43	16.3	31.52	0	0	Hay/Pasture	s Pasture
Andrew	40	8/24/1998	9/5/1998	884	412.82	10.3205	10.32	16.6	54.29	0	0	Corn	orn (Oats)
Andrew	20	9/14/1998	9/14/1998	52	25.01	1.2505	1.25	13.5	6.13	0	0	Pasture	s Pasture
Andrew	150.6	12/17/1998	12/31/1998	923	365.51	2.427025	2.43	16.2	4.28	0	0	Corn	Corn
Andrew	138.9	11/2/1999	11/16/1999	1681.92	596.24	4.29	7.78	20	14.6	--	--	Corn	Corn
Andrew	13	10/4/1999	10/4/1999	249.9	97.89	7.53	11.02	18.4	25.42	--	--	Red Clover	Oats
Andrew	29	9/29/1999	10/2/1999	374.85	146.83	5.06	8.55	17.3	19.1	--	--	Pasture	Pasture
Andrew	150.6	1998	1/9/1999	403	147.1	0.98	0.98	16.2	1.3	--	--	Corn	Corn
Buchanan	48	6/18/2001	6/30/2001	1244	330.53	6.89	11.79	10.9	3.84	23.53	16.46	Clover Grass	ver Grass
Buchanan	89.4	1/23/2001	2/2/2001	1611.17	401.66	4.49	4.49	10.2	10.04	0	16.61	Soybeans	Corn
Buchanan	41.3	2/3/2001	2/6/2001	631.18	163.85	3.97	3.97	13.2	2.1	0	16.61	Soybeans	Corn
Buchanan	16.8	4/7/2000	4/8/2000	157.23	60.56	3.61	3.61	12.3	3.78	0	17.47	Corn	Soybeans
Buchanan	25	4/8/2000	4/12/2000	419.28	161.51	6.46	6.46	14.1	6.77	0	17.47	Brome Hay	rome Hay
Buchanan	70	4/19/2000	4/25/2000	890.97	343.2	4.9	4.9	13.8	5.14	0	17.47	Brome Hay	rome Hay
Buchanan	14	8/1/2000	8/2/2000	203.28	48.32	3.45	3.45	11.3	4.68	0	16.94	Alfalfa	Alfalfa
Buchanan	35	7/24/2000	8/1/2000	1134.98	270.81	7.74	7.74	14.4	7.73	0	16.94	Alfalafa/Grass	ver Grass
Buchanan	17	8/2/2000	8/3/2000	254.1	60.4	3.55	3.55	13.4	4.82	0	16.94	Grass Hay	Grass Hay

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	35	8/4/2000	8/10/2000	1009	239.84	6.85	6.85	12.1	9.29	24	16.82	Clover Grass	ver Grass
Andrew	100	8/29/1992	9/12/1992	1140	490.43	4.9	-	18.5	4.9	0	0	-	Pasture
Andrew	50	9/14/1992	9/16/1992	270	119.58	2.39	-	19.6	3.82	0	0	-	Corn
Andrew	200	5/1/1990	5/8/1990	585	163.57	0.82		18.2	1.8	0	0	0	Pasture
Andrew	40	5/1/1989	5/8/1989	484	144.09	3.6		12.8	13.68	0	0	0	Corn
Andrew	100	7/6/1994	7/21/1994	988	433.63	4.3363	20.39	14.1	4.42	0	0	Hay	Brome
Clinton	40	9/28/1987	9/28/1987	95	29.74	0.74		15.5	3.43	0	0	0	ure & Hay
Clinton	50	9/29/1987	9/29/1987	190	59.49	1.19		17	5.52	0	0	0	ure & Hay
Buchanan	120	7/9/1986	10/3/1986	1233	397.64	3.31		10	23.83	0	0		0
Buchanan	90	10/6/1986	11/13/1986	972	325.52	3.62		0	18.82	0	0		Wheat
Buchanan	130	1/10/1985	8/16/1985	2030	601.9	4.63		8.6	12.04	0	0		Wheat
Buchanan	90	2/15/1985	10/8/1985	339	101.63	1.13		12.39	2.49	0	0		Wheat
Buchanan	220	3/26/1984	5/14/1984	636	187.24	1.55		0	39.37	0	0		Beans
Buchanan	90	2/16/1984	4/30/1984	1246	370.56	3.71		0	73.46	0	0		Milo
Dekalb	45	5/1/2002	5/10/2002	1056	304.13	6.758444	6.76	13.3	1.04	0	16	Lespedeza	Legume
Dekalb	38	3/22/2005	3/28/2005	700.04	195.87	5.154474	19.62	16.5	1.42	0	15.91	Lespedeza	espedeza
Dekalb	50	3/30/2004	4/3/2004	570.18	157.6	3.152	14.47	15.5	0.56	0	16.77	Fescue	Fescue
Dekalb	50	4/15/2003	4/23/2003	839.82	228.18	4.5636	11.32	15.6	1.54	24.58	15.96	Lesepedza	esepedza
Dekalb	108	3/11/2002	3/23/2002	1204.7	353.82	3.276111	3.28	13.7	0.43	23.78	16	GR_Pasture	Fescue
Dekalb	12	3/18/2002	3/18/2002	192	56.39	4.699167	4.7	15.2	0.62	0	16	Grass	Fescue
Dekalb	29	3/23/2002	3/27/2002	447.12	131.32	4.528276	4.53	16.4	0.6	23.78	16	Fescue	Fescue
Dekalb	82	4/1/2002	4/12/2002	1309.3	399.73	4.874756	4.87	12.6	0.87	23.73	16	Fescue	Fescue
Dekalb	140	3/28/2002	4/30/2002	2076.76	621.99	4.442786	4.44	18.2	0.69	23.73	16	Fescue	Fescue
Dekalb	45	2/14/2005	2/18/2005	738.24	206.63	4.591778	11.33	16.4	1.16	0	15.38	Fescue	Fescue
Dekalb	11	3/28/2005	3/29/2005	190.92	53.42	4.856364	16.89	22.1	1.33	0	15.91	Fescue	Fescue
Dekalb	60	2/18/2005	2/24/2005	912	255.27	4.2545	9.08	27.4	1.07	0	16	Fescue	Fescue
Dekalb	32	3/29/2005	4/1/2005	509.12	141.66	4.43	17.93	22.9	1.22	0	15.91	Fescue	Fescue
Dekalb	10	4/6/2004	4/6/2004	134.16	38.14	3.814	12.03	25.5	0.11	0	16.77	Fescue	Fescue
Dekalb	12	4/4/2004	4/5/2004	251.55	71.52	5.96	5.96	19.5	0.17	0	16.77	Fescue	Fescue
Dekalb	64	3/20/2004	3/29/2004	1150.68	308.96	4.8275	4.83	14.6	1.57	24.51	16.77	Fescue	Fescue
Dekalb	45	3/12/2004	3/19/2004	884.94	237.61	5.280222	13.5	17.9	1.72	24.51	16.77	Fescue	Fescue
Dekalb	107	3/10/2003	3/20/2003	1364.52	370.19	3.45972	6.74	16.4	0.69	24.57	16	Fescue	Fescue
Dekalb	16	3/10/2003	3/10/2003	207.74	56.36	3.5225	8.22	15.7	0.7	0	15.98	Fescue	Fescue
Dekalb	100	3/31/2003	4/14/2003	1597.84	433.81	4.3381	8.87	17.1	1.16	24.56	16	Fescue	Fescue
Dekalb	90	3/22/2003	3/31/2003	1111.52	301.56	3.350667	8.22	18.7	0.66	24.56	16	Fescue	Fescue
Dekalb	23	10/24/1998	10/26/1998	260	115.96	5.041739	5.04	16.2	23.8	0	0	Pasture	s Pasture
Dekalb	14.7	3/4/1998	3/7/1998	286	105.85	7.2	7.2	14.7	9.38	0	0	Milo	ilo (Corn)
Dekalb	35	3/13/1998	3/14/1998	169	62.55	1.79	1.79	12	2.33	0	0	Pasture	s Pasture
Dekalb	80	10/10/1998	10/17/1998	663	295.7	3.7	3.7	14.8	17.45	0	0	Pasture	s Pasture
Dekalb	40	10/19/1998	10/23/1998	481	214.53	5.36325	5.36	15.8	25.31	0	0	Pasture	s Pasture
Dekalb	40	9/9/2002	9/14/2002	592.8	174.7	4.3675	12.65	18.2	1.53	24.7	0	Brome	0
Dekalb	30	8/31/2002	9/7/2002	682.9	193.36	6.445333	21.12	18.4	1.64	24.7	16	Clover	Clover

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Dekalb	30	8/19/2002	8/23/2002	646.8	175.67	5.855667	21.88	22.7	0.94	24.26	16.04	Brome	Clover
Dekalb	30	8/17/2002	8/27/2002	436.68	118.6	3.953333	16.46	26.9	0.63	24.26	0	Brome	Brome
Dekalb	20	8/28/2002	8/30/2002	286.3	77.76	3.888	6.53	15.3	0.62	24.7	16	Alfalfa	Alfalfa
Dekalb	30	5/10/2001	5/12/2001	305.36	76.65	2.55	16.02	16.1	1.49	23.36	16.52	Red Clover	ed Clover
Dekalb	87.7	6/4/2001	6/16/2001	1284.8	341.37	3.89	12.35	17.8	2.17	23.36	0	Brome	Brome
Dekalb	23.7	5/2/2001	5/9/2001	826.64	207.49	8.75	21.7	14.9	5.11	23.36	16.52	Brome Hay	rome Hay
Dekalb	64.6	7/3/2000	7/14/2000	1724.84	413.1	6.39	14.67	29.6	4.11	24.23	16.94	Grass Pasture	s Pasture
Dekalb	22.8	4/27/2000	4/29/2000	384.34	148.05	6.49	13.47	14.6	6.81	0	17.47	Red Clover	ed Clover
Dekalb	50	6/20/2000	6/23/2000	891.48	276.72	5.53	12.51	19.9	6.51	0	17.48	Brome Hay	rome Hay
Dekalb	84	5/8/2000	5/17/2000	1030.14	320.17	3.81	8.46	23.3	3.99	0	17.46	Grass Pasture	s Pasture
Dekalb	19	6/15/2000	6/16/2000	482.12	149.65	7.88	12.53	21.5	9.26	25	17.48	Alfalfa	Alfalfa
Dekalb	23	6/17/2000	6/19/2000	614.84	190.85	8.3	12.95	23.8	9.76	25	17.48	Brome Hay	rome Hay
Dekalb	13.5	9/27/1999	9/28/1999	249.9	102.96	7.63	7.63	17.7	12.05	--	--	Red Clover	ed Clover
Dekalb	18	7/28/1999	7/28/1999	114.84	47.54	2.64	2.64	20.4	6.02	--	--	Alfalfa	Alfalfa
Dekalb	40	7/29/1999	7/31/1999	344.52	142.63	3.57	3.57	17.6	8.13	--	--	Pasture	Grass/Hay
Dekalb	20	7/9/1999	7/12/1999	171.81	71.13	3.56	3.56	23.9	8.5	--	--	Alfalfa	Alfalfa
Dekalb	18	5/13/1999	5/14/1999	209.16	84.44	4.69	10.05	14.4	5.63	--	--	Hay	Grass/Hay
Dekalb	5	7/3/1999	7/3/1999	57.27	23.71	4.74	4.74	16.9	10.81	--	--	Grass/Pasture	Grass/Hay
Dekalb	21	6/30/1999	7/2/1999	267.26	110.65	5.27	5.27	16.9	12.01	--	--	Hay	Grass/Hay
Dekalb	12	5/12/1999	5/13/1999	164.34	66.34	5.53	10.89	15.2	6.63	--	--	Hay	Grass/Hay
Dekalb	35	5/7/1999	5/11/1999	403.38	162.84	4.65	4.65	16.2	5.58	--	--	Hay	Grass/Hay
Dekalb	12	5/6/1999	5/7/1999	164.34	66.34	5.53	5.53	16.4	6.63	--	--	Hay	0
Dekalb	39	4/27/1999	5/1/1999	345.84	138.85	3.56	7.55	17	4.71	--	--	Hay/Pasture	Pasture
Dekalb	19	6/29/1999	6/29/1999	171.81	64.94	3.42	3.42	14.6	5.45	--	--	Pasture	Pasture
Dekalb	21	9/3/2003	9/8/2003	432.21	111.81	5.324286	17.97	19.1	0.57	24.39	16.59	Red Clover	ed Clover
Dekalb	50	9/8/2003	9/16/2003	993.18	256.94	5.1388	26.26	20.1	0.55	24.39	16.59	Brome	Brome
Dekalb	30	8/21/2003	8/27/2003	696.3	183.2	6.106667	27.99	19.1	1.4	24.56	16.59	Brome	Brome
Dekalb	30	8/12/2003	8/20/2003	892.78	234.89	7.829667	24.29	22.8	1.79	24.56	16.59	Brome	Brome
Dekalb	23	8/4/2003	8/7/2003	476.28	125.31	5.448261	10.81	14.7	1.25	24.65	16.29	Brome	Brome
Dekalb	33	8/28/2003	9/2/2003	578.55	150.94	4.573939	16.92	19.5	0.77	24.39	16.59	Brome	Brome
Dekalb	18	8/8/2003	8/11/2003	450.7	118.58	6.587778	19.12	20	151	24.56	16.59	Alfalfa	Alfalfa
Dekalb	65.8	4/8/1992	5/8/1992	1770	827.3	12.57		16.1	15.08	0	0	0	0
Clinton	195	2/24/1992	2/27/1992	345	149.07	0.43	-	15.3	0.34	0	0	-	Grass
Andrew	160	1/20/1998	1/27/1998	728	205.15	1.282188	23.42	16.3	6.31	0	0	E_Corn	Corn
Andrew	140	11/17/1999	11/29/1999	1464.9	519.31	3.71	27.13	15	46.67	--	--	Corn	Soybeans
Andrew	78	10/25/1999	11/2/1999	898.2	351.82	4.51	4.51	16.8	11.55	--	--	Corn	Soybeans
Andrew	86	8/25/1999	9/17/1999	1330	538.14	6.26	19.64	13.1	36.04	--	--	Hay/Pasture	y/Pasture
Andrew	121	6/19/1997	6/30/1997	858	325.95	2.69	2.69	16.6	4.45	0	0	NE Crop	Grass
Andrew	170	7/1/1997	8/13/1997	3237	1301.6	7.66	19.46	17.8	9.53	0	0	Hay (Homeplace)	Grass
Andrew	160	12/15/1997	12/31/1997	1573	599.2	3.5	22.14	16.3	9.53	0	0	E Corn	Corn
Andrew	70	3/25/2006	4/6/2006	1425.5	399.3	5.7	5.7	15.4	1.29	0	14.81	Gamma Gras	mma Gras
Andrew	180	4/18/1996	5/30/1996	2236	899.1	4.995	11.8	13.1	12.49	0	0	Homeplace	s Pasture

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Andrew	160	2/19/1996	4/17/1996	3289	1352.44	8.45275	18.64	15.6	14.4	0	0	East Corn	Corn
Andrew	78.5	3/28/1994	3/30/1994	390	160.41	2.043439	2.04	14.6	6.87	0	0	Not Identified	Pasture
Andrew	120	3/31/1994	6/10/1994	1664	726.34	6.052833	6.05	15.2	11.08	0	0	Not Identified	Pasture
Andrew	115	4/20/1994	5/4/1994	1131	470.72	4.093217	4.09	16.3	5.07	0	0	Corn	Corn
Andrew	130	4/18/1994	4/19/1994	598	253.31	1.948538	1.95	12.9	3.07	0	0	Pasture	Pasture
Andrew	120	5/5/1994	5/16/1994	1014	414.52	3.454333	3.45	13.8	3.12	0	0	Corn	Soybeans
Andrew	40	5/17/1994	8/15/1994	897	349.52	8.738	12.99	14.7	19.2	0	0	Brome	Brome
Andrew	100	7/27/1994	8/5/1994	702	285.01	2.8501	2.85	14.9	6.33	0	0	Soybeans	Pasture
Andrew	160	3/20/1995	6/2/1995	2782	1078.58	6.741125	10.19	14.8	7.21	0	0	E Corn	Corn
Andrew	170	5/9/1995	6/23/1995	2080	827.01	4.864765	6.81	13.9	5.16	0	0	Grass Hay	Grass Hay
Andrew	67	4/3/1995	4/7/1995	299	115.5	1.723881	10.46	16.4	1.87	0	0	Brome	Brome
Andrew	50	3/5/2007	3/12/2007	825.52	244.11	4.88	18.26	13.5	1.21	24.28	0	Grass Hay	Grass Hay
Andrew	125	2/3/2007	2/16/2007	1942.4	576.31	4.61	31.74	18	1.2	24.28	0	Soybeans	Corn
Andrew	65	2/26/2007	3/3/2007	971.2	287.72	4.43	7.28	13.6	1.12	24.28	0	Grass Hay	Grass Hay
Andrew	60	2/17/2007	3/6/2007	936.68	277.53	4.63	9.14	18.7	1.17	24.28	14.52	Soybeans	Corn
Andrew	20	2/23/2007	3/6/2007	276.42	81.83	4.09	4.09	16.7	1.04	24.28	14.52	Brome	Brome
Andrew	50	2/20/2008	2/25/2008	724.4	205.44	4.11	10.37	15.8	0.92	25.18	18.4	Grass	Grass
Andrew	75	2/10/2008	1/0/1900	1221.2	346.33	4.62	11.9	19	1.03	25.18	18.4	Grass	Grass
Andrew	75	2/8/2008	2/12/2008	1017.84	288.66	3.85	9.55	19	0.86	25.18	18.4	Warm Seaso	Grass
Andrew	15	3/6/2008	3/6/2008	225	66.17	4.41	4.41	20.9	1.19	25	0	Mixed Grass	ed Grass
Buchanan	131	4/1/1991	5/7/1991	2101	814.14	6.21		8.2	81.97	0	0	0	orn (Milo)
Buchanan	58	8/1/1990	8/7/1990	258	80.11	1.38		11	4.97	0	0	0	Wheat
Buchanan	155	6/23/1989	6/23/1989	96	28.25	0.18		22.2	0.72	0	0	0	Beans
Buchanan	155	5/16/1988	6/16/1988	1187.5	367.18	2.37		22.2	7.58	0	0	0	Beans
Buchanan	59	7/9/1987	8/25/1987	1149.5	384.05	6.51		10.9	23.44	0	0	0	Milo
Buchanan	183	8/3/1987	8/21/1987	560.5	203.13	1.11		17.1	2.89	0	0	0	Wheat
Buchanan	83	8/19/1991	9/2/1991	915	398.57	4.8		20.9	6.72	0	0	0	Corn (Wh
Buchanan	40	9/3/1991	9/9/1991	540	217.94	5.45		18.9	5.45	0	0	0	Corn (Wh
Buchanan	120	3/20/1990	3/26/1990	300	88.14	0.73		12.5	2.34	0	0	0	n (Beans)
Buchanan	78	4/23/1990	4/26/1990	273	86.49	1.11		16.9	2.89	0	0	0	ns (Corn)
Buchanan	120	11/21/1990	12/14/1990	555	172.55	1.44		14.6	3.74	0	0	0	h (Wheat)
Buchanan	50	11/29/1990	12/10/1990	1065	328.98	6.58		14.4	17.11	0	0	0	h (Wheat)
Buchanan	40	9/21/1988	9/22/1988	350	122.05	3.06		12.1	12.86	0	0	0	Corn
Buchanan	35	11/7/1988	11/17/1988	810	244.54	6.99		12.7	16.78	0	0	0	Corn
Andrew	45	3/11/2008	3/15/2008	675	198.52	4.41	8.57	18.2	1.19	25	0	Grass Hay	Grass Hay
Andrew	30	2/24/2003	2/25/2003	536.26	155.19	5.173	5.17	14.6	1.2	24.86	15.98	Grass Hay	Grass Hay
Andrew	50	2/26/2003	3/3/2003	1148.88	322.09	6.4418	6.44	15.3	1.39	24.86	15.98	Grass Hay	Grass Hay
Andrew	10	3/4/2003	3/4/2003	99.44	26.98	2.698	2.7	11.4	0.53	24.86	0	Grass Hay	Grass Hay
Andrew	10	8/9/2004	8/9/2004	168.2	46.25	4.625	9.8	17.9	4.85	0	16.82	Grass	Grass
Andrew	55	8/2/2004	8/7/2004	807.36	222.02	4.036727	10.48	17	4.23	0	16.82	Grass	Grass
Andrew	5	8/9/2004	8/9/2004	50.46	13.88	2.776	5.48	15	2.91	0	16.82	Grass	Grass
Andrew	7	8/10/2004	8/10/2004	67.28	18.5	2.642857	2.64	16.3	2.77	0	16.82	Grass	Grass

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Andrew	40	3/13/2007	3/16/2007	562.72	166.4	4.16	4.16	14.2	1.03	24.28	14.52	Grass Hay	Grass Hay
Buchanan	35	1/6/1987	1/8/1987	108	35.23	1.01		12	5.45	0	0	0	Corn
Buchanan	80	8/6/1986	8/29/1986	837	267.42	3.34		9.2	24.05	0	0		Wheat
Buchanan	35	11/14/1986	12/3/1986	585	204.34	5.84		12	42.05	0	0		Corn
Buchanan	80	8/12/1985	9/18/1985	1263	418.94	5.24		8.8	44.02	0	0		Wheat
Buchanan	30	11/5/1985	12/6/1985	525	153.3	5.11		17.17	34.75	0	0		Corn
Buchanan	93	10/27/1992	11/9/1992	1350	558.23	6	-	16.2	6	0	0	-	Corn
Buchanan	160	11/13/1992	1/5/1993	3390	1439.06	8.99	-	15.2	10.79	0	0	-	Corn
Buchanan	132	9/18/1992	10/26/1992	1680	701.74	5.32	-	18.3	5.32	0	0	-	Corn
Buchanan	177	1/2/1991	1/28/1991	1605	638.79	3.61		15.4	5.05	0	0	0	Corn (Wh
Buchanan	205	1/29/1991	3/23/1991	3300	1382.37	6.74		13.6	4.04	0	0	0	Corn
Buchanan	30	3/25/1991	3/29/1991	495	194.44	6.48		11.8	3.89	0	0	0	Pasture
Buchanan	151	9/10/1991	10/18/1991	2865	1187.54	7.86		17.7	12.58	0	0	0	h (Wheat)
Buchanan	80	10/21/1991	11/4/1991	1380	537.65	6.72		12.1	10.75	0	0	0	h (Wheat)
Buchanan	100	11/25/1991	11/29/1991	540	199.58	2		14.4	3.6	0	0	0	Pasture
Buchanan	150	1/2/1990	1/8/1990	338	93.19	0.62		11.8	2.11	0	0	0	Corn
Buchanan	170	1/7/1990	1/22/1990	861	258.64	1.52		13.7	2.43	0	0	0	Pasture
Buchanan	177	12/24/1990	12/31/1990	645	200.4	1.13		15.4	3.16	0	0	0	h (Wheat)
Buchanan	35	8/9/1989	8/16/1989	426	143.35	6.02		14.6	19.26	0	0	0	n (wheat)
Buchanan	80	8/18/1989	9/12/1989	1620	494.91	6.19		13.9	19.81	0	0	0	n (wheat)
Buchanan	35	9/19/1989	10/2/1989	840	264.35	7.55		12.9	25.67	0	0	0	n (wheat)
Buchanan	30	10/4/1989	10/13/1989	528	167.22	5.57		14.6	15.6	0	0	0	eat (Hay)
Buchanan	150	10/6/1989	12/29/1989	2465	727.18	4.85		11.8	13.58	0	0	0	Corn
Buchanan	150	1/2/1986	2/1/1986	1006	379	2.53		14.71	12.65	0	0		Corn
Buchanan	150	2/7/1985	2/21/1985	240	69.31	0.46		15.74	1.29	0	0		Corn
Buchanan	35	2/22/1985	4/5/1985	250	72.95	2.08		15.21	4.99	0	0		Corn
Buchanan	150	1/28/1984	3/9/1984	1032	307.02	2.05		0	40.59	0	0		Corn
Buchanan	20	5/17/1984	8/3/1984	455	132.59	6.63			133.93	0	0		sture/Hay
Buchanan	20	11/5/1984	12/27/1984	340	106.45	5.32			131.94	0	0		Corn
Buchanan	6	9/28/1983	9/30/1983	110	31.3	5.22		84.56	84.56	0	0		Wheat
Buchanan	50	6/8/1983	6/27/1983	565	168.14	3.36		18.98	74.59	0	0		Corn
Buchanan	50	6/8/1983	6/27/1983	565	168.14	3.36	0	0	74.59	0	0	0	Corn
Buchanan	205	3/6/1989	3/13/1989	616	161.15	0.79		16.8	4.11	0	0	0	Milo
Buchanan	150	1/3/1989	1/9/1989	575	161.46	1.08		11.2	4.97	0	0	0	Corn
Buchanan	147	3/29/1989	6/16/1989	1014	284.83	1.94		12.7	6.21	0	0	0	Milo
Buchanan	147	2/2/1988	5/13/1988	1206.5	370.88	2.53		11.7	8.1	0	0	0	Milo
Buchanan	205	7/12/1988	8/12/1988	1425	455.15	2.22		16.2	12.88	0	0	0	Milo
Buchanan	96	8/15/1988	9/13/1988	1558	503.39	5.24		15.8	31.44	0	0	0	Wheat
Buchanan	150	12/19/1988	12/30/1988	759	213.89	1.43		11.2	4.58	0	0	0	Corn
Buchanan	205	2/4/1987	6/10/1987	2091	642.77	3.14		9.5	16.33	0	0	0	Beans
Buchanan	147	11/4/1987	11/20/1987	1311	385.7	2.62		11.7	9.96	0	0	0	Milo
Buchanan	81	9/1/1987	9/25/1987	836	252.47	3.12		13.1	12.48	0	0	0	Wheat

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	205	10/19/1987	10/30/1987	978.5	280.93	1.37		11.7	3.84	0	0	0	Wheat
Dekalb	20	3/21/2006	3/24/2006	506.94	141.23	7.0615	7.06	19	1.49	23.24	14.63	Soybeans	Soybeans
Dekalb	38	4/18/2006	4/26/2006	990.75	278.2	7.321053	7.32	18.8	1.77	24.9	14.85	Soybeans	Soybeans
Dekalb	31	4/7/2006	4/17/2006	1095.6	307.64	9.923871	9.92	16.3	2.4	24.9	0	Soybeans	Soybeans
Andrew	23	3/7/2008	3/10/2008	350	102.93	4.48	4.48	20.2	1.21	25	0	Grass	Grass hay
Buchanan	46	3/27/1986	4/10/1986	450	133.74	2.91		12.2	23.28	0	0		Milo
Buchanan	40	3/4/1985	3/5/1985	160	44.77	1.12		14.96	2.66	0	0		Milo
Buchanan	20	5/10/1985	5/20/1985	230	67.48	3.37		18.64	11.46	0	0		Beans
Buchanan	65	1/23/1984	12/24/1984	1015.5	303	2.89			66.47	0	0		Milo
Buchanan	40	10/15/1984	3/5/1985	700.5	216	5.4			132.25	0	0		Milo
Buchanan	105	11/22/1983	12/29/1983	1240	356	3.39		18.82	67.12	0	0		Milo
Buchanan	60	7/20/1983	9/20/1983	1564	504.08	3.4		0	95.41	0	0		Wheat
Buchanan	30	1/1/1983	1/1/1983	0	0	0		0		0	0		
Buchanan	30	7/14/1983	11/21/1983	854.5	258	8.6		20.58	175.44	0	0		None
Buchanan	62.5	3/15/1983	4/27/1983	1300	376	6.02		21.41		0	0		
Buchanan	56	9/9/2006	9/29/2006	1136.31	325.89	5.819464	5.82	13	1.28	23.19	0	Grass Hay	Grass Hay
Buchanan	30	9/25/2006	10/2/2006	510.18	146.53	4.88	4.88	17.8	1.07	23.19	0	Grass Hay	Grass Hay
Buchanan	30	10/2/2006	10/2/2006	208.71	60.07	2.002333	2	17.8	0.44	23.19	0	Grass Hay	0
Buchanan	35	10/2/2006	10/9/2006	627.48	180.59	5.159714	5.16	15.5	1.13	23.24	0	Grass Hay	Grass Hay
Buchanan	65	9/17/2007	9/25/2007	914.3	301.44	4.64	4.64	18.5	1.29	22.3	0	Grass Hay	Grass Hay
Buchanan	25	10/22/2007	10/24/2007	358.65	114.52	4.58	4.58	16.4	1.28	47.82	0	Grass Hay	Grass Hay
Buchanan	30	9/25/2007	9/29/2007	458.6	151.2	5.04	5.04	20.6	1.4	22.93	0	Grass Hay	Grass Hay
Buchanan	10	4/7/2001	4/7/2001	115.2	30.94	3.09	3.09	17.5	3.4	23.04	0	Wheat	rome Hay
Dekalb	80	7/23/2005	8/6/2005	1390.26	369.11	4.61	4.61	20.2	1.73	0	15.98	Wheat	Corn
Dekalb	175	11/24/2005	12/23/2005	3171.25	875.77	5	5	15.7	1.48	0	14.75	Soybeans	Corn
Andrew	65	7/31/2006	8/14/2006	1357.2	387.78	5.97	5.97	11.1	1.3	23.4	0	Grass Hay	Grass Hay
Andrew	23	8/16/2006	8/30/2006	491.4	140.44	6.106087	6.11	13.1	1.33	23.4	0	Grass Hay	Grass Hay
Andrew	20	8/26/2006	9/2/2006	440.61	126.11	6.31	6.31	31.7	1.38	23.19	0	Grass Hay	Grass Hay
Buchanan	50	8/25/2007	9/1/2007	802.8	248.31	4.97	4.97	12.3	1.46	22.3	0	Clover/Grass	ver/Grass
Buchanan	19	9/14/2007	9/15/2007	245.3	80.88	4.26	4.26	12	1.19	22.3	0	Clover/Grass	ver/Grass
Buchanan	69	9/4/2007	9/13/2007	1003.5	330.85	4.79	4.79	34	1.33	22.3	0	Brome Hay	rome Hay
Andrew	52	1/9/2007	1/20/2007	849.8	253.33	4.87	4.87	17.7	1.27	24.28	0	Soybeans	Corn
Andrew	45	1/10/2007	1/17/2007	752.68	224.37	4.99	4.99	30.3	1.3	24.28	0	Soybeans	Corn
Andrew	105	1/22/2007	2/2/2007	1722.2	512.35	4.88	4.88	18.5	1.27	24.28	14.52	Soybeans	Corn
Andrew	80	6/13/2008	6/25/2008	1190.8	362.24	4.53	15.29	10.1	1.32	22.9	0	Grass Hay	Grass Hay
Andrew	22	2/2/2008	1/0/1900	340.55	96.44	4.38	9.26	14.4	0.98	22.67	0	Corn	Corn
Andrew	70	12/18/2007	1/7/2008	1058.44	306.9	4.38	0	17	1.81	0	0	Soybeans	Corn
Andrew	21	1/15/2008	1/19/2008	337.8	102.86	4.9	4.9	29.6	2.48	22.52	0	Alfalfa	Corn
Andrew	55	1/8/2008	1/0/1900	855.76	260.58	4.74	4.74	27.7	2.4	22.52	0	Soybeans	Corn
Andrew	92	1/19/2008	1/31/2008	1486.32	452.58	4.92	4.92	16.7	2.49	22.52	0	Soybeans	Corn
Andrew	62	11/30/1999	12/4/1999	686.4	244.91	3.95	3.95	14.1	9.88	--	--	Corn	Corn
Buchanan	94	2/3/1992	3/4/1992	1260	567.25	6.03	-	18.6	3.62	0	0	-	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Andrew	34	4/13/1999	4/19/1999	389.07	155.39	4.57	4.57	11.5	6.62	--	--	Corn	Corn
Andrew	16	4/19/1999	4/20/1999	187.33	74.82	4.68	4.68	14.4	6.77	--	--	Corn	Corn
Andrew	64	3/30/1999	4/13/1999	706.09	271.84	4.25	4.25	14	8.04	--	--	Corn	Corn
Buchanan	38	11/3/2004	11/8/2004	712.94	210.53	5.540263	5.54	16.1	0.95	0	16.58	Soybeans	Corn
Dekalb	55	7/6/2005	7/13/2005	878.9	222.36	4.042909	4.04	17.1	1.88	0	15.98	Brome	Brome
Dekalb	22	7/14/2005	7/16/2005	335.58	84.9	3.859091	3.86	18.6	1.8	0	15.98	Red Clover	ed Clover
DeKalb	30	5/7/2007	5/10/2007	513.7	154.47	5.15	14.34	19.8	1.26	23.35	0	Brome	Brome
DeKalb	17	5/10/2007	5/12/2007	233.5	70.21	4.13	17.45	13.4	1.01	23.35	0	Brome	Brome
DeKalb	35	6/5/2007	6/9/2007	584.25	176.74	5.05	5.05	15	1.26	23.37	0	Grass	Grass
DeKalb	25	3/24/2008	3/25/2008	377.7	111.08	4.44	8.57	18.2	1.2	25.18	0	Grass	0
DeKalb	23	3/26/2008	3/28/2008	377.7	111.08	4.83	8.69	19.9	1.3	25.18	0	Grass Hay	0
Clinton	165	5/11/1992	6/20/1992	2265	1003.4	6.08	-	15.3	4.86	0	0	-	Soybeans
Clinton	80	7/24/1992	7/31/1992	1005	387.33	4.84	-	19.4	7.74	0	0	-	Corn
Buchanan	294	4/4/1990	4/20/1990	1040	305.55	1.04		18.3	2.91	0	0	0	Beans
Buchanan	82.5	3/18/1988	3/21/1988	351.5	93.86	1.14		13.7	2.74	0	0	0	Corn
Buchanan	26	3/11/1988	3/11/1988	399	110.25	4.25		19	10.2	0	0	0	Corn
Buchanan	144	9/27/1988	10/13/1988	700	219.45	1.52		16.1	6.08	0	0	0	Wheat
Buchanan	218	10/17/1988	11/2/1988	1080	319.36	1.46		15.8	4.09	0	0	0	Corn
Buchanan	150	11/21/1988	12/16/1988	1764.5	394.01	2.63		13.3	11.57	0	0	0	Corn
Buchanan	72	6/15/1987	6/19/1987	399	124.41	1.73		15.6	13.84	0	0	0	Corn
Buchanan	26	6/9/1987	6/12/1987	171	52.1	2		19	7.2	0	0	0	Corn
Buchanan	25	6/4/1987	6/8/1987	180.5	82.71	3.31		17.2	13.9	0	0	0	Corn
Dekalb	50	8/22/2005	8/30/2005	905.96	251.86	5.0372	7.33	16.6	1.42	0	15.62	Grass	Grass
Dekalb	56	8/6/2005	9/3/2005	921.58	256.2	4.57	4.57	19.4	1.29	0	15.62	Brome	Brome
Dekalb	160	2/19/1998	2/28/1998	871	327.93	2.05	2.05	18.8	2.47	0	0	Alfalfa	Alfalfa
Dekalb	48	3/2/1998	3/4/1998	390	144.34	3.01	7.85	15.3	3.92	0	0	Pasture	s Pasture
Dekalb	80	3/20/1998	4/6/1998	1222	479.75	5.996875	6	13.7	6.94	0	0	Pasture	s Pasture
Dekalb	40	4/16/1998	7/11/1998	858	373.14	6.22	8.53	19.3	21.82	0	0	Pasture	s Pasture
Dekalb	105	9/21/1998	10/9/1998	1417	656.78	6.255048	6.26	14.9	30.09	0	0	Cap	Oats
Dekalb	60	4/16/1998	7/22/1998	858	373	6.216667	8.53	19.3	21.82	0	0	Pasture	0
Dekalb	40	4/9/1998	4/15/1998	650	269.88	6.747	6.75	20.2	6.84	0	0	Pasture	s Pasture
Dekalb	20	9/17/1998	9/19/1998	234	112.55	5.6275	5.63	15.2	27.58	0	0	Pasture	s Pasture
Dekalb	40	2/16/1998	3/19/1998	650	242.65	6.07	10.91	18.6	7.6	0	0	S_Farm	Corn
Dekalb	80	1/5/1998	1/19/1998	1872	527.53	6.594125	11.43	18.6	32.44	0	0	S_Corn	Corn
Dekalb	80	7/29/2002	8/16/2002	1817.92	489.75	6.121875	18.28	15.3	3.04	23.92	0	Alfalfa	Alfalfa
Dekalb	75	5/20/2002	6/1/2002	1418.06	399.75	5.33	19.93	15.2	2.4	23.73	16	Alfalfa	Alfalfa
Dekalb	50	6/3/2002	6/13/2002	1166.47	321.71	6.4342	10.64	20.8	4.81	23.31	16	Alfalfa	Alfalfa
Dekalb	140	6/14/2002	7/27/2002	2794.42	758.69	5.419214	6.58	13.7	4.28	23.66	16	Alfalfa	Alfalfa
Dekalb	50	6/20/2002	7/1/2002	1196.07	324.73	6.4946	21.02	14.1	5.13	23.43	16	Brome	0
Dekalb	60	5/21/2001	6/2/2001	1224.4	316.32	5.27	14.6	16.7	3.01	23.36	16.52	Alfalfa	Alfalfa
Dekalb	50	4/6/2001	4/21/2001	1612.8	433.2	8.66	18.21	18.1	9.53	23.04	0	Brome Hay	rome Hay
Dekalb	100	4/23/2001	5/19/2001	1512.08	392.84	3.93	8.63	17.7	3.53	23.36	16.52	Alfalfa	Alfalfa

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Dekalb	65	5/27/2000	6/14/2000	1531.32	475.53	7.32	12.16	13.7	8.13	25	17.48	Alfalfa	Alfalfa
Dekalb	30	7/14/2000	7/18/2000	668.16	160.02	5.33	10.17	25.2	3.42	24.23	16.94	Alfalfa	Alfalfa
Dekalb	42	5/1/2000	5/8/2000	628.56	195.36	4.65	21.85	18	4.87	0	17.46	Alfalfa	Alfalfa
Dekalb	40	5/3/2000	5/6/2000	541.26	168.22	4.21	4.21	20.9	4.4	0	17.46	Clover Grass	ver Grass
Dekalb	100	5/18/2000	5/26/2000	1361.88	423.27	4.23	5.39	15.8	4.43	0	17.46	Alfalfa	Alfalfa
Dekalb	58	6/2/2000	6/10/2000	929.68	288.57	4.98	14.53	15.9	5.85	25	17.48	Grass Hay	Grass Hay
Dekalb	38	6/1/1999	6/3/1999	381.11	144.06	3.79	15.52	16.9	6.04	--	--	Corn (Sudan)	n (Sudan)
Dekalb	35	5/26/1999	6/1/1999	248.55	97.15	2.78	7.62	16.6	2.57	--	--	Pasture	n (Sudan)
Dekalb	20	5/28/1999	5/29/1999	180.36	72.81	3.64	8.48	14.7	4.37	--	--	Corn (Sudan)	n (Sudan)
Dekalb	15	5/24/1999	5/25/1999	135.27	54.61	3.64	14.55	15.1	4.37	--	--	Corn (Sudan)	n (Sudan)
Dekalb	40	4/21/1999	4/27/1999	590.81	235.73	5.89	10.73	13.1	8.53	--	--	Hay/Pasture	Alfalfa
Dekalb	37	6/17/1999	6/22/1999	439.07	165.97	4.49	9.33	14.5	3.87	--	--	Alfalfa	Alfalfa
Dekalb	20.5	6/23/1999	6/28/1999	343.62	129.89	6.34	17.93	15.4	10.1	--	--	Alfalfa	Alfalfa
Dekalb	35	6/15/1999	6/25/1999	591.79	223.7	6.39	17.2	18.5	10.19	--	--	Alfalfa	Alfalfa
Dekalb	58.3	6/3/1999	6/8/1999	546.81	206.69	3.55	14.36	12.7	5.65	--	--	Pasture	Pasture
Dekalb	55	5/3/1999	5/6/1999	489.94	197.79	3.6	12.13	15.1	4.32	--	--	Hay/Pasture	Pasture
Dekalb	130	7/12/1999	7/27/1999	1474.98	610.64	4.7	4.7	18.6	10.71	--	--	Alfalfa	Alfalfa
Dekalb	50	10/27/1997	10/31/1997	455	169.94	3.4	14.54	18.6	5.04	0	0	Homeplace	Grass
Dekalb	80	1/2/1997	1/3/1997	156	59.09	0.74	5.35	14.5	1.28	0	0	East Hay	Grass
Dekalb	80	11/3/1997	11/14/1997	1170	454.9	5.69	10.3	22	6.89	0	0	Pasture	Grass
Dekalb	115	5/28/2005	7/22/2005	1885.64	477.07	4.148435	20.32	16.5	1.93	0	15.98	Alfalfa	Alfalfa
Dekalb	80	5/5/2005	5/16/2005	1341.76	372.34	4.65425	35.9	18.8	1.3	23.24	15.61	Alfalfa	Alfalfa
Dekalb	120	6/20/2005	7/5/2005	2011.68	525.45	4.38	27.05	18.6	1.47	0	15.84	Brome	Brome
Dekalb	145	5/17/2005	6/18/2005	2547.33	696.57	4.815	20.12	17.6	1.17	24.59	15.75	Alfalfa	Alfalfa
Dekalb	50	8/8/2005	8/16/2005	812.24	225.8	4.516	29.29	17.9	1.27	0	15.62	Alfalfa	Alfalfa
Dekalb	130	5/24/2004	6/16/2004	2779.33	780.3	6.002308	16.17	17.9	0.79	24.49	17	Alfalfa	Alfalfa
Dekalb	100	5/15/2004	7/24/2004	1740.86	474.96	4.7496	31.25	15.7	1.03	24.28	16.94	Alfalfa	Alfalfa
Dekalb	130	5/21/2004	7/22/2004	2294.8	626.1	4.816154	24.67	17.4	1.04	24.28	16.94	Alfalfa	Alfalfa
Dekalb	110	5/7/2004	7/6/2004	1878.24	512.45	4.658636	15.38	16.8	1.01	24.31	16.9	Alfalfa	Alfalfa
Dekalb	60	7/26/2004	7/31/2004	874.64	224.78	3.746333	24.77	11.7	1.46	0	16.82	Brome	Brome
Dekalb	36	8/11/2004	8/13/2004	300.24	82.57	2.293611	2.29	15.4	2.4	0	16.68	Grass	Grass
Dekalb	51	8/14/2004	8/23/2004	1247.67	343.11	6.727647	6.73	21.6	7.05	24.21	16.68	Brome	Brome
Dekalb	100	5/5/2003	5/24/2003	2464.1	657.42	6.5742	26.5	12.9	1.22	24.65	16	Alfalfa	Alfalfa
Dekalb	115	5/27/2003	6/14/2003	2065.35	532.14	4.627304	19.85	11.7	1.38	24.65	16	Alfalfa	Alfalfa
Dekalb	80	6/16/2003	6/27/2003	1523.15	378.5	4.73125	15.37	13.2	1.95	24.65	16.09	Alfalfa	Alfalfa
Dekalb	130	7/16/2003	8/2/2003	2052.59	537.57	4.135154	10.72	15.4	1.18	24.65	16.29	Alfalfa	Alfalfa
Dekalb	50	6/28/2003	7/15/2003	1559.59	397.07	7.9414	26.15	14.1	2.99	24.65	16.29	Brome	Brome
Dekalb	158	12/2/1996	12/31/1996	2379	884.04	5.59519	9.56	16.2	7.74	0	0	South	s Pasture
Dekalb	317	11/13/1996	11/29/1996	1274	501.83	1.58306	11.14	15.9	1.01	0	0	East	s Pasture
Dekalb	140	8/15/1996	9/18/1996	1716	644.87	4.606214	4.61	14.5	7.61	0	0	North Pasture	s Pasture
Dekalb	200	8/23/1995	9/27/1995	2080	792.48	3.9624	3.96	18.5	7.92	0	0	Grass Hay	Grass Hay
DeKalb	160	4/16/2007	5/5/2007	2441.74	731.5	4.57	4.57	16	1.1	22.82	0	Brome	Brome

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
DeKalb	80	9/22/2008	1/0/1900	516	178.43	2.23	22.55	18.5	5.71	21.5	0	Brome/Pasture	0
DeKalb	80	10/1/2008	10/7/2008	513	134.2	1.68	22	18.5	6.33	42.5	0	Brome/Pasture	0
DeKalb	110	3/28/2008	1/0/1900	476.91	140.26	1.28	37.18	18.4	0.34	22.71	0	Brome	0
DeKalb	60	4/21/2008	4/26/2008	953.82	281.09	4.68	38.44	18.5	0.49	22.71	0	Brome	0
DeKalb	95	8/11/2008	1/0/1900	1053.5	316.68	3.33	41.77	17.4	2.76	21.5	0	Brome Hay	0
DeKalb	95	9/2/2008	9/19/2008	817	282.52	2.97	41.41	17.4	7.62	21.5	0	Brome Hay	0
DeKalb	75	4/10/2008	4/19/2008	1226.34	361.4	4.82	25	19.5	0.51	22.71	0	Brome	0
Dekalb	71	10/12/1994	10/26/1994	1209	416.02	5.859437	7.47	15.3	19.69	0	0	Corn(Brome)	Brome
Dekalb	78.7	12/15/1999	12/22/1999	932.8	332.82	4.23	4.23	17.7	10.57	--	--	Corn	Corn
Dekalb	50	12/22/1999	12/27/1999	475.2	169.55	3.39	3.39	15.7	8.48	--	--	Corn	Corn
Dekalb	28	3/10/1998	3/12/1998	221	81.79	2.921071	2.92	14.4	3.8	0	0	Pasture	s Pasture
Dekalb	15	5/1/1999	5/3/1999	172.92	69.81	4.65	4.65	23.1	5.58	--	--	Hay	Grass/Hay
Andrew	70	1/11/1989	2/28/1989	1371	368.8	5.27		16.8	25.3	0	0	0	ns (Corn)
Andrew	136	1/16/1989	3/3/1989	1245	330.8	2.43		12.1	11.66	0	0	0	Beans
Andrew	121	1/30/1989	2/13/1989	1320	355.61	2.94		15.2	14.7	0	0	0	Corn
Andrew	116	2/15/1988	2/16/1988	624	182.84	1.58		19	7.87	0	0	0	Corn
Andrew	136	1/12/1988	1/13/1988	271.5	80.94	0.6		9.4	2.4	0	0	0	Corn
Andrew	358	1/4/1988	1/29/1988	1486	457.69	1.28		16.5	6.4	0	0	0	Corn
Andrew	121	2/19/1988	3/4/1988	973	293.46	2.43		16.7	9.23	0	0	0	Corn
Andrew	136	6/22/1987	6/25/1987	294.5	96.12	0.71		17.5	1.14	0	0	0	Beans
Andrew	347	5/4/1987	5/15/1987	323	88.28	0.25		17.7	1.3	0	0	0	Milo
Andrew	150	3/26/1987	4/22/1987	1607.5	477.27	3.18		16.9	14.64	0	0	0	Beans
Andrew	159	2/2/1987	3/5/1987	680	232.56	1.46		12.4	7.59	0	0	0	Beans
Andrew	85	1/5/1987	1/29/1987	958	320.26	3.77		10.2	19.6	0	0	0	Beans
Andrew	136	11/23/1987	12/24/1987	1846.5	568.35	4.18		9.4	18.39	0	0	0	Corn
Andrew	178	2/12/1986	8/5/1986	4254	1470.61	8.26		14.18	59.47	0	0		Milo
Andrew	347	6/23/1986	6/27/1986	207	77.25	0.22		17.7	1.63	0	0		Miko
Andrew	85	12/4/1986	12/24/1986	718	241.75	2.84		10.2	18.74	0	0		Beans
Buchanan	35	3/24/1989	4/11/1989	759	183.91	5.25		12.4	14.7	0	0	0	Corn
Buchanan	25	3/15/1989	3/22/1989	506	123.92	4.96		12.7	17.86	0	0	0	Corn
Buchanan	45	3/22/1988	4/6/1988	1121	319.15	7.09		12.5	18.43	0	0	0	Corn
Buchanan	82	10/3/1988	10/3/1988	200	60.04	0.73		10.8	2.63	0	0	0	Wheat
Buchanan	82	3/12/1987	4/24/1987	788.5	232.85	2.84		9.8	14.77	0	0	0	Corn
Buchanan	45	9/30/1987	10/15/1987	494	148.6	3.3		13.2	12.54	0	0	0	Wheat
Buchanan	35	1/6/1986	1/29/1986	297	111.73	3.1		13.47	22.32	0	0		Corn
Buchanan	35	1/20/1986	1/23/1986	117	38.84	1.11		16.05	7.77	0	0		Corn
Buchanan	35	1/24/1986	3/11/1986	801	287.8	8.22		17.47	57.54	0	0		Corn
Buchanan	45	3/20/1986	3/20/1986	36	10.3	0.23		19.48	1.66	0	0		Corn
Buchanan	20	3/25/1986	3/26/1986	90	28.4	1.42		19.52	12.21	0	0		Corn
Buchanan	36	12/23/1985	12/31/1985	243	68.5	1.9		19.37	15.2	0	0		
Buchanan	37	1/23/1985	3/26/1985	850	247.61	6.69		15.48	16.06	0	0		Corn
Buchanan	33	1/1/1985	1/22/1985	340	100.44	3.04		25.87	7.9	0	0		Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Buchanan	35	4/29/1985	5/9/1985	180	50.67	1.45		23.98	4.05	0	0		Corn
Buchanan	45	5/24/1985	11/8/1985	1086	331.66	7.37		19.48	11.79	0	0		Corn
Buchanan	20	10/28/1985	11/1/1985	252	77.44	3.87		19.52	2.32	0	0		Corn
Buchanan	30	11/11/1985	12/9/1985	252	73.41	2.45		14.01	19.6	0	0		Beans
Buchanan	35	11/19/1985	12/18/1985	342	97.16	2.78		16.05	23.91	0	0		Corn
Buchanan	35	12/8/1983	3/6/1984	380	112.78	3.2			63.76	0	0		Corn
Buchanan	30	2/6/1984	2/8/1984	104.5	30.79	1.03			22.66	0	0		re/Brome
Buchanan	20	7/23/1984	7/27/1984	217.5	65.88	3.29			7.9	0	0		y/Pasture
Buchanan	33	8/6/1984	1/22/1985	470	138.18	4.19			105.59	0	0		Corn
Buchanan	40	8/21/1984	8/29/1984	240	70.56	1.76			45.06	0	0		Corn
Buchanan	36	8/30/1984	10/12/1984	817	248.69	6.91			172.75	0	0		Corn
Buchanan	35	12/8/1983	3/6/1984	120	34	0.99		18.22	19.5	0	0		Corn
Buchanan	35	1/1/1983	1/1/1983	0	0	0		0		0	0		
Buchanan	20	9/26/1983	9/27/1983	100	28.45	1.42		18.76	23	0	0		ne-Clover
Buchanan	30	10/11/1983	11/14/1983	640	192	6.4		21.12	127.8	0	0		Corn
Buchanan	30	11/22/1983	2/8/1984	530	87	1.78		16.21	39.16	0	0		re-Brome
Buchanan	10	1/1/1983	1/1/1983	0	0	0		0		0	0		
Buchanan	25	9/28/1983	9/30/1983	0	0	5.22		0	84.56	0	0	Beans	Wheat
Buchanan	9	1/1/1983	1/1/1983	0	0	0		0		0	0		
Buchanan	20	1/1/1983	1/1/1983	0	0	0		0		0	0		
Buchanan	75	12/13/1982	1/3/1983	1862	439.06	5.85		0	40.95	0	0		Corn
Dekalb	80	11/27/1998	12/8/1998	1040	390	4.875	9.41	13.7	25.16	0	0	Corn	oybeans)
Dekalb	20	11/23/1998	11/25/1998	286	101.53	5.08	9.47	11.6	43.45	0	0	Corn	oybeans)
Dekalb	100	10/27/1998	11/23/1998	2106	843.45	8.4345	9.8	15	56.01	0	0	Corn	oybeans)
Dekalb	95	12/6/1999	12/14/1999	1196.8	427.02	4.49	4.49	15.8	11.24	--	--	Corn	Soybeans
Dekalb	77	10/15/1999	10/25/1999	877.16	343.58	4.46	4.46	18.3	11.42	--	--	Soybeans	Corn
Dekalb	100	10/5/1999	10/15/1999	1094.55	428.74	4.29	4.29	14.1	10.98	--	--	Corn	Soybeans
Dekalb	60	3/10/1992	3/20/1992	1110	513.04	8.55	-	15.1	6.84	0	0	-	Hay
Dekalb	80	3/23/1992	4/3/1992	900	425.34	5.32	-	20.8	5.32	0	0	-	Corn
Dekalb	160	4/6/1992	4/7/1992	285	128.54	0.8	-	14.6	0.48	0	0	-	Corn
Dekalb	30	8/9/1990	10/1/1990	629	197.95	6.6		16.9	26.4	0	0	0	Wheat
Dekalb	160	10/2/1990	10/31/1990	1560	621.04	3.88		12.9	6.98	0	0	0	n (Clover)
Dekalb	100	11/1/1990	11/12/1990	750	214.05	2.14		15.4	5.56	0	0	0	n (Beans)
Dekalb	100	11/10/2005	11/25/2005	1593	439.51	4.3951	8.69	15.3	1.29	0	14.75	Soybeans	Corn
Dekalb	200	1/15/2003	2/18/2003	3908.28	1097.84	5.4892	5.49	15.2	1.62	24.86	15.98	Corn	Corn
Dekalb	26	3/6/2003	3/8/2003	431.46	117.06	4.502308	4.5	14.5	0.89	0	15.98	GR Hay	GR Hay
Dekalb	80	1/28/1994	2/4/1994	819	344.31	4.303875	16.22	15.7	14.68	0	0	Corn	Corn
Dekalb	80	2/7/1994	2/14/1994	858	362.51	4.531375	4.53	19.6	15.77	0	0	Corn	Corn
Dekalb	20	2/15/1994	2/17/1994	208	87.88	4.394	4.39	13.5	15.29	0	0	Soybeans	Corn
Dekalb	100	2/18/1994	2/25/1994	715	302.09	3.0209	7.7	15.9	10.51	0	0	Not Identified	Grass
Dekalb	100	6/13/1994	7/1/1994	1365	592.68	5.93	592.68	15.1	8.25	0	0	Grass	Identified
Dekalb	150.5	2/28/1994	3/4/1994	494	205.95	1.368439	1.37	17.5	4.68	0	0	Corn	Corn

County	Acres	Date_Started	Date_Completed	Wet_Tons	Dry_Tons	Dry_Tons_Ac	Dry_Tons_Accum	CEC	Lbs_Chr_Acre	Wgt_With_Pup	Wgt_WO_Pup	Field_Prev_Crop	Crop_Planted
Andrew	65	2/26/2008	3/5/2008	1002	289.46	4.45	0	17.9	1.1	0	0	Grass	Grass Hay
Dekalb	21	8/13/1999	8/17/1999	361	143.24	6.82	6.82	14.3	12.13	--	--	Red Clover	Hay
Dekalb	22.5	8/11/1999	8/13/1999	247	98.01	4.36	4.36	16.7	7.74	--	--	Hay	Corn
Dekalb	25	8/17/1999	8/20/1999	285	113.09	4.52	4.52	16.4	8.04	--	--	Clover	Corn
Dekalb	11	8/20/1999	8/23/1999	194.59	77.21	7.02	7.02	22.5	12.48	--	--	Clover	Clover
Dekalb	17	8/28/1999	8/30/1999	253.5	100.59	5.92	5.92	16.2	10.52	--	--	Alfalfa	Alfalfa
Dekalb	32	8/24/1999	8/27/1999	475.2	188.56	5.89	5.89	13.3	10.48	--	--	Alfalfa	Alfalfa
Dekalb	40	8/31/1999	9/7/1999	684.4	281.97	7.05	7.05	16.3	11.42	--	--	Grass/Pasture	s/Pasture
Buchanan	110	2/7/2000	2/15/2000	1126.4	498.66	4.53	5.41	13.3	2.45	0	17.6	Corn	Soybeans
Buchanan	37	2/17/2000	2/22/2000	492.8	218.16	5.9	10.49	21.3	3.18	0	17.6	Corn	Soybeans
Buchanan	86.6	1/13/1999	1/19/1999	208	75.92	0.88	0.88	11.2	1.17	--	--	Corn	Corn
Buchanan	76.4	1/20/1999	1/29/1999	960.78	350.68	4.59	4.59	10.8	6.1	--	--	Corn	Corn
Buchanan	75	4/22/1993	6/3/1993	2422	948.21	12.43	12.43	21.9	14.82	0	0	Corn	Corn
Dekalb	60	9/6/2005	9/15/2005	1015.3	282.25	4.704167	4.7	18.6	1.33	0	15.62	Grass	Grass
Andrew	290	5/2/1997	6/18/1997	3432	1289.75	4.45	16.52	15.1	7.02	0	0	CRP	son Grass
Dekalb	286	5/31/1996	11/6/1996	4043	1559.14	5.451538	12.07	15.6	10.09	0	0	Homeplace CRP	son Grass

Tannery Sludge Farm Fields Site
Andrew, Buchanan, Clinton, and
DeKalb Counties, Missouri
Pre-CERCLIS Site Screening
Reference USEPA, 2009c

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

DEC 0 2 2009

MEMORANDUM

SUBJECT: Chromium(VI) Risk-Based Soil Screening Levels
Former Prime Tanning Facility
St. Joseph, Missouri

FROM: Kelly Schumacher
Toxicologist
ENSV/EAMB

TO: Ron King
Site Assessment Manager
SUPR/ERNB

As requested, this memorandum provides risk-based screening levels for chromium(VI) in surface soil, intended for use in Andrew, Buchanan, Clinton, and DeKalb Counties where tanning sludge from the Former Prime Tanning Facility, located in St. Joseph, Missouri, was applied as fertilizer. These screening levels were developed in the spring and summer of 2009. The table below lists the risk-based screening levels for receptors exposed to soil from farm fields or residential yards, all of which are based on an excess individual lifetime cancer risk of 1 x 10^{-5}. Of the receptors exposed to farm field soil, the screening level for members of farm families (86 mg/kg) is lower than for the farmers (138 mg/kg), primarily because the farm family screening level accounts for exposure by children. Both of these values are driven by offsite inhalation exposure. The yard soil screening level (2 mg/kg) is lower than the field soil screening levels due to greater influence by the oral pathway, which has a different toxicity value than the inhalation pathway. The attached document provides additional information on the derivation and uncertainty of these values. If you have any questions or need further assistance, please contact me at x7963.

Chromium(VI) Soil Screening Levels (mg/kg) - Excess Individual Lifetime Cancer Risk = 1 x 10^{-5}.			
Source:	**Farm Field**		**Residential Yard**
Receptor:	Farmer	Resident Adjacent to Field	Resident
Soil Screening Level:	**138**	**86**	**2**

Attachment

GLOBE RECYCLED 100% FIBER

Chromium(VI) Risk-Based Soil Screening Levels
Former Prime Tanning Facility
St. Joseph, Missouri

1.0 INTRODUCTION

Sludge containing chromium(VI) from the National Beef Leathers tannery (formerly Prime Tanning), located in St. Joseph, Missouri, was applied as fertilizer to agricultural fields in Andrew, Buchanan, Clinton, and DeKalb Counties from 1983 to 2009. The types of fields treated with tanning sludge include pastureland and cropland, on which corn and soybeans were the major crops grown. The objective of this document is to develop site-specific risk-based screening levels for surface soil that take into account the most recent toxicological information on chromium(VI), as well as current and historical agricultural practices pertaining to this part of northwestern Missouri.

Screening levels are risk-based concentrations derived from standardized equations combining exposure assumptions with EPA toxicity data, which are considered by the Agency to be protective of human health (including sensitive groups) over a lifetime. The chromium(VI) screening levels derived in this document are based on an excess lifetime cancer risk of 1×10^{-5}. This level of risk means that one additional person out of 100,000 people could develop cancer from exposure to a carcinogenic substance. The Agency's target risk range for carcinogenic health effects is 10^{-4} to 10^{-6}.

2.0 EVALUATION OF EXPOSURE

2.1 Exposure Pathways

Risk-based screening levels were developed for chromium(VI) in agricultural field soil and residential yard soil. The first screening level was developed for farmers who work in fields treated with tanning sludge, because they have the highest potential exposure to chromium(VI) in field soil. A second screening level was developed for the field soil to account for the potential greater health risks to a child living adjacent to a treated farm field, compared to the farmer, based on differences in exposure and toxicity between children and adults. Finally, a third screening level was derived for exposure to chromium(VI) in yard soil by farm family residents. The exposure pathways for these receptors are discussed in more detail below.

A farmer could be exposed to chromium(VI) in field soil while working on a treated field, while working on an untreated field adjacent to a treated field, and while at home in a residence located near a treated field. While working on a treated field, a farmer could be exposed via incidental ingestion of and dermal contact with the field soil, as well as by inhalation of particulates generated by wind erosion and farming practices. The types of farming practices that generate dust derived from soil on a corn or soybean field include tilling, chisel plowing, and other land preparation activities, as well as planting and harvesting the crop. Farming practices are generally less intensive on pastureland, compared to corn or soybean fields, and are expected to generate less dust. It was assumed that a farmer would conduct all

land preparation, planting, and harvesting activities on the treated fields, rather than hiring workers to conduct these activities. Therefore, a farmer's inhalation of particulates generated by these farming practices would occur on the treated field, rather than offsite. A farmer could also be exposed to chromium(VI) offsite by inhaling particulates generated by wind erosion of the treated field soil that are transported by the wind to other untreated fields where the farmer works or to the farmer's residence.

A second type of receptor with potential exposure to chromium(VI) in the agricultural field soil is a member of a farm family who lives in a residence located adjacent to a treated field. The farm family residents, including adults and children, could be exposed to chromium(VI) by inhaling particulates generated from the treated field soil by wind erosion and farming activities that are transported to their homes by the wind.

The airborne particulates from treated field soil could also be deposited onto the yards of nearby residences. A farm family resident could then be exposed to chromium(VI) in yard soil via incidental ingestion and dermal contact, as well as by inhaling particulates re-generated from the yard soil by wind erosion.

2.2 Exposure Parameters

This section discusses the specific exposure parameters used to derive screening levels for chromium(VI) in field soil, based on risks to farmers and farm family residents, and for chromium(VI) in yard soil, based on risks to farm family residents. In general, the equations used to calculate aggregate exposure and incidental ingestion were obtained from the Risk Assessment Guidance for Superfund, Volume I, Part B (USEPA, 1991a), while those for inhalation exposure were taken from the Risk Assessment Guidance for Superfund, Volume I, Part F (USEPA, 2009a) and from EPA's Supplemental Soil Screening Guidance (USEPA, 2002). The exposure parameters were selected to best represent reasonable maximum exposure scenarios. A reasonable maximum exposure (RME) is the highest exposure that is reasonably expected to occur at a site. The definitions, values, and references for the exposure parameters used in this document are provided in Table 1.

2.2.1 Agricultural Fields

2.2.1.1 Farmer

A farmer could be exposed to chromium(VI) in field soil while actively working on a treated field via incidental ingestion, dermal contact, and inhalation of particulates, as well as while offsite via inhalation of particulates. Equations 1, 2, and 3 were used to derive the levels of chromium(VI) in field soil that represent a target cancer risk of 1×10^{-5} (see Section 1) to a farmer under RME scenarios including incidental ingestion, inhalation of particulates while on the treated fields, and off-site inhalation of particulates, respectively. The dermal pathway was not evaluated quantitatively because it was not expected to significantly contribute to exposure (only 1.3% of chromium(VI) on the skin is absorbed; USEPA, 2008a).

$$FieldSL_{farm-ing}(mg/kg) = \frac{TR \cdot AT \cdot BW_a}{EF_{work} \cdot ED \cdot CSF_o \cdot IR_S \cdot 10^{-6} \frac{kg}{mg}} \quad (1)$$

$$FieldSL_{farm-inh-work}(mg/kg) = \frac{TR \cdot AT}{EF_{work} \cdot ED \cdot \frac{ET_{work}}{24hrs} \cdot IUR \cdot 1000 \frac{\mu g}{mg} \cdot \frac{1}{PEF_{farm-work}}} \quad (2)$$

$$FieldSL_{farm-inh-off}(mg/kg) = \frac{TR \cdot AT}{\left[(EF_{res} - EF_{work}) \cdot \frac{ET_{res}}{24} + EF_{work} \cdot \frac{ET_{work}}{24hrs}\right] \cdot ED \cdot IUR \cdot 1000 \frac{\mu g}{mg} \cdot \frac{1}{PEF_{farm-off}}} \quad (3)$$

Default values were used in equations 1, 2, and 3 for the averaging time (AT), adult body weight (BW_a), soil ingestion rate (IR_s), exposure duration (ED), exposure frequency (EF), and exposure time (ET). The IR_s value for a construction worker (330 mg/day) was used instead of the outdoor worker or adult resident IR_s value (100 mg/kg) because it is considered more representative of the soil ingestion rates of a farmer who is engaged in high contact-intensive activities. Under the RME scenario, it was assumed that the farmers practice traditional farming methods. Compared to today's no-till farming, traditional farming involves a greater number of passes across the field to knock down corn stalks (stubble disc), heavy till, and/or field cultivate (weeding) (USEPA, 2009b & 2009c). The RME scenario also assumes use of open-cab vs. closed cab tractors, which means that the tractors do not have windows and air filters to limit the farmer's exposure to dust. Even though more farmers today use closed cab tractors, they may not regularly replace the filters and, instead, open the windows (USEPA, 2009b). The default residential values for ED (30 year) and total EF (350 days/year) were used for the farmers instead of the default values for an outdoor worker because the farmers incur both residential and work-related exposures to chromium(VI). A reasonable maximum estimate of the time to conduct farming activities on an 80 acre corn or soybean field (which is the mean area of sludge application, based on data from 1983-2008) is 7 days/year, which includes 5 days/yr for land preparation activities and 2 days/yr to harvest (USEPA, 2009d). The total exposure frequency (350 days/year) comprises EF_{work}, which is the 7 days/year a farmer is on a treated field, and EF_{res}, which is the 343 days/year that a farmer works on untreated fields or is at home. Finally, the default residential value for ET_{res} (24 hrs/day) was used to represent the hrs/day that offsite inhalation occurred (working on untreated fields plus at home), while a site-specific value was selected for ET_{work} (12 hrs/day; USEPA, 2009d) to represent the hrs/day spent working on a treated field.

Site-specific particulate emission factors (PEFs) were used to derive screening levels accounting for inhalation exposure by a farmer (equations 2 and 3). A PEF "represents an estimate of the relationship between the concentration of contaminant in soil to the concentration of contaminant in air (as a consequence of particle suspension)" (USEPA, 2002). Site-specific PEFs were derived for the inhalation of particulates by a farmer while working on a treated field (equation 4) and while offsite (equation 5). Both of these equations take the form of Equation E-

3 from USEPA (2002) and include a dispersion factor (Q/C) and a unit emission flux (J).

$$PEF_{farm-work}\left(m^3/kg\right)=\frac{Q}{C_{field-work}}\cdot\frac{1}{J_{field-tot}} \tag{4}$$

$$PEF_{farm-off}\left(m^3/kg\right)=\frac{Q}{C_{field-off}}\cdot\frac{1}{J_{field-wind}} \tag{5}$$

The site-specific dispersion factors used in equations 4 and 5 were derived using equations 6 and 7. $Q/C_{field\text{-}work}$ (equation 6) is the inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source, while $Q/C_{field\text{-}off}$ (equation 7) is the inverse of that ratio at the site boundary (USEPA, 2002). The assumption made in equation 6 is that a farmer is located in the center of a field treated with tanning sludge for the entire duration spent working on that field. The assumption made in equation 7 is that a farmer is located on the edge of the treated field at all other times, including the time spent working on untreated fields and the time spent at home. Both of these assumptions represent maximum possible exposures. The size of the treated field (A_{field}) used in both equations 6 and 7, is 80 acres, as previously discussed. The values for the constants A_{cen}, B_{cen}, and C_{cen} were obtained from Exhibit E-3, and the values for A_{off}, B_{off}, and C_{off} were obtained from Exhibit E-5 in USEPA (2002) for the meteorological station closest to this site (*i.e.*, Lincoln, NE).

$$\frac{Q}{C_{field-work}}\left(g/m^2\cdot s_per_kg/m^3\right)=A_{cen}\cdot\exp\left[\frac{\left(\ln A_{field}-B_{cen}\right)^2}{C_{cen}}\right] \tag{6}$$

$$\frac{Q}{C_{field-off}}\left(g/m^2\cdot s_per_kg/m^3\right)=A_{off}\cdot\exp\left[\frac{\left(\ln A_{field}-B_{off}\right)^2}{C_{off}}\right] \tag{7}$$

The site-specific unit emission flux values used in equations 3 and 4 were derived using equations 8 and 9. $J_{field\text{-}tot}$ (equation 8) is the PM_{10} emission flux for the mass of dust generated annually from wind erosion ($M_{wind\text{-}field}$), tilling (M_{till}), and harvesting (M_{harv}) an 80 acre field over a 30 year period, while $J_{field\text{-}wind}$ (equation 9) is the PM_{10} emission flux for the mass of dust generated annually from wind erosion only. During the time that a farmer works on a treated field, particulates containing chromium(VI) are generated by the wind as well as by farming activities. In contrast, when the farmer is offsite, tilling and harvesting activities are not assumed to occur on the treated field.

$$J_{field-tot}\left(g/m^2\cdot s\right)=\frac{M_{wind-field}+M_{till}+M_{harv}}{A_{field}\cdot ED\cdot 31{,}536{,}000\ \text{s/yr}} \tag{8}$$

$$J_{field-wind}\left(g/m^2\cdot s\right)=\frac{M_{wind-field}}{A_{field}\cdot ED\cdot 31{,}536{,}000\ \text{s/yr}} \tag{9}$$

Equations 10, 11, and 13 were used to estimate the mass of particulates derived from soil generated annually by wind erosion, tilling, and harvesting an 80 acre field, respectively. The equation used to calculate the mass generated by wind erosion, equation 10, takes the form of Equation E-20 in USEPA (2002), with the addition of '365-p/365' to account for rainfall, as in Equation E-27 (USEPA, 2002). The vegetative cover ('V') in this equation is assumed to be 0.365 because crops are expected to be on the field for 19 out of 52 weeks per year, between the time of emergence and time of harvest (USEPA, 2009c). The equation used to calculate the mass generated by tilling, equation 11, takes the form of Equation E-24 in USEPA (2002), except that EmF_{till} is calculated in Equation 12. This emission factor for PM_{10} generated from tilling was taken from Section 11.2.2.3 of the 4th edition of the "Compilation of Air Pollutant Emission Factors" (USEPA, 1985). The 4th edition is referenced because the most current edition does not address emission factors associated with agricultural tilling. Based on information provided from a local agricultural extension office, the reasonable maximum number of passes a farmer would be expected to make while tilling (e.g., discing, chisel plowing, planting, etc.) a soybean or corn field is five passes (USEPA, 2009c). The number of passes using no-till practices is lower. The value of the soil silt content ('s') used in Equation 12 was obtained by averaging the silt contents of the various soil types found in Andrew, Buchanan, Clinton, and DeKalb Counties, as presented at NRCS (2009). The equation used to calculate the mass generated by harvesting, equation 13, takes the form of Equation E-24 in USEPA (2002), where the value of EmF_{harv} was obtained from WRAP (2006) as the PM_{10} emission factor for harvesting corn as grain. It was assumed that a farmer makes one pass while harvesting corn or soybeans.

$$M_{wind-field}(g) = 0.036 \cdot (1 - V_{field}) \cdot \left(\frac{U_m}{U_t}\right)^3 \cdot F(x) \cdot A_{field} \cdot ED \cdot 8760 \cdot \left(\frac{365days - p}{365days}\right) \quad (10)$$

$$M_{till}(g) = LPA_{till} \cdot EmF_{till} \cdot A_{field} \cdot 453.59237 \frac{g}{lb} \quad (11)$$

$$EmF_{till} = 0.21 \cdot 4.8 \cdot s^{0.6} \quad (12)$$

$$M_{harv}(g) = LPA_{harv} \cdot EmF_{harv} \cdot A_{field} \cdot 453.59237 \frac{g}{lb} \quad (13)$$

2.2.1.2 Farm Family Residents

The farm family residents, including adults and children, could be exposed to chromium(VI) in field soil by inhaling particulates generated by wind erosion and farming activities that are transported from the treated agricultural fields to their homes by the wind. Equation 14 was used to derive the level of chromium(VI) in field soil that represents a target cancer risk of 1×10^{-5} (see Section 1) to a farm family resident under RME scenarios via off-site inhalation of particulates. This equation contains default residential values (USEPA, 1991a) for

the averaging time (AT), exposure duration (ED), exposure frequency (EF), and exposure time (ET).

$$FieldSL_{res-inh-off}(mg/kg) = \frac{TR \cdot AT}{EF_{res} \cdot ED \cdot \frac{ET_{res}}{24hrs} \cdot IUR \cdot ADAF_{wtd} \cdot 1000 \frac{\mu g}{mg} \cdot \frac{1}{PEF_{res-off}}} \quad (14)$$

Because the farm family residents include children, age-dependent adjustment factors (ADAFs) were applied to equation 14 to account for the postulated mutagenic mode of action of chromium(VI). This is discussed in more detail in Section 3.3. Equation 15 is the total ADAF, weighted by age: an ADAF of 10 for ages 0-2 years, an ADAF of 3 for ages 2-16 years, and an ADAF of 1 for ages 16-30, for a total exposure duration of 30 years.

$$ADAF_{wtd} = \frac{(ED_{0-2yrs} \cdot 10) + (ED_{2-16yrs} \cdot 3) + (ED_{16-30yrs} \cdot 1)}{ED_{0-30yrs}} \quad (15)$$

A site-specific particulate emission factor ($PEF_{res-off}$) was derived for the inhalation of particulates generated from field soil by a farm family resident (equation 16). The terms in equation 16 are $Q/C_{field-off}$, previously defined in equation 7, and $J_{field-tot}$, previously defined in equation 8. The offsite dispersion factor, $Q/C_{field-off}$, assumes that all residential exposure to the field soil via inhalation of particulates occurs while the resident is located on the border of the treated field. This is a very high-end estimate, as it is unlikely that a resident will spend 350 days/yr for 30 yrs on the field boundary. The PM_{10} emission flux, $J_{field-tot}$, accounts for the mass of dust generated annually from wind erosion and by tilling and harvesting an 80 acre field treated with tanning sludge (Equations 10, 11, and 13, respectively).

$$PEF_{res-off}(m^3/kg) = \frac{Q}{C_{field-off}} \cdot \frac{1}{J_{field-tot}} \quad (16)$$

2.2.2 Residential Yards

A farm family resident could be exposed to chromium(VI) in yard soil via incidental ingestion, dermal contact, and inhalation of particulates regenerated from the yard soil by wind erosion. Equations 17 and 18 were used to derive the levels of chromium(VI) in yard soil that represent a target cancer risk of 1×10^{-5} (see Section 1) to a farm family resident under RME scenarios including incidental ingestion and inhalation of particulates, respectively. The dermal pathway was not evaluated quantitatively because it was not expected to significantly contribute to exposure (only 1.3% of chromium(VI) on the skin is absorbed; USEPA, 2008a). Equations 17 and 18 contain default residential values (USEPA, 1991a) for the averaging time (AT), exposure duration (ED), exposure frequency (EF), and exposure time (ET).

$$YardSL_{res-ing}(mg/kg) = \frac{TR \cdot AT}{EF_{res} \cdot IFSM_{adj} \cdot CSF_o \cdot 10^{-6} \frac{kg}{mg}} \quad (17)$$

$$YardSL_{res-inh}(mg/kg) = \frac{TR \cdot AT}{EF_{res} \cdot ED \cdot \frac{ET_{res}}{24hrs} \cdot IUR \cdot ADAF_{wtd} \cdot 1000 \frac{\mu g}{mg} \cdot \frac{1}{PEF_{yard}}} \quad (18)$$

Because the farm family residents include children, age-dependent adjustment factors (ADAFs) were applied to equations 17 and 18 to account for the postulated mutagenic mode of action of chromium(VI). This is discussed in more detail in Section 3.3. Equation 17 includes a term, $IFSM_{adj}$, that accounts for the different ADAFs, body weights, and soil ingestion rates applicable from ages 0-2 years, 2-6 years, 6-16 years, and 16-30 years, over a total exposure duration of 30 years. $IFSM_{adj}$ is defined in equation 19 and includes default residential values for the body weights and soil ingestion rates of adults and children. Equation 18 incorporates the age-weighted ADAF previously defined in equation 15.

$$IFSM_{adj} = \frac{ED_{0-2yrs} \cdot IR_C \cdot 10}{BW_C} + \frac{ED_{2-6yrs} \cdot IR_C \cdot 3}{BW_C} + \frac{ED_{6-16yrs} \cdot IR_a \cdot 3}{BW_a} + \frac{ED_{16-30yrs} \cdot IR_a \cdot 1}{BW_a} \quad (19)$$

Equation 20 was used to calculate the particulate emission factor (PEF_{yard}) for the inhalation of particulates generated from yard soil. The terms in equation 20 are Q/C_{yard}, defined in equation 21, and J_{yard}, defined in equation 22.

$$PEF_{yard}(m^3/kg) = \frac{Q}{C_{yard}} \cdot \frac{1}{J_{yard}} \quad (20)$$

The yard dispersion factor (Q/C_{yard}) is the inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source (USEPA, 2002). The assumption made in equation 21 is that all residential exposure to the yard soil via inhalation of particulates occurs while a resident is located in the center of their yard. The size of the yard (A_{yard}) is assumed to be 0.5 acres, which is the default residential value. The values for the constants A_{cen}, B_{cen}, and C_{cen} were obtained from Exhibit E-3 in USEPA (2002) for the meteorological station closest to this site (*i.e.*, Lincoln, NE).

$$\frac{Q}{C_{yard}}(g/m^2 \cdot s_per_kg/m^3) = A_{cen} \cdot \exp\left[\frac{(\ln A_{yard} - B_{cen})^2}{C_{cen}}\right] \quad (21)$$

The PM_{10} emission flux (J_{yard}) accounts for the mass of dust generated annually from wind erosion of a 0.5 acre yard. The mass of dust generated from wind erosion of the yard ($M_{wind\text{-}yard}$, equation 23) differs from the mass of wind-borne dust from the field determined in

equation 10 in that the size of the yard is 0.5 acres, and the vegetative cover is assumed to be 50%, which is the default value for a residential yard.

$$J_{yard}\left(g/m^2 \cdot s\right) = \frac{M_{wind-yard}}{A_{yard} \cdot ED \cdot 31{,}536{,}000\ \text{s/yr}} \tag{22}$$

$$M_{wind-yard}(g) = 0.036 \cdot \left(1 - V_{yard}\right) \cdot \left(\frac{U_m}{U_t}\right)^3 \cdot F(x) \cdot A_{yard} \cdot ED \cdot 8760 \cdot \left(\frac{365days - p}{365days}\right) \tag{23}$$

Table 1. Exposure Parameters Used to Calculate Soil Screening Levels for Chromium(VI).

Parameter	Definition	Units	Value	Reference
A_{cen}	Dispersion constant – center of field or yard (based on conditions at Lincoln, NE)	-	14.1901	USEPA, 2002 Exhibit E-3
$ADAF_{wtd}$	Age-dependent adjustment factor for mutagens – weighted by age	-	2.53	Calculated: Equation (15)
A_{field}	Area of the treated field	acres	80	BPJ: section 2.2.1.1
A_{off}	Dispersion constant – edge of field (based on conditions at Lincoln, NE)	-	17.6897	USEPA, 2002 Exhibit E-5
AT	Averaging time – cancer health effects	days	25,550	USEPA, 1989 Exhibit 6-11
A_{yard}	Area of a residential yard	acres	0.5	USEPA, 2002
B_{cen}	Dispersion constant – center of field or yard (based on conditions at Lincoln, NE)	-	18.5634	USEPA, 2002 Exhibit E-3
B_{off}	Dispersion constant – edge of field (based on conditions at Lincoln, NE)	-	22.7826	USEPA, 2002 Exhibit E-5
BW_a	Body weight - adult	kg	70	USEPA, 2002 Exhibit 1-2
BW_C	Body weight - child	kg	15	USEPA, 2002 Exhibit 1-2
C_{cen}	Dispersion constant – center of field or yard (based on conditions at Lincoln, NE)	-	210.5281	USEPA, 2002 Exhibit E-3
C_{off}	Dispersion constant – edge of field (based on conditions at Lincoln, NE)	-	273.2907	USEPA, 2002 Exhibit E-5
ED	Exposure duration	years	30	USEPA, 1991b
EF_{res}	Exposure frequency – resident	days/yr	350	USEPA, 1991b
EF_{work}	Exposure frequency – farmer, working on treated fields	days/yr	7	USEPA, 2009d
EmF_{harv}	PM_{10} emission factor – corn	lb/pass	1.7	WRAP, 2006
EmF_{till}	PM_{10} emission factor – tilling	lb/pass	11.4	Calculated: Equation (12)
ET_{res}	Exposure time – resident	hrs/day	24	USEPA, 2009a
ET_{work}	Exposure time – farmer, working on treated fields	hrs/day	12	USEPA, 2009d
F(x)	Function dependent on U_m/U_t derived from Cowherd et al. (1985)	-	0.194	USEPA, 2002
$FieldSL_{farm\text{-}ing}$	Field soil screening level – farmer, incidental ingestion only	mg/kg	327	Calculated: Equation (1)
$FieldSL_{farm\text{-}inh\text{-}off}$	Field soil screening level – farmer, inhalation, offsite only	mg/kg	242	Calculated: Equation (3)

Table 1. Exposure Parameters Used to Calculate Soil Screening Levels for Chromium(VI).				
Parameter	**Definition**	**Units**	**Value**	**Reference**
$FieldSL_{farm\text{-}inh\text{-}work}$	Field soil screening level – farmer, inhalation, on treated fields only	mg/kg	13,221	Calculated: Equation (2)
$IFSM_{adj}$	Mutagenic resident soil intake factor – age-adjusted	mg-year/kg-day	489.5	Calculated: Equation (19)
IR_a	Ingestion rate of soil – adult resident	mg/day	100	USEPA, 2002 Exhibit 1-2
IR_c	Ingestion rate of soil – child	mg/day	200	USEPA, 2002 Exhibit 1-2
IR_f	Ingestion rate of soil – farmer	mg/day	330	BPJ: section 2.2.1.1
$J_{field\text{-}tot}$	Time-averaged unit emission flux – field, wind erosion and farming activities	g/m^2-s	8.08E-08	Calculated: Equation (8)
$J_{field\text{-}wind}$	Time-averaged unit emission flux – field, wind erosion only	g/m^2-s	7.39E-08	Calculated: Equation (9)
J_{yard}	Time-averaged unit emission flux – yard, wind erosion only	g/m^2-s	5.82E-08	Calculated: Equation (22)
LPA_{harv}	# Land passes per acre – harvesting	passes/acre	1	USEPA, 2009d
LPA_{till}	# Land passes per acre – tilling	passes/acre	5	USEPA, 2009d
M_{harv}	Unit mass emitted from harvesting – field	g	6.17E+04	Calculated: Equation (13)
M_{till}	Unit mass emitted from tilling – field	g	2.06E+06	Calculated: Equation (11)
$M_{wind\text{-}field}$	Unit mass emitted from wind erosion – field	g	2.26E+07	Calculated: Equation (10)
$M_{wind\text{-}yard}$	Unit mass emitted from wind erosion – yard	g	1.11E+05	Calculated: Equation (23)
p	Precipitation - average # of days with > 0.1 inches rain in St. Joseph from 1971-2000	days	57	NOAA, 2009
$PEF_{farm\text{-}off}$	Particulate emission factor – farmer, offsite (border of treated field)	m^3/kg	8.27E+08	Calculated: Equation (5)
$PEF_{farm\text{-}work}$	Particulate emission factor – farmer, working (center of treated field)	m^3/kg	4.56E+08	Calculated: Equation (4)
$PEF_{res\text{-}off}$	Particulate emission factor – resident, offsite (border of treated field)	m^3/kg	7.56E+08	Calculated: Equation (16)
PEF_{yard}	Particulate emission factor – resident, yard (center of yard)	m^3/kg	1.42E+09	Calculated: Equation (20)
$Q/C_{field\text{-}off}$	Air dispersion factor for particulates generated from soils – border of treated field	g/m^2-s per kg/m^3	61.06	Calculated: Equation (7)
$Q/C_{field\text{-}work}$	Air dispersion factor for particulates generated from soils – center of treated field	g/m^2-s per kg/m^3	36.89	Calculated: Equation (6)
Q/C_{yard}	Air dispersion factor for particulates generated from soils – center of yard	g/m^2-s per kg/m^3	82.59	Calculated: Equation (21)
s	Average silt content of soil in Andrew, Buchanan, Clinton, and DeKalb counties	%	56.7	NRCS, 2009
TR	Target cancer risk	-	1×10^{-5}	-
U_m	Mean windspeed	m/s	4.69	USEPA, 2002
U_t	Equivalent threshold value of windspeed at 7 m	m/s	11.32	USEPA, 2002
V_{field}	Fraction of vegetative cover - field	-	0.365	USEPA, 2009c
V_{yard}	Fraction of vegetative cover - yard	-	0.5	USEPA, 1996
$YardSL_{res\text{-}ing}$	Yard soil screening level –	mg/kg	2	Calculated:

Table 1. Exposure Parameters Used to Calculate Soil Screening Levels for Chromium(VI).				
Parameter	**Definition**	**Units**	**Value**	**Reference**
	resident, incidental ingestion only			Equation (17)
$YardSL_{res\text{-}inh}$	Yard soil screening level – resident, inhalation only	mg/kg	162	Calculated: Equation (18)

3.0 EVALUATION OF CHROMIUM(VI) CARCINOGENICITY

When evaluating the potential carcinogenicity of a chemical, EPA generally assumes that any exposure to a chemical will increase an individual's risk of developing cancer. In other words, there is no threshold below which the probability of developing cancer is zero. EPA evaluates carcinogenic effects in two parts. First, the Agency evaluates all available scientific information and assigns a weight-of-evidence classification based on a compound's potential to cause cancer in humans. Second, a toxicity value is calculated to define the quantitative relationship between dose or concentration and carcinogenic response. These values are known as cancer slope factors (CSFs) and inhalation unit risks (IURs). CSFs and IURs are generally plausible upper-bound estimates of the increased probability of developing cancer following a lifetime of exposure. These toxicity values are used to estimate the increased risk of developing cancer from exposure to potentially carcinogenic chemicals.

EPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-53 (USEPA, 2003) provides the hierarchy of human health toxicity values and guidance on the selection of the most appropriate sources of toxicity information that should be used to perform human health risk assessments for Comprehensive Environmental Response Compensation and Liability Act (CERCLA or "Superfund") sites. Tier 1 toxicity values are those in EPA's Integrated Risk Information System (IRIS). Tier 2 values are those from EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs). Finally, Tier 3 values are those from other EPA or non-EPA sources, especially those with the most current information, which are publicly available and transparent regarding the methods and process used to derive the values, and which have been peer-reviewed. According to this hierarchy document, "draft toxicity assessments are not appropriate for use until they have been through peer review, the peer review comments have been addressed in a revised draft, and the revised draft is publicly available."

3.1 Inhalation Route

EPA's IRIS program has evaluated the carcinogenic potential of chromium(VI) via the inhalation route and has classified it as a Group A "Known Human Carcinogen," under the 1986 Guidelines for Carcinogen Risk Assessment (USEPA, 1986). "Results of occupational epidemiologic studies of chromium-exposed workers across investigators and study populations consistently demonstrate that chromium is carcinogenic by the inhalation route of exposure" (USEPA, 1998). In workers, dose-response relationships have been established for chromium exposure and lung cancer. Animal studies support the finding that chromium(VI) is carcinogenic via inhalation.

Although IRIS has determined that chromium(VI), but not chromium(III), is

carcinogenic, none of the few available human studies that specifically examine inhalation of chromium(VI) provide adequate exposure data for a dose-response assessment. Therefore, IRIS used an occupational study that examined lung cancer in human workers who were exposed to total chromium (Mancuso, 1975) to derive an inhalation unit risk value of 1.2×10^{-2} $(\mu g/m^3)^{-1}$. In the Mancuso study, the ratios of chromium(III) to chromium(VI) concentrations in the airborne dust ranged from 1:3 in nine departments of the plant, to 1:6 in the lime and ash operations, and 1:52 in the ore preparation department (Bourne and Yee, 1950). Although none of the workers were exposed to 100% chromium(VI), it is unlikely that the majority were exposed to the 1:52 ratio in the ore preparation department. The inhalation unit risk value available in the EPA Regional Screening Levels for chemical Contaminants at Superfund Sites, 8.4×10^{-2} $(\mu g/m^3)^{-1}$, was derived by multiplying the IRIS inhalation unit risk value by 7, which makes the conservative assumption that the Mancuso cohort was exposed to a 1:6 ratio of chromium(VI) to chromium(III) (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm). The inhalation unit risk available in the Regional Screening Levels was selected for derivation of site-specific risk-based screening levels in northwestern Missouri.

3.2 Oral Route

Oral cancer slope factors for chromium(VI) are not available from Tier 1 (IRIS) or Tier 2 (PPRTV) sources. Although the IRIS program determined that chromium(VI) was carcinogenic via inhalation in 1998, they were unable to evaluate the carcinogenicity via oral exposure due to a lack of sufficient epidemiological or toxicological data at that time. Since then, the National Toxicology Program (NTP) has conducted cancer bioassays in rats and mice to assess the carcinogenicity of chromium(VI) by the oral route of exposure (NTP, 2008). Based on these studies, the NTP concluded that sodium dichromate dihydrate in drinking water caused oral cancers in rats and cancer of the small intestine in mice.

Two Tier 3 sources for toxicity values, the EPA's Office of Pesticide Programs (OPP) and the New Jersey Department of Environmental Protection (NJDEP), have recently used the NTP studies to derive oral cancer slope factors. OPP classified the carcinogenicity of chromium(VI) via the oral route of exposure as "Likely to be Carcinogenic to Humans" based on the presence of oral mucosa and tongue tumors in male and female rats and tumors of the small intestine in male and female mice at doses that were adequate, but not excessive, to assess carcinogenicity (Kidwell, 2008). From the female mouse data in the NTP studies, OPP derived a cancer slope factor of 0.79 $(mg/kg/day)^{-1}$. This finalized toxicity value was used in the reregistration eligibility decision for chromated arsenicals (USEPA, 2008). NJDEP also classified the carcinogenicity of chromium(VI) by ingestion as "Likely to be Carcinogenic to Humans" (NJDEP, 2009). Using the male mice data from the NTP studies, NJDEP derived a cancer slope factor of 0.5 $(mg/kg/day)^{-1}$.

For the derivation of risk-based chromium(VI) screening levels, the OPP cancer slope factor was selected. Use of the slightly higher OPP cancer slope factor results in lower, more health-protective screening levels than use of the NJDEP value. In addition, the NJDEP cancer slope factor supports the OPP value, in that both are based on the same critical study and both

numbers are at the same order of magnitude.

3.3 Mutagenic Mode of Action

Traditionally, assessment of risks associated with exposure to carcinogens employs the use of a cancer slope factor based on effects observed following exposures to adult humans or sexually mature animals. However, for some chemicals, there may be an increased susceptibility for carcinogenesis following early-life exposure, in comparison with exposure during adulthood. The *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (USEPA, 2005) directs the use of a weight-of-evidence approach to evaluate the mode of action associated with a chemical. For those chemicals determined to have a mutagenic mode of action, this guidance recommends application of age-dependent adjustment factors (ADAFs), as appropriate, to develop risk estimates (USEPA, 2005).

The IRIS toxicological profile on chromium(VI) was completed prior to the guidance on the determination of a mutagenic mode of action. However, at the time of their review, IRIS concluded that the *in vitro* data available were suggestive of a mutagenic mode of action (USEPA, 1998). In 2008, OPP concluded that "[t]here is clear evidence that Cr(VI) is mutagenic and convincing evidence supporting a mutagenic mode of action" (Chen and McMahon, 2008). Chromium(VI) rapidly crosses cell membranes and is then quickly reduced to chromium(III), which generates chromium(V) and chromium(IV) intermediates, as well as other reactive oxygen species(ROS), including hydroxyl free radicals and singlet oxygen (Chen and McMahon, 2008). This reduction process results in many types of deoxyribonucleic acid (DNA) damage. OPP cited the 2005 Supplemental Guidance in their decision to apply ADAFs for cancer risk estimates for child receptors. NJDEP noted the OPP determination of a mutagenic mode of action but did not use ADAFs in their draft risk assessment, stating that "the criteria for this determination are not clear."

To develop screening levels for chromium(VI) in Missouri farm fields, Region 7 determined that it was appropriate to apply ADAFs. First, application of ADAFs to derive risk estimates for children exposed to a mutagenic chemical results in more conservative (health-protective) screening levels. Second, OPP's determination of a mutagenic mode of action is final and publicly available (USEPA, 2008c; McCarroll et al., 2009). Because the postulated mutagenic mode of action for chromium(VI) is oxidative damage to DNA resulting from reactive oxygen intermediates formed in the reduction of chromium(VI) to chromium(III) and because this reduction process occurs in all cells, regardless of type, ADAFs were applied to risk estimates for early life exposure via both inhalation and ingestion.

4.0 RISK-BASED SCREENING LEVELS

Risk-based screening levels for chromium(VI) were developed for surface soil in agricultural fields and residential yards. The total screening levels, as well as route-specific screening levels, are presented in Table 2.

Equation 24 was used to derive the concentration of chromium(VI) in agricultural fields

treated with tanning sludge that results in a 1 x 10^{-5} excess lifetime cancer risk to a farmer ($FieldSL_{farm\text{-}tot}$), based on exposure by incidental ingestion ($FieldSL_{farm\text{-}ing}$, equation 1) and inhalation ($FieldSL_{farm\text{-}inh\text{-}work}$, equation 2) while on the treated field, plus offsite inhalation of particulates ($FieldSL_{farm\text{-}inh\text{-}off}$, equation 3). The field soil screening level for a farmer is 138 mg/kg.

$$FieldSL_{farm-tot}(mg/kg) = \frac{1}{\frac{1}{FieldSL_{farm-ing}} + \frac{1}{FieldSL_{farm-inh-work}} + \frac{1}{FieldSL_{farm-inh-off}}} \tag{24}$$

Because farm family residents are only exposed to chromium(VI) in field soil via inhalation of particulates that drift to the edge of the treated field, the concentration of chromium(VI) in field soil that results in a 1 x 10^{-5} excess lifetime cancer risk to a resident ($FieldSL_{res\text{-}tot}$) equals $FieldSL_{res\text{-}inh\text{-}off}$ (equation 14). The field soil screening level for a farm family resident is 86 mg/kg.

$$FieldSL_{res-tot}(mg/kg) = FieldSL_{res-inh-off} \tag{25}$$

Finally, Equation 26 was used to derive the concentration of chromium(VI) in yards that results in a 1 x 10^{-5} excess lifetime cancer risk to a resident ($YardSL_{res\text{-}tot}$), based on exposure by incidental ingestion ($YardSL_{res\text{-}ing}$, equation 17) and inhalation ($YardSL_{res\text{-}inh}$, equation 18). The yard soil screening level for a resident is 2 mg/kg.

$$YardSL_{res-tot}(mg/kg) = \frac{1}{\frac{1}{YardSL_{res-ing}} + \frac{1}{YardSL_{res-inh}}} \tag{26}$$

Table 2. Chromium(VI) Soil Screening Levels (mg/kg) - Excess Individual Lifetime Cancer Risk = 1 x 10^{-5}.

Source:	Farm Field		Residential Yard
Receptor:	Farmer	Resident Adjacent to Field	Resident
Oral Screening Level:	**327**	-	**2**
Inhalation Screening Level – work:	**13,221**	-	-
Inhalation Screening Level – offsite:	**242**	**86**	-
Inhalation Screening Level – yard:	-	-	**162**
Total Soil Screening Level:	**138**	**86**	**2**

5.0 UNCERTAINTIES

The uncertainties involved in deriving risk-based screening levels for chromium(VI) in agricultural field and yard soil are discussed below. We attempted to derive reasonable maximum exposure (RME) scenarios, which could overestimate potential health risks. However, if our assumptions do not represent RME scenarios, the true health risks could be

underestimated.

5.1 Uncertainties in Evaluating Exposure

Many of the exposure parameters used to derive these risk-based screening levels are defaults provided in EPA guidance documents, which represent RME scenarios. Parameters where EPA default values were used include the averaging time, exposure frequency, exposure duration, exposure time, body weights, soil ingestion rates, area of a residential yard, and many of the parameters used to calculate the particulate emission factors, such as the dispersion constants. Although the default exposure duration for a resident was used (30 years), the tanning sludge was only applied for a period of 26 years, from 1983-2009. Use of this longer exposure duration results in a lower, more health-protective screening level.

For other exposure parameters, site-specific values representing an average were selected. For example, data available for all sludge applications from 1983-2008 show that the size of a treated field (A_{field}) ranges from 4 to 728 acres, with no "typical" size of field. We elected to use the average size of sludge application, 74 acres, rounded up to 80 acres, which is a typical unit used in agriculture, for A_{field}. The largest field size for which the PEF equations are valid is 500 acres. The impact of using a field size of 500 acres, rather than 80 acres, is a reduction in the field screening level for the farmer from 138 to 119 mg/kg and in the screening level for the farm family from 86 to 68 mg/kg. The value for 'p' is the average number of days in St. Joseph, Missouri, that have > 0.1 inches rainfall per year, based on data from 1971-2000. The value for 's', 56.7%, is the average of the silt content found in the various soil types across Andrew, Buchanan, Clinton, and DeKalb counties; this site-specific value is more conservative than the default value of 18% recommended by EPA guidance documents. The fraction of vegetative cover in a field, 36.5%, is the portion of the year that crops are present in the field. For corn or soybeans, which are the predominant crops grown in northwestern Missouri, 19 weeks is the average time from emergence to harvest (USEPA, 2009c).

For those exposure parameters where default or average site-specific values were not used, we used high-end estimates. For example, many farmers currently practice "no-till" farming, which involves minimal disturbance of agricultural field soil in order to minimize soil erosion. These farmers may only make two passes over their fields, one to prepare the land and another to plant, compared to traditional practices in which a farmer might knock down stalks, engage in heavy tilling, field cultivate twice, and then plant. We elected to use the higher possible number of passes for land preparation because 1) no-till practices were less prevalent in northwest Missouri in the 1980's when tanning sludge was first applied and 2) not all of today's farmers practice no-till farming. Assuming a greater number of field passes also results in a greater exposure frequency in which a farmer is actively working in the fields treated with tanning sludge and, thus, a lower, more health-protective screening level. A high-end estimate was also used for the soil ingestion rate of a farmer. Because some farmers, particularly those working in open-cab tractors, may have much greater soil ingestion rates than the typical outdoor worker, the default value for a construction worker (330 mg soil/day) was used instead of the default value for an outdoor worker (100 mg soil/day). Finally, very high-end assumptions were made about the exposure frequencies, particularly those of the residents. For off-site residential exposure, it was assumed that a resident spends 24 hrs/day, 350 days/year, for 30 years at the

edge of a treated field; for residential exposure to the yard soil, it was assumed that a resident spends 24 hrs/day, 350 days/year, for 30 years in the center of their yard.

5.2 Uncertainties in Toxicity Values

The inhalation unit risk value used in this document was derived by EPA's IRIS program, based on lung cancer in workers exposed to total chromium (Mancuso, 1975). Consistent with EPA Region 7 practice, this inhalation unit risk was multiplied by 7 to develop screening levels specifically for chromium(VI), rather than for total chromium, following the conservative assumption that the Mancuso cohort was exposed to a 1:6 ratio of chromium(VI) to chromium(III). If the inhalation unit risk value had not been multiplied by 7, the resulting field soil screening levels would have been higher. The screening level for the farmer would have been 273 *vs.* 138 mg/kg, and the screening level for the farm family would have been 605 *vs.* 86 mg/kg.

The oral cancer slope factor used to account for ingestion of chromium(VI) in soil was generated by EPA's Office of Pesticide Programs (OPP). This Tier 3 source (as indicated by the OSWER hierarchy document) was used because no Tier 1 or Tier 2 cancer slope factors were available. Another Tier 3 cancer slope factor is available from the state of New Jersey. Although derived independently, the two cancer slope factors are similar, which increases confidence in these values. For this site, the OPP value was selected because it is slightly more conservative at 0.79 $(mg/kg/day)^{-1}$, in comparison to the NJDEP value of 0.5 $(mg/kg/day)^{-1}$, meaning that the OPP value results in lower, more health-protective screening levels. If the NJDEP value had been used, the screening level for yard soil would have been 3 mg/kg, in comparison to 2 mg/kg, which was calculated using the OPP value.

Age-dependent adjustment factors were applied to both the oral cancer slope factor and inhalation unit risk value to account for the postulated mutagenicity of chromium(VI). Although IRIS did not find that chromium(VI) was mutagenic, the guidance for determining a mutagenic mode of action was published after the IRIS review was completed. However, OPP followed this guidance to propose that the mutagenic mode of action for chromium(VI) is oxidative damage to DNA resulting from reactive oxygen intermediates formed during the reduction of chromium(VI) to chromium(III). This determination was made with regard to the oral pathway due to a lack of mutagenicity studies via the inhalation pathway. Region 7 applied ADAFs to risk estimates for early life exposure via ingestion and inhalation because the reduction process of chromium(VI) occurs in all cells, regardless of type. Additionally, application of ADAFs to risk estimates for all exposure pathways results in more health-protective screening levels.

Although the screening levels developed in this document are all based on the carcinogenic potential of chromium(VI), this compound is also associated with non-cancer health effects. However, had the non-cancer toxicity values been used to derive screening levels, they would have been higher. Therefore, the screening levels were based on the more health-protective cancer toxicity values.

6.0 CONCLUSIONS

In summary, risk-based surface soil screening levels were derived for chromium(VI) in agricultural fields and residential yards in northwestern Missouri, based on an excess lifetime cancer risk of 1×10^{-5}. For the agricultural fields, screening levels were developed for farmers (138 mg/kg) and for members of farm families who live adjacent to fields treated with tanning sludge (86 mg/kg). These values are both driven by offsite inhalation exposure, primarily of particulates generated by wind erosion, which occurs for many more days/year than direct exposure to the farmer while working in the treated fields. A screening level was also derived for residents exposed to chromium(VI) in soil in their yards (2 mg/kg) to account for the potential wind-borne dust that could be generated by wind erosion or farming practices on the field soil and deposited on these yards. The yard soil screening level is lower than the field soil screening levels due to greater influence by the oral pathway, which has a different toxicity value than the inhalation pathway.

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APPENDIX F
PRE-CERCLIS SITE SCREENING FORMS

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 202**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Easton	**County:** Buchanan	**State:** MO	**Zip:** 64443
Directions to Site: Farm field is located southwest of the intersection of [redacted] and State Highway [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] State Route [redacted]		
City: Easton	**State:** MO	**Zip:** 65443
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1999 and 2007, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 202 document a concentration of 1.7 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1999 (15.47lbs), 2000 (11.97 lbs),2001 (9.97 lbs), 2002 (0.84 lbs), 2006 (1.21 lbs), 2007 (1.24 lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 302.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 302.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.13 mg/kg, 0.607 mg/kg, and 0.269 mg/kg. The 95%UCL calculated using these SUIS samples is 1.7 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 203**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Osborn	**County:** Dekalb	**State:** MO	**Zip:** 64474
Directions to Site: Farm field is located northeast of the intersection of [redacted] Road and [redacted] Road in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Osborn	**State:** MO	**Zip:** 64474
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1998 and 1999, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 203 document a concentration of 0.54 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1998 (3.8lbs), 1999 (5.58lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 203.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 303.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water	**Yes** __	**No** _X_
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.278 mg/kg, 0.418 mg/kg, and 0.386 mg/kg. The 95%UCL calculated using these SUIS samples is 0.54 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 204**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Maysville	**County:** Dekalb	**State:** MO	**Zip:** 64469
Directions to Site: Farm field is located southwest of the intersection of [redacted] Road and [redacted] Road in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Maysville	**State:** MO	**Zip:** 64469
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1998 and 2003, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 204 document a concentration of 0.85 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** _

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1998 (25.31lbs),1999 (55.18lbs), 2001 (7.28lbs), 2002 (0.62lbs), 2003 (153.02lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 304.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 304.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.406 mg/kg, 0.666 mg/kg, and 0.462 mg/kg. The 95%UCL calculated using these SUIS samples is 0.85 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 205**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401
Directions to Site: Farm field is located northwest of the intersection of state Highway [redacted] and State Highway [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION	
Referred By: US EPA Region VII	**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.	
Mailing Address: 901 N. 5th Street	
City: Kansas City	**State:** KS **Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] State Route [redacted]		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1999 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 205 document a concentration of 1.4 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1999 (12.13lbs), 2000 (5.66 lbs),2001 (20.86 lbs), 2002 (4.62 lbs), 2003 (2.32 lbs), 2004 (1.53 lbs), 2006 (3.19 lbs), 2007 (1.99 lbs), 2008 (2.67 lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 205.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 305.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SUIS samples was 1.00 mg/kg, 0.82 mg/kg and 1.27 mg/kg, and 0.624 mg/kg. The 95%UCL calculated using these SUIS samples is 1.4 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 209**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: NW of St. Joseph	**County:** Buchanan	**State:** MO	**Zip:** 64505
Directions to Site: Farm field is located northeast of the intersection of County Road [redacted] and County Road [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] County Road [redacted]		
City: St. Joseph	**State:** MO	**Zip:** 64505
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 2007 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 209 document a concentration of 2.2 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 2007 (1.27 lbs), 2008 (0.98lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 309.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 1,500 feet northwest of the field at the owner's residence.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water	**Yes** __	**No** _X_
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.560 mg/kg, 0.694 mg/kg, and 0.657 mg/kg. The 95%UCL calculated using these SUIS samples is 2.2 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 210**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: NW of St. Joseph	**County:** Buchanan	**State:** MO	**Zip:** 64505
Directions to Site: Farm field is located northeast of the intersection of County Road [redacted] and County Road [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] County Road [redacted]		
City: St. Joseph	**State:** MO	**Zip:** 64505
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 2007 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 210 document a concentration of 1.2 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 2007 (1.27 lbs), 2008 (0.98lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 209.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 1,500 feet northwest of the field at the owner's residence.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water	**Yes** __	**No** _X_
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.803 mg/kg, 0.225 mg/kg, and 0.242 mg/kg. The 95%UCL calculated using these SUIS samples is 1.2 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 212**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Union Star	**County:**Dekalb	**State:** MO	**Zip:** 64494
Directions to Site: Farm field is located northwest of the corner of County Road [redacted] and County Road [redacted] in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] County Road [redacted]		
City: Union Star	**State:** MO	**Zip:** 64494
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1994 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 212 document a concentration of 1.5 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1994 (14.47lbs), 1996 (12.49lbs), 1997 (9.53lbs), 2006 (1.29lbs), 2008 (1.89lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 312.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 312.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.100 mg/kg, 0.605 mg/kg, and 0.468 mg/kg. The 95%UCL calculated using these SUIS samples is 1.5 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 213**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Easton	**County:** Buchanan	**State:** MO	**Zip:** 64443
Directions to Site: Farm field is located northeast of the intersection of [redacted] Road [redacted] and State Highway [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Easton	**State:** MO	**Zip:** 64443
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1992 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 213 document a concentration of 2.1mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1992 (2.65lbs), 1998 (77.39lbs), 2000 (3.97lbs), 2001 (5.33lbs), 2002 (2.46lbs), 2004 (1.26lbs), 2006 (1.48lbs), 2007 (2.31lbs), 2008 (2.9lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Not Determined

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes _X_** **No __**

Explain:
National Beef Leathers
205 Florence Rd

(Revised by Missouri DNR 1/26/04)

Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.833 mg/kg, 0.760 mg/kg, and 1.540 mg/kg. The 95%UCL calculated using these SUIS samples is 2.1 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 214**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Union Star	**County:** Dekalb	**State:** MO	**Zip:** 64494
Directions to Site: Farm field is located along both sides of County Road [redacted] approximately 0.5 miles north of its intersection with County Road [redacted] in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] County Road [redacted]		
City: Union Star	**State:** MO	**Zip:** 64494
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1994 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 214 document a concentration of 1.8 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1994 (9.4lbs), 1995 (5.16lbs), 1996 (12.49lbs), 1997 (9.53lbs), 1999 (36.04lbs), 2007 (2.33lbs), 2008 (0.92lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 312.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 312.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: undetermined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.387 mg/kg, 1.610 mg/kg, and 0.240 mg/kg. The 95%UCL calculated using these SUIS samples is 1.8 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 215**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Maysville	**County:** Dekalb	**State:** MO	**Zip:** 64469
Directions to Site: Farm field is located southwest of the intersection of [redacted] Road and [redacted] Road in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Maysville	**State:** MO	**Zip:** 64469
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1998 and 2003, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 215 document a concentration of 1.9 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1998 (25.31lbs), 1999 (55.18lbs), 2001 (7.28lbs), 2002 (0.62lbs), 2003 (153.02lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

The groundwater pathway was evaluated as part of investigation done at the residence near this farm field, and is discussed in the Pre-CERLIS Site Screening form for DU 304.

General Hydrology:
NA

Are Karst Features Present on or Near Site: NA

Depth to Shallowest Groundwater: NA

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On adjacent residential lot – see SS form for DU 304.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X_

Drinking Water **Yes** __ **No** _X_
Surface Water **Yes** __ **No** _X_

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.050 mg/kg, 0.728 mg/kg, and 0.069 mg/kg. The 95%UCL calculated using these SUIS samples is 1.9 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 216**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Maysville	**County:** Dekalb	**State:** MO	**Zip:** 64469
Directions to Site: Farm field is located northeast of the intersection of [redacted] Road and [redacted] Road in Dekalb county. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Maysville	**State:** MO	**Zip:** 64469
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1998 and 2003, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 216 document a concentration of 2.2 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1998 (11.72lbs), 1999 (16.76lbs), 2000 (4.11lbs), 2002 (1.53lbs), 2003 (48.78lbs) Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 0.25 miles east of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes _X_** **No __**

Explain:
National Beef Leathers
205 Florence Rd

(Revised by Missouri DNR 1/26/04)

Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.692 mg/kg, 1.140 mg/kg, and 1.580 mg/kg. The 95%UCL calculated using these SUIS samples is 2.2 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 217**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Clarksdale	**County:** Dekalb	**State:** MO	**Zip:** 64430
Directions to Site: Farm field is located northeast of the intersection of [redacted] Road and [redacted] Road in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION	
Referred By: US EPA Region VII	**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.	
Mailing Address: 901 N. 5th Street	
City: Kansas City	**State:** KS **Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Clarksdale	**State:** MO	**Zip:** 64430
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1990 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 217 document a concentration of 2.1 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1990 (1.89lbs), 1991 (4.64lbs), 1992 (1.77lbs), 1993 (8.4lbs), 1995 (7.13lbs), 1996 (12.9lbs), 1997 (12.96lbs), 1998 (1.49lbs), 2000 (12.54lbs), 2006 (1.4lbs), 2007 (2.98lbs), 2008 (1.29lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 0.75 miles northeast of the field.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

2. Has a PRP been identified? **Yes** X **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** X

Drinking Water	**Yes** __	**No** X
Surface Water	**Yes** __	**No** X
Soil Exposure/Air	**Yes** __	**No** X

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes** ___ **No** X

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes** ___ **No** X

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.780 mg/kg, 0.821 mg/kg, and 1.550 mg/kg. The 95%UCL calculated using these SUIS samples is 2.1 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes** __ **No** X

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

7. Is there a threat of fire or explosion? **Explain:**	**Yes ___**	**No _X_**
8. Are there other situations or factors which warrant further Superfund response? **Explain:**	**Yes ___**	**No _X_**

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 218**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Clarksdale	**County:** Dekalb	**State:** MO	**Zip:** 64430
Directions to Site: Farm field is located northeast of the intersection of [redacted] Road and [redacted] Road in Dekalb County **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: Paul Deshon		
Mailing Address: [redacted] Road		
City: Clarksdale	**State:** MO	**Zip:** 64430
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1990 and 2008, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 218 document a concentration of 2.6 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1990 (1.89lbs), 1991 (4.64lbs), 1992 (1.77lbs), 1993 (8.4lbs), 1995 (7.13lbs), 1996 (12.9lbs), 1997 (12.96lbs), 1998 (1.49lbs), 2000 (12.54lbs), 2006 (1.4lbs), 2007 (2.98lbs), 2008 (1.29lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 0.75 miles northeast of the field.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

2. Has a PRP been identified? **Yes** X **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** X

Drinking Water	**Yes** __	**No** X
Surface Water	**Yes** __	**No** X
Soil Exposure/Air	**Yes** __	**No** X

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes** ___ **No** X

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes** ___ **No** X

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.830 mg/kg, 1.190 mg/kg, and 0.812 mg/kg. The 95%UCL calculated using these SUIS samples is 2.6 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes** __ **No** X

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

7. Is there a threat of fire or explosion? **Explain:**	**Yes ___**	**No _X_**
8. Are there other situations or factors which warrant further Superfund response? **Explain:**	**Yes ___**	**No _X_**

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 219**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401
Directions to Site: Farm field is located along both sides of [redacted] Road [redacted] approximately 0.5 miles south of its intersection with State Highway [redacted] n Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road [redacted]		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 2000 and 2007, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 219 document a concentration of 1.5 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 2000 (13.28lbs). 2001 (10.9lbs), 2003 (3.32lbs), 2004 (1.54lbs), 2005 (1.41lbs), 2006 (1.07lbs), 2007 (1.4lbs) . Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 1 mile northeast of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes _X_** **No __**

Explain:
National Beef Leathers
205 Florence Rd

(Revised by Missouri DNR 1/26/04)

Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 1.110 mg/kg, 1.040 mg/kg, and 1.290 mg/kg. The 95%UCL calculated using these SUIS samples is 1.5 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 221**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Union Star	**County:** Dekalb	**State:** MO	**Zip:** 64494
Directions to Site: Farm field is located southwest of the intersection of [redacted] Road and [redacted] Road in Dekalb County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION		
Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Union Star	**State:** MO	**Zip:** 64494
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1994 and 1998, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 221 document a concentration of 5.1 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1994 (4.68lbs), 1998 (56.01lbs) . Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 0.5 miles south of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes _X_** **No __**

Explain:
National Beef Leathers
205 Florence Rd

(Revised by Missouri DNR 1/26/04)

Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 2.450 mg/kg, 3.400 mg/kg, and 0.487 mg/kg. The 95%UCL calculated using these SUIS samples is 5.1 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 222**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Union Star	**County:** Dekalb	**State:** MO	**Zip:** 64494

Directions to Site:
Farm field is located southwest of the intersection of [redacted] Road and [redacted] Road in Dekalb County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Union Star	**State:** MO	**Zip:** 64494
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions in 1994 and 1998, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 222 document a concentration of 4.03 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1994 (4.68lbs), 1998 (56.01lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 0.5 miles south of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 3.290 mg/kg, 2.250 mg/kg, and 2.520 mg/kg. The 95%UCL calculated using these SUIS samples is 4.03 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 223**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Helena	**County:** Andrew	**State:** MO	**Zip:** 64459

Directions to Site:
Farm field is located along both sides of County Road [redacted] at it's intersection with County Road [redacted] n Andrew County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted]		
City: Helena	**State:** MO	**Zip:** 64459
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. In 1999, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 223 document a concentration of 0.65 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU. According to the documentation, the field received one application of 19 lbs/acre in 1999. Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 500 feet west of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.474 mg/kg, 0.279 mg/kg, and 0.234 mg/kg. The 95%UCL calculated using these SUIS samples is 0.65 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 224**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Lathrop	**County:** Clinton	**State:** MO	**Zip:** 64465
Directions to Site: Farm field is located east of [redacted] Road approximately halfway between [redacted] Street and [redacted] Street in Clinton County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION	
Referred By: US EPA Region VII	**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.	
Mailing Address: 901 N. 5th Street	

City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted]		
City: Lathrop	**State:** MO	**Zip:** 64465
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1992 and 1993, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 224 document a concentration of 1.4 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1992 (2.06lbs), 1993 (15.41lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 1.5 miles southeast of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes ___** **No _X_**

Is site access restricted? Fence around farm field **Yes** _X_ **No ___**

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes ___** **No _X_**

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes _X_** **No __**

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.872 mg/kg, 0.296 mg/kg, and 0.166 mg/kg. The 95%UCL calculated using these SUIS samples is 1.4 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION			
Name: Tannery Sludge Farm Fields Site – **DU 225**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Rushville	**County:** Buchanan	**State:** MO	**Zip:** 64484
Directions to Site: Farm field is located northwest of the intersection of [redacted] Road and State Highway [redacted] in Buchanan County. **Map Attached:** Yes			

II. SITE REFERRAL INFORMATION	
Referred By: US EPA Region VII	**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.	
Mailing Address: 901 N. 5th Street	
City: Kansas City	**State:** KS **Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066

III. SITE INFORMATION		
Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Route [redacted]		
City: Rushville	**State:** MO	**Zip:** 64484
Telephone: [redacted]	**Fax:**	
Type of Facility: Agricultural farm field	**Type of Ownership:** private	
Current Site Status: Active farm field	**Years of Operation:** Unknown; probably several decades	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a farm field (decision unit, or DU) that has been in operation for an unknown period of time. On several occasions between 1983 and 1986, the farm owner/operator received waste leather tannery sludge from NBL (then Prime Tanning, and previously Blueside) to land apply as fertilizer. The waste sludge was applied by a representative from Prime Tanning using a mechanical spreader.

This farm field was assessed along with several other fields, residential yards and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge at concentrations ranging from 0.21 mg/kg to 46 mg/kg. Average background levels of Cr^{+6} in agricultural soils unaffected by sludge application were determined to be 0.10 mg/kg. Results of Cr^{+6} analyses on samples collected in farm field DU 225 document a concentration of 3.6 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to farm field on several occasions in varying quantities

Waste Types and Quantities: Leather tannery waste sludge was applied on several occasions at varying rates. Documentation provided by NBL provides the mass total chromium applied in this DU for each application year as follows – the number in parenthesis following the year is the pounds of Cr applied per acre: 1983 (40.95lbs), 1984 (281.57lbs), 1985 (43.51lbs), 1986 (65.31lbs). Some of the total chromium applied would have been in the more toxic hexavalent oxidation state, however the ratio of total: Cr^{+6} in the sludge was not documented prior to or at the time of application. Over time, natural soil conditions would be expected to favor reduction of Cr^{+6} to the less toxic trivalent form Cr^{+3}.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA

Private Wells: NA

Municipal Wells: NA

Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Approximately 1 mile northeast of the field.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: not determined

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: Unknown; seasonal farm workers.

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? Fence around farm field **Yes** _X_ **No** ___

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:
The levels of Cr^{+6} documented in surface soils in the farm field were over an order of magnitude below the site-specific screening level of 86 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:
National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in one-acre sampling units (SUs) selected within the farm field decision unit (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SUIS samples was 0.518 mg/kg, 1.360 mg/kg, and 2.270 mg/kg. The 95%UCL calculated using these SUIS samples is 3.6 mg/kg, which is well below the site-specific health-based screening level of 86 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}). However the concentration of Cr^{+6} in the farm field is well below the risk-based screening level established for the site indicating that past use of tannery sludge on the farm field has not posed an actual or potential threat.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGNATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 302**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Easton	**County:** Buchanan	**State:** MO	**Zip:** 64443

Directions to Site:
Residence is located southwest of the intersection of [redacted] and State Highway [redacted] n Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009	
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] State Route [redacted]		
City: Easton	**State:** MO	**Zip:** 65443
Telephone:	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 302 was determined to be 0.14mg/kg, which is less than three times the background level of Cr^{+6}. However a water sample collected from the private well on site documents Cr^{+6} concentration (0.3 ug/L, 0.266 ug/L) significantly above the mean background groundwater level of 0.026 ug/L

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** X

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 202.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured right at the screening level of 0.3 ug/L during the December 2009 sampling event, and found to be 0.266 ug/L upon resampling in January 2010. Therefore, while the groundwater concentration of is significantly above the background mean, it does not significantly exceed the screening level.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes __ No _X__**

Drinking Water	**Yes __**	**No _X**
Surface Water	**Yes __**	**No _X_**
Soil Exposure/Air	**Yes __**	**No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SU samples were 0.080 mg/kg, 0.115 mg/kg, and 0.100 mg/kg. The 95%UCL calculated using these SUIS samples is 0.14 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS					
SITE SCREENING FINDINGS Answer the following questions as support for the site recommendation.					
Yes	**No**	**Condition or Factor**	**Yes**	**No**	**Condition or Factor**
X		**Is there a release or threat of release?**		**X**	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		**X**	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		**X**	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		**X**	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		**X**	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		**X**	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		**X**	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	**X**		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		**X**	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS	
X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has not resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. A release of Cr^{+6} to groundwater was documented in the on site private well, however the concentration was not significantly above the health-based screening level.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 303**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Osborn	**County:** Clinton	**State:** MO	**Zip:** 64474

Directions to Site:
Residence is located at [redacted] Road in Clinton County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Osborne	**State:** MO	**Zip:** 64474
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 303 was determined to be 0.24 mg/kg, which is greater than three times the background level of Cr^{+6}. The concentration of Cr^{+6}in the private drinking water well at the residence was measured at <0.017 ug/l, which is less than the three times the background concentration determined for the site of 0.026 ug/l.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 203.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.24 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured at <0.017 ug/l which below the screening level of 0.3 ug/l.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water **Yes** __ **No** _X
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SU samples were 0.063 mg/kg, 0.163 mg/kg, and 0.061 mg/kg,. The 95%UCL calculated using these SUIS samples is 0.24 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 304**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Maysville	**County:** Dekalb	**State:** MO	**Zip:** 64469

Directions to Site:
Residence is located at [redacted] Road in Dekalb County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Union Star	**State:** MO	**Zip:** 64469
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** __ **No** X

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 304 was determined to be 0.17mg/kg, which is less than three times the background level of Cr^{+6}. The concentration of Cr^{+6} in the private drinking water well at the residence was measured at <0.017 ug/l, which is less than the three times the background concentration determined for the site of .026 ug/l.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 204.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.17 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured at <0.017 ug/l which below the screening level of 0.3 ug/l.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water **Yes** __ **No** _X
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were 0.072 mg/kg, 0.061 mg/kg, and 0.156 mg/kg, and 0.117 mg/kg. The 95%UCL calculated using these SUIS samples is 0.17 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X_**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
	X	**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils and groundwater have not documented a release of hexavalent chromium at the residence.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 305**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401

Directions to Site:
Residence is located at [redacted] State Route [redacted] in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009	
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] State Route [redacted]		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 305 was determined to be 0.24mg/kg, which is greater than three times the background level of Cr^{+6}. A water sample collected from the private well on site documents a Cr^{+6} concentration of 0.138 ug/L which is greater than three times the mean background groundwater level of 0.026 ug/L

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

(Revised by Missouri DNR 1/26/04)

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 205.

Hazardous Substances Present: Hexavalent chromium.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: 2

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.24 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured at 0.138 ug/l which below the screening level of 0.3 ug/l. Therefore, while the groundwater concentration of Cr^{+6} is significantly above the background mean, it does not significantly exceed the screening level.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SU samples were 0.063 mg/kg, 0.163 mg/kg, and 0.061 mg/kg. The 95%UCL calculated using these SUIS samples is 0.24 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard and to the private well at the residence. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 306**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401

Directions to Site:
Residence is located at [redacted] State Route [redacted] in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted] – residence occupied by [redacted] daughter		
Mailing Address: [redacted] State Route [redacted]		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 306 was determined to be 0.30mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 205.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.30 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured at 0.033 ug/l which below the screening level of 0.3 ug/l.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SU samples were 0.139 mg/kg, 0.206 mg/kg, and 0.220 mg/kg. The 95%UCL calculated using these SUIS samples is 0.30 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 312**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Union Star	**County:** Dekalb	**State:** MO	**Zip:** 64494

Directions to Site:
Residence is located at [redacted] County Road [redacted] in Dekalb County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009	
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] County Road [redacted]		
City: Union Star	**State:** MO	**Zip:** 64494
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 312 was determined to be 0.10mg/kg, which is less than three times the background level of Cr^{+6}. However, the concentration in the private drinking water well at the residence was measured at 0.23 ug/l, which is greater than the three times the background concentration determined for the site of .026 ug/l.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching,

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:

Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:

Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 212.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.10 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site. The concentration of Cr^{+6} in the private well located on site was measured at 0.230 ug/l which below the screening level of 0.3 ug/l.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water **Yes** __ **No** _X
Surface Water **Yes** __ **No** _X_

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Soil Exposure/Air **Yes __** **No _X_**

Explain:
Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the three SU samples were 0.139 mg/kg, 0.206 mg/kg, and 0.220 mg/kg. The 95%UCL calculated using these SUIS samples is 0.30 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to the private drinking water well at the residence. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 313**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Easton	**County:** Buchanan	**State:** MO	**Zip:** 64443

Directions to Site:
Residence is located at [redacted] Road in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Easton	**State:** MO	**Zip:** 64443
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:

The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** X **No** __

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 313 was determined to be 0.86 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** _

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 213.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: Not determined

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.86 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** __X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were 0.484 mg/kg, 0.131 mg/kg, and 0.763 mg/kg, and 0.195 mg/kg,. The 95%UCL calculated using four SUIS samples is 0.073 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 319**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401

Directions to Site:
Residence is located at [redacted] Road in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** __ **No** X

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 319 was determined to be 0.073 mg/kg, which is less than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 219.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.073 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___** **No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___** **No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were <0.014 mg/kg, 0.022 mg/kg, and 0.019 mg/kg, and 0.069 mg/kg,. The 95%UCL calculated using four SUIS samples is 0.073 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __** **No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___** **No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___** **No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
	X	**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has not resulted in a release of hazardous substances (Cr^{+6}) to this residential yard.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 320**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Agency	**County:** Buchanan	**State:** MO	**Zip:** 64401

Directions to Site:
Residence is located at [redacted] Road in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Road		
City: Agency	**State:** MO	**Zip:** 64401
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes X__** **No __**

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 320 was determined to be 0.42 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 219.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.42 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were 0.319 mg/kg, 0.035 mg/kg, and 0.025 mg/kg, and 0.293 mg/kg,. The 95%UCL calculated using four SUIS samples is 0.30 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 325**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Rushville	**County:** Buchanan	**State:** MO	**Zip:** 64484

Directions to Site:
Residence is located at [redacted] Route [redacted] in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII	**Date of Referral:** April, 2009

Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.

Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Route [redacted]		
City: Rushville	**State:** MO	**Zip:** 64484
Telephone: [redacted]	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes** __ **No** X

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 325 was determined to be 0.12 mg/kg, which is less than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** __

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 225.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.12 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** _X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were 0.111 mg/kg, 0.048 mg/kg, and 0.069 mg/kg, and 0.052 mg/kg,. The 95%UCL calculated using these SUIS samples is 0.12 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
	X	**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:
Sampling and analysis of surface soils have not documented a release of hexavalent chromium at the residence.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

APPROVED BY:

NAME: Dennis Stinson **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

I. SITE NAME AND LOCATION

Name: Tannery Sludge Farm Fields Site – **DU 326**		**Alias:** Prime Tanning, National Beef Leather (NBL)	
Address or other Location Identifier:			
City: Near Rushville	**County:** Buchanan	**State:** MO	**Zip:** 64484

Directions to Site:
Residence is located at [redacted] Route [redacted] in Buchanan County.

Map Attached: Yes

II. SITE REFERRAL INFORMATION

Referred By: US EPA Region VII		**Date of Referral:** April, 2009
Reason for Referral (if applicable): Public concern arose regarding potential health threat posed from hexavalent chromium in tannery waste sludge being applied as fertilizer to farm fields in NW Missouri.		
Mailing Address: 901 N. 5th Street		
City: Kansas City	**State:** KS	**Zip:** 66101
Telephone: 913-551-7003	**Fax:** 913-551-7066	

III. SITE INFORMATION

Type of Facility: Residence	**Type of Ownership:** private	
Owner 1 Name: [redacted]		
Mailing Address: [redacted] Route [redacted]		
City: Rushville	**State:** MO	**Zip:** 64484
Telephone: [redacted] ([redacted]s father [redacted])	**Fax:**	
Type of Facility: Private Residence	**Type of Ownership:** private	
Current Site Status: Occupied	**Years of Operation:** Age of residence unknown	

Operational History:
The site is located in a rural agricultural farming area. The site itself is a residential yard (decision unit, or DU) that is located near an agricultural field to which tannery waste sludge was applied.

This residence was assessed along with several other residential yards, farm fields, and private wells as part of a 4-county assessment of potential threats posed by application of tannery sludge as fertilizer. This Pre-CERCLIS Site Screening (SS) form is one of 28 others (one per DU) that are included as appendices to the overall SS narrative report.

IV. CERCLA APPLICABILITY [40 CFR 300.410(E)]

1. Is there a release as defined by the NCP? **Yes X__** **No __**

Explain:
Hexavalent chromium (Cr^{+6}) has been documented to be present in the leather tannery sludge applied to area farm fields. The mean background concentration of Cr^{+6} in residential yard soil of areas unaffected by sludge application was determined to be 0.071 mg/kg. An estimate of the mean concentration ofCr^{+6} in the surface soil of residential yard DU 326 was determined to be 0.30 mg/kg, which is greater than three times the background level of Cr^{+6}.

(A RELEASE Is Defined As Any Spilling, Leaking, Pumping, Pouring, Emitting, Emptying, Discharging, Injecting, Escaping, Leaching, Dumping, Or Disposing Into The Environment (Including The Abandonment Of Barrels, Containers, And Other Closed Receptacles Containing Any Hazardous Substances Or Pollutant Or Contaminant), But Excludes: Workplace Exposures; Engine Exhaust Emissions; Nuclear Releases Otherwise Regulated; And The Normal Application Of Fertilizer. For Purposes Of The NCP, Release Also Means Threat Of Release.)

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

2. Is the source a facility or vessel as defined by the NCP? **Yes** X **No** _

Explain:
Yes, the source is soil in agricultural farm fields which has been amended with leather tannery waste sludge as a fertilizer.

(A FACILITY Is Defined As Any Building, Structure, Installation, Equipment, Pipe Or Pipeline (Including Any Pipe Into A Sewer Or POTW), Well, Pit, Pond, Lagoon, Impoundment, Ditch, Landfill, Storage Container, Motor Vehicle, Rolling Stock, Or Aircraft Or Any Site Or Area, Where A Hazardous Substance Has Been Deposited, Stored, Disposed Of, Or Placed, Or Otherwise Come To Be Located; But Does Not Include Any Consumer Product In Consumer Use Or Any Vessel. A VESSEL Is Defined As Any Description Of Watercraft Or Other Artificial Contrivance Used, Or Capable Of Being Used, As A Means Of Transportation On Water Other Than A Public Vessel.)

3. Does the release involve either a hazardous substance, pollutant or contaminant as defined by the NCP? **Yes** X **No** _

Explain:
Hexavalent chromium is a hazardous substance as defined by the NCP.

(A HAZARDOUS SUBSTANCE Means Any Substance, Element, Compound, Mixture, Solution, Hazardous Waste, Toxic Pollutant, Hazardous Air Pollutant, Or Imminently Hazardous Chemical Substance Or Mixture Designated Pursuant To The CWA, CERCLA, SDWA, CAA Or TSCA. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas. The Definition Of POLLUTANT Or CONTAMINANT Includes, But Is Not Limited To, Any Element, Substance, Compound, Or Mixture, Including Disease-Causing Agents, Which After Release Into The Environment And Upon Exposure, Ingestion, Inhalation, Or Assimilation Into Any Organism, Either Directly From The Environment Or Indirectly By Ingestion Through Food Chains, Will Or May Reasonably Be Anticipated To Cause Death, Disease, Behavioral Abnormalities, Cancer, Genetic Mutation, Physiological Malfunctions Or Physical Deformations, In Such Organisms Or Their Offspring. The Term Does Not Include Petroleum Products, Natural Gas, Natural Gas Liquids, Liquefied Natural Gas, Synthetic Gas Or Mixtures Of Natural And Synthetic Gas.)

4. Is the release subject to the limitations on response? **Yes** ___ **No** X

Explain:

(The LIMITATIONS ON RESPONSE Provisions Of The NCP (40 CFR 300.400(B) States That Removals Shall Not Be Undertaken In Response To A Release: Of A Naturally Occurring Substance In Its Unaltered Or Natural Form; From Products That Are A Part Of The Structure Of, And Result In Exposure Within, Residential Buildings Or Business Or Community Structures; Or Into Public Or Private Drinking Water Supplies Due To Deterioration Of The System Through Ordinary Use.)

5. Is there a potential for other federal or state response mechanisms? **Yes** ___ **No** X

If so, identify the appropriate program:

___ **RCRA** ___ **NRC** ___ **FIFRA** ___ **UST**

___ **State VCP** ___ **Other State Deferral** ___ **Other Federal (_____)**

Explain:

V. PATHWAY EVALUATION

1. Source and Waste Characteristics

Source Types and Locations: Process wastes generated at National Beef Leathers in St. Joseph, MO

Size of Sources: Waste sludge applied to nearby farm fields on several occasions in varying quantities

Waste Types and Quantities: Application rates for the farm field near this residence are provided in the SS form for DU 225.

Hazardous Substances Present: Hexavalent chromium.

2. Groundwater Use and Characteristics Within 4 Miles

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

General Hydrology:
The site lies in northwestern Missouri east of St. Joseph and north of Kansas City. This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone.

The glacial material is 15 to 35 feet thick and dominantly silty clay. This unit seldom produces more than a few gallons per minute and has a slow recovery rate.

The alluvium is derived from the same glacial material as the hills and, therefore, consists of a high percentage of silt and clay. However, the sand content of the alluvium is greater than the hills since much of the fines have washed down stream. The alluvium is at some points up to 100 feet thick due to pre-glacial channel filling. The general water quality of the alluvium is high enough to permit its use as a drinking water source. The productivity of the alluvium ranges from tens to hundreds of gallons per minute.

The Pennsylvanian-age shale, limestone, and sandstone bedrock is several hundred feet thick within the area and is known for minor oil and gas production. Due to the brines associated with these oil deposits, the bedrock groundwater has a total dissolved solid content of 4,000 to 6,000 parts per million in the area near the site. This makes the bedrock groundwater non-potable or nearly so.

Are Karst Features Present on or Near Site: While the bedrock is composed of minor limestone beds, dissolution features that would otherwise lead to karst features are filled with the encompassing shales. Therefore, karst features are not an issue for this part of Missouri.

Depth to Shallowest Groundwater: 15-35 feet below ground surface in glacial till.

Well counts were not made for individual DUs. Rather, the number of potentially affected well and population were estimated for the 4-county area as a whole and provided in the narrative summary report.

Groundwater Wells Within 4 Miles: NA
Private Wells: NA
Municipal Wells: NA
Industrial/Agricultural Wells: NA

Locations and Populations Served (if known): NA

Distance to Nearest Drinking Water Well: On site.

3. Surface Water Use and Characteristics Pathway Not Assessed as part of the Pre-CERCLIS Site Screening

Is Site in a Flood Plain: Unknown **If Yes, ___ 10 year ___ 100 year ___ 500 year**

Distance to Nearest Surface Water: Not Determined
(If within 2 miles, fill out surface water pathway)

List Surface Water Bodies Within 15 Downstream Miles: Not Determined

Drinking Water Intakes Within 15 Downstream Miles: Not Determined

Locations and Populations Served (if known): Not Determined

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Fisheries, Sensitive Environments or Wetlands Within 15 Downstream Miles: Not Determined

Significant Features (if known or applicable): Not Determined

3. Soil and Air Exposure Characteristics

This portion of Missouri is characterized by rolling hills of glacial till that blanket Pennsylvanian-age shale, limestone, and sandstone The glacial material is 15 to 35 feet thick and dominantly silty clay (25% to 50% clay) with minor amounts of sand, cobbles, and boulders. The covering of soil over the glacial till has the same constituents as the glacial till with the exception of a higher organic detritus content. This leads the soils to have a slightly acidic pH (5.1) that becomes neutral at depth (7.3).

Number of People Living Within 200 Feet of Site: unknown

Number of Schools or Daycares Within 200 Feet of Site: None

General Population Within 4 Miles (rural, small city, heavy urban area, etc…): Rural area with low density population.

Number of Workers On-Site: none

Any terrestrial sensitive environments and/or wetlands present on-site? **Yes** ___ **No** _X_

Is site access restricted? **Yes** __ **No** __X_

VI. SUPERFUND SITE SCREENING CRITERIA [40 CFR 300.410(e)]

1. Does the quantity or concentration of hazardous substances warrant response? **Yes** ___ **No** _X_

Explain:

An estimate of the mean concentration of Cr^{+6} documented in yard surface soil of 0.30 mg/kg is below the site-specific screening level of 2 mg/kg developed for the site.

2. Has a PRP been identified? **Yes** _X_ **No** __

Explain:

National Beef Leathers
205 Florence Rd
Saint Joseph, MO 64504-1069
(816) 279-7468

3. Is there an actual or potential threat due to hazardous substances, pollutants or contaminants? ***If "Yes", specify for which of the following exposure pathways a actual or potential threat exists:*** **Yes** __ **No** __X__

Drinking Water	**Yes** __	**No** _X
Surface Water	**Yes** __	**No** _X_
Soil Exposure/Air	**Yes** __	**No** _X_

Explain:

Concentrations of Cr^{+6} in the farm field soils are well below the site specific screening levels.

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

4. Are there hazardous substances, pollutants or contaminants in drums, barrels or bulk storage containers? **Yes ___ No _X_**

Explain:

5. Are there high levels of hazardous substances, pollutants or contaminants in surface soils? **Yes ___ No _X_**

Explain:

Surface soil samples were collected in sampling units (SUs) established within the residential yard (DU) and analyzed for Cr^{+6} and other analytical parameters. The sampling design is further described in the SS narrative report. Results of Cr^{+6} analysis for the four SU samples were 0.116 mg/kg, 0.098 mg/kg, and 0.185 mg/kg, and 0.277 mg/kg,. The 95%UCL calculated using four SUIS samples is 0.30 mg/kg, which is below the site-specific risk based screening level of 2.0 mg/kg.

("High levels" may be determined by streamlined risk assessments, health consultations, state or federal soil screening criteria, and/or Superfund program policies or directives.)

6. Are there conditions on site which may be susceptible to impact from adverse weather conditions? **Yes __ No _X__**

Explain:

7. Is there a threat of fire or explosion? **Yes ___ No _X_**

Explain:

8. Are there other situations or factors which warrant further Superfund response? **Yes ___ No _X_**

Explain:

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

VII. SUPERFUND SITE SCREENING FINDINGS AND RECOMMENDATIONS

SITE SCREENING FINDINGS

Answer the following questions as support for the site recommendation.

Yes	No	Condition or Factor	Yes	No	Condition or Factor
X		**Is there a release or threat of release?**		X	**Is there a direct soil exposure pathway threat?**
X		**Is the source a facility or vessel?**		X	**Is there an air pathway threat?**
X		**Does the release involve a hazardous substance, pollutant, or contaminant?**		X	**Are there drums, barrels, or bulk storage containers present?**
	X	**Is the site subject to response limitations?**		X	**Are there high levels of contaminants in surface soils?**
	X	**Does the quantity or concentration of hazardous substances warrant response?**		X	**Is the site susceptible to adverse weather conditions?**
X		**Has a PRP been identified?**		X	**Is there a threat of fire or explosion?**
	X	**Are there actual or potential exposure threats (any pathway)?**		X	**Are there other factors which warrant Superfund response?**
	X	**Is there an actual or a potential threat for contamination of drinking water supplies?**	X		**Is there a willing/capable PRP response?**
	X	**Is there a surface water pathway threat?**		X	**Can the site be referred to another program?**

SITE SCREENING RECOMMENDATIONS

X	**Superfund CERCLIS Entry Not Warranted** **No Further Superfund Response Action Required**
	Superfund CERCLIS Entry Warranted **Not Recommended For CERCLIS Entry At This Time – Other Response Action Planned**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Additional Integrated Assessment Recommended**
	Superfund CERCLIS Entry Warranted **Recommended For CERCLIS Entry – Removal Action Recommended** *(Complete A Removal Evaluation Form)* **___ Emergency ___ Time-Critical ___ Non-Time-Critical**

(Revised by Missouri DNR 1/26/04)

MISSOURI SUPERFUND PRE-CERCLIS SITE SCREENING FORM

Comments:

Sampling and analysis of surface soils show that past application of tannery sludge as fertilizer in this farm field has resulted in a release of hazardous substances (Cr^{+6}) to this residential yard. However, the concentrations did not exceed the health-based screening levels developed for the site.

VIII. ADDITIONAL INFORMATION OR COMMENTS

This Pre-CERCLIS Site Screening Form is included along with 28 other forms (one per DU) as an appendix to a SS narrative report describing the overall investigation of sludge applications across a 4-county area.

PREPARED BY:

NAME: Michael Stroh **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

REVIEWED BY:

NAME: Julieann Warren **SIGN ATURE:** _____ **DATE:** Sept. 10, 2010

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