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DEPARTMENT OF NATURAL RESOURCES

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FINAL REMEDY DECISION

Ashland, Inc.
7710 Polk Street
St. Louis, Missouri
EPA ID#: MOD031005341

INTRODUCTION

This Final Remedy Decision (FRD) is issued by the Missouri Department of Natural Resources (Department) in coordination with the U.S. Environmental Protection Agency (EPA). The purpose of the FRD is to identify the selected final remedy, present any concerns and issues raised during the public comment period, and provide responses. Since no formal comments were received during the public comment period, the selected final remedy was not changed from that original remedy in the Statement of Basis.

SELECTED REMEDY

The selected final remedy for the Ashland, Inc. (Ashland) facility, located at 7710 Polk Street in St. Louis, Missouri, St. Louis City, consists of the following:

1. A no further action for the soil because the contaminants in the soil were below applicable screening levels, as discussed in the February 28, 2003 Phase I Resource Conservation and Recovery Act Facility Investigation (RFI) Report and July 8, 2004 Phase II RFI report, which also included a human health risk assessment and an ecological risk evaluation. This information is also summarized in the Corrective Measure Study/Corrective Measure Implementation Work Plan dated August 22, 2007.
2. For the contaminated groundwater at the site, the final remedy consists of monitored natural attenuation (MNA) and the implementation of institutional controls, as described in the approved final Corrective Measure Study/Corrective Measure Implementation Work Plan dated August 22, 2007.



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The final remedy for the site addressing the groundwater contamination is described below.

Implementation of Institutional Controls

Institutional controls are actions that will control land use and site access through public agencies or records. Institutional controls will not have a direct bearing upon on-site restoration, but could reduce the potential for human exposure. Institutional controls are designed to prevent land use that could potentially expose humans to groundwater contact. Institutional controls do not reduce contaminant concentrations in groundwater, but limit the exposure to the groundwater at the site. Some institutional controls are already in place.

Missouri Well Construction Code rules include statewide limits on the installation of wells, based on their proximity to chemical storage facilities such as this site. Missouri Code of State Regulations 10 CSR 23-3.010(2)(A)(1) prohibits a well from being constructed within 300 feet of chemical storage.

On August 1, 2005, the City of St. Louis approved Ordinance 66777. The Ordinance prohibits the use or attempted use of groundwater as a potable water supply and the drilling or installation of wells to be used for a potable water supply within the corporate limits of the City of St. Louis. Further, the Ordinance authorizes the Mayor of the City of St. Louis to enter into a Memorandum of Understanding (MOU) with the Department with regard to the Ordinance.

On October 25, 2006, the City of St. Louis and the Department entered into the MOU referred to in Ordinance 66777. The intent of the MOU is to specify the roles and responsibilities of the City and the Department. The MOU ensures that both the Department and the City track remediated sites and the City notifies the Department of changes to, and violations of, the Ordinance.

Additionally, Ashland and the Department will enter into an Environmental Covenant pursuant to the Missouri Environmental Covenants Act, Section 260.1000 through 260.1039, RSMo. The Environmental Covenant will restrict exposure to the groundwater that exceeds regulatory limits, in the event that other controls do not.

Monitored Natural Attenuation

MNA is part of the final groundwater remedy for the site. Natural attenuation is a term used to describe a remedial action that relies on in-situ natural processes without human intervention. Natural attenuation includes a variety of chemical, biological, or physical process, such as dispersion, volatilization, biodegradation, adsorption, and chemical reactions, which can reduce contaminant concentrations to acceptable levels. This approach requires evaluation of historical groundwater and/or soil chemistry data to demonstrate trends of declining constituent concentrations in addition to hydrogeological and geochemical data that demonstrate natural attenuation processes are occurring. It also involves long-term monitoring to confirm that degradation is proceeding at rates consistent with clean-up objectives.

Natural attenuation processes were evaluated in the groundwater at the site, including aerobic and anaerobic degradation. The primary contaminants of concern in groundwater evaluated for evidence of biodegradation were benzene, toluene, ethylbenzene, and xylenes (BTEX) and chlorinated volatile organic compounds (VOCs). Natural attenuation parameters analyzed and evaluated during the preliminary screening to determine evidence for biodegradation included temperature, pH, dissolved oxygen, reduction-oxidation (redox) potential, methane, nitrate, sulfate, and alkalinity. The analysis of natural attenuation parameters shows both aerobic and anaerobic conditions exist in the site groundwater. Changes in redox potential, depletion of dissolved oxygen, sulfate, and generation of methane were observed. There is depletion of oxygen at the center of the plume, where BTEX concentrations were highest. Methane was detected in the groundwater at elevated concentrations, especially at the leading edges of the plume. The increases in methane concentration may be an indication of the presence of methanogenic microorganisms in the aquifer, which are degrading the VOCs to carbon dioxide and methane. Corresponding changes in alkalinity and carbon dioxide measurements and changes in redox potential within the plume are evidence that biodegradation processes are taking place.

The corrective action goal for groundwater at the site is the protection of human health and the environment. To achieve this goal, the corrective action objective is to prevent contaminants of concern in groundwater from reaching potential receptors above acceptable risk levels. Appropriate remedial goals for groundwater at the site must be set at the Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency for those constituents that possess MCLs. Other constituents should have remedial goals based on a hierarchy consisting of, in order 1) the current Missouri Water Quality Standards for drinking water, 2) a risk-based level similar to those presented in the U.S. Environmental Protection Agency Regional Screening Levels, or 3) a site-specific risk-based standard. Ashland will propose final corrective action goals for Department approval during the first year of corrective action monitoring.

The groundwater monitoring program is designed to use the existing network of monitoring wells to document groundwater concentration trends over time and with distance downgradient. Ashland's Sampling and Analysis Plan and Standard Operating Procedures can be found in Appendix E of the Corrective Measures Study/Corrective Measures Implementation Work Plan dated August 22, 2007. Groundwater monitoring will be conducted annually at all ten existing wells and semi-annually at the selected downgradient wells. The wells for annual and semi-annual sampling protocols are provided in the following table:

Sampled Annually Only	Sampled Annually and Semi-Annually
MW-6A (replacement for MW-6)	MW-15 (replacement for MW-14)
MW-18 (replacement for MW-1)	MW-16
MW-4	MW-17
MW-7	MW-19
MW-8	MW-20A (replacement for MW-20)

The analytical parameters to be monitored include VOCs, Semi-Volatile Organic Compounds (SVOCs), and MNA indicator parameters of aerobic and anaerobic biodegradation, such as degradation breakdown products and nutrients and dissolved oxygen. The EPA methods and analytical parameters for both annual and semi-annual sampling protocol are provided in the following table:

Annual Analytical Parameters	Semi-Annual Analytical Parameters
VOCs by EPA Method 8260B	BTEX only by EPA Method 8260B
SVOCs by EPA Method 8270C	ORP (redox potential)
ORP (redox potential) by field measurement	Dissolved Oxygen
Temperature, pH, Conductivity by field measurement	Temperature, pH, Conductivity
Alkalinity by Method 310.1	
Carbon Dioxide by Method SM4500	
Methane by EPA/SM6211M-FID or RSK175	
Ferrous Iron by field test kit	
Total Dissolved Iron by EPA Method 6010B	
Total Dissolved Manganese by EPA Method 6010B	

Groundwater monitoring will continue until all contaminant levels in the groundwater are below the groundwater protection standards throughout the plume of contamination for a period of three (3) consecutive years. As a matter of policy, the Department generally requires that groundwater meet the protection standards for a period of three (3) consecutive years prior to considering cessation of groundwater corrective action.

The following activities are included in the MNA program at the Ashland facility.

- Annual groundwater monitoring for VOCs, SVOCs, and MNA indicator parameters of aerobic and anaerobic biodegradation, such as degradation breakdown products and nutrients and dissolved oxygen in all ten on-site wells [MW-6A (replacement for MW-6), MW-18 (replacement for MW-1), MW-4, MW-7, MW-8, MW-15 (replacement for MW-14), MW-16, MW-17, MW-19, and MW-20A (replacement for MW-20)] and associated quality control/quality assurance sampling and analysis.
- Semi-annual groundwater monitoring for BTEX and the most indicative of the biodegradation parameters (ORP, temperature, pH, conductivity and dissolved oxygen), and associated quality control/quality assurance sampling and analysis for monitoring wells MW-15 (replacement for MW-14), MW-16, MW-17, MW-19, and MW-20A (replacement for MW-20).

- Water levels will be measured in all wells on site during both annual and semi-annual sampling events to collect the information necessary to construct potentiometric maps and determine groundwater flow direction and rate.
- Inspection and maintenance of monitoring wells will be scheduled in conjunction with the semi-annual and annual monitoring events, as necessary.
- Semi-annual progress reports will be submitted September 1st of each year, and will include the following information on the semi-annual groundwater sampling event:
 - Data Summary Table summarizing all sampling locations, all analytes, detection results, detection limits, and appropriate remedial goals.
 - Laboratory Analytical Data Reports.
 - Field parameter measurement results.
 - Copies of field sampling and well inspection log sheets.
 - Well repair documentation.
 - Quality assurance/quality control data.
- Annual progress reports will be submitted March 1st of each year and will be more detailed than the semi-annual groundwater reports. In addition to the information required for the semi-annual progress reports, annual progress reports will include an analysis of the groundwater data consisting of the following elements:
 - A narrative discussion of the nature and evolution of the facility-wide groundwater monitoring program as well as conclusions concerning the overall adequacy of the program and proposed remedies for any inadequacies identified.
 - Define the vertical and horizontal extent of contamination.
 - Potentiometric contour maps showing the direction of groundwater movement.
 - Chemical parameter trend graphs.
 - Contaminant isoconcentration maps showing the spatial extent of concentrations; of hazardous constituents in groundwater throughout the contaminant plume.
 - Any surface or subsurface well integrity problems.
 - Measured thickness of Non-Aqueous Phase Liquids, if present.
 - Boring logs and well diagrams of new additional or replacement monitoring wells.
- The report of the 5-year review will include all of the items listed for the annual reports plus a detailed evaluation of biodegradation and other attenuation processes and their effect on concentrations within the plume. This evaluation must include calculation of the attenuation rate and an estimation of the remaining time necessary to reach the groundwater protection standards.

COSTS

Ashland's total estimated cost for implementation of the groundwater remedy, as received via e-mail June 7, 2010, is \$411,365.08. The Department finds Ashland's current estimated costs

satisfactory. Ashland is required to provide financial assurance for the final remedy in accordance with the requirements of the Facility Specific Provision I of the Letter of Agreement (LOA).

Ashland will adjust annually the corrective action cost estimate for inflation until all corrective action activities required by this remedy decision are complete. The inflation adjustment will be determined using the procedures described in 40 CFR 264.142(b), except that the inflation factor should be derived from the most recent annual Implicit Price Deflator for the Gross Domestic Product instead of the Gross National Product. The cost estimate is due within 60 calendar days before the anniversary date of the establishment of the financial assurance instrument used to comply with this section. If Ashland uses a financial test or corporate guarantee to demonstrate financial assurance, the cost estimate is due within 30 calendar days of the end of the provider's fiscal year. Discounting is not allowed. Reduction of the cost estimate for the passage of time will not be allowed unless a Missouri board certified professional engineer certifies that the facility will meet and maintain compliance with MCLs via MNA for three consecutive years in the timeframe stated in the cost estimate.

Ashland will increase the cost estimate if Ashland or the Department determines that any additional corrective action activities are required, or if any other conditions increase the estimated cost of the corrective action activities to be performed under this remedy decision.

EVALUATION OF THE FINAL REMEDY

A complete evaluation of the final remedy is available in the Statement of Basis, dated December 17, 2008. In the Statement of Basis, the Department and EPA determined that the selected final remedy meets the general evaluation standards (threshold criteria) and five other factors (balancing criteria) for Corrective Measure Alternatives in accordance with the EPA document entitled, RCRA Corrective Action Plan (Final), May 1994, OSWER Directive 9902.3-2A.

The final remedy meets the threshold criteria that 1) protects human health and the environment, 2) will attain the media clean up standards, 3) controls the sources of releases so as to reduce or eliminate, to the maximum extent practicable, further releases that may pose a threat to human health and the environment, and 4) complies with applicable standards for management of wastes.

This final remedy also meets the balancing criterion factors such as 1) long-term reliability and effectiveness, 2) reduction of toxicity, mobility, or volume of wastes, 3) short-term effectiveness; 4) implementability; and 5) cost.

Due to the elimination of source areas in the vadose zone and the absence of residual non-aqueous phase liquid, the Ashland facility is a good candidate for natural attenuation as a stand-alone technology to remediate the dissolved plume. The current natural biodegradation screening results and the site-wide groundwater chemistry suggests that biodegradation processes are sufficiently strong to fully attenuate the BTEX compounds found in the areas of the dissolved

groundwater plume. On the basis of this evaluation, and state and community acceptance of the remedy, MNA is selected as the final remedy for the groundwater contamination at the Ashland facility, located at 7710 Polk Street, St. Louis, Missouri.

PUBLIC PARTICIPATION ACTIVITIES

The public was invited to review and offer written comments on the proposed final remedy during a 45-day public comment period. The public comment period began December 17, 2008, and ended February 2, 2009. The public was notified of the availability of the proposed final remedy for review through a newspaper legal notice, facility mailing list letter, and radio announcement. Neither the Department nor EPA received a request for a public meeting or public hearing. There were no comments submitted during the public comment period.

COMMENTS RAISED AND THE DEPARTMENT AND EPA'S RESPONSES

No comments were received during the public comment period; consequently, no changes were made to the proposed final remedy.

DECLARATIONS

Based on the administrative record compiled for this corrective action, I have determined that the selected final remedy to be ordered at this site is appropriate and will be protective of human health and the environment.

September 30, 2010

Date

[Original signed by David J. Lamb]

David J. Lamb, Director
HAZARDOUS WASTE PROGRAM