

Hazardous Waste Management Commission Report

April through June 2013

Quarterly Report



**MISSOURI
DEPARTMENT OF
NATURAL RESOURCES**

Hazardous Waste Management Commissioners

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Andrew Bracker, Vice Chair
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Elizabeth Aull
Deron Sugg
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"The goal of the Hazardous Waste Program is to protect human health and the environment from threats posed by hazardous waste."

For more information

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Past issues of the Hazardous Waste Management Commission Report are available online at www.dnr.mo.gov/env/hwp/quarterlyreport.htm.



**Missouri Department of Natural Resources
Hazardous Waste Program**

Program Update Letter from the Director

The end of this quarter marks the end of spring and the beginning of summer. This is always a busy time of year, as with better weather, staff ramp up their sampling and inspection efforts across the state. It also marks the end of the state fiscal year, which means our Budget and Planning staff are also very busy as they look to close out the 2013 fiscal year activities and begin preparing for the upcoming 2014 fiscal year.

This quarter also marks the end of the 2013 legislative session. This session produced legislation critical to the department with the passage of House Bills 28 and 650. These bills, both omnibus bills, contain fees extensions for the department's Air, Water, Land Reclamation and Hazardous Waste programs among other things. For the Hazardous Waste Program, these fees, which were extended for five years to Dec. 31, 2018, make up \$2 million of the program's annual budget. These funds also allow us to meet the match requirements for several of the federal grants that make up the rest of our budget. In addition to the provisions related to fees, these bills also provide the department with the authority to conduct a comprehensive review of the Hazardous Waste Program's fee structure. It also streamlines some of the requirements of the hazardous waste permitting process and adds a representative from the petroleum industry to the Hazardous Waste Management Commission. This new authority, and changes to our processes, will hopefully prove useful and productive as they are implemented.

Staff continue to work diligently to meet the requirements of House Bill 1251, the "No Stricter Than" legislation passed during last year's legislative session. Review of existing rules, to determine those that are inconsistent with federal regulations, is nearing completion and the program is looking forward to the next phase, the rulemaking process, that will amend or rescind those rules deemed inconsistent. Stakeholder meetings have been held every 60 to 90 days since House Bill 1251's passage and we will continue to work with stakeholders as this process moves forward.

This edition of the quarterly report includes several fiscal year end reports and milestones reached for our various sections. I hope you enjoy reading about all of the different things this program has accomplished in fiscal 2013.

Sincerely,



David J. Lamb

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Brownfields/Voluntary Cleanup Program

Certificates of Completion

Brownfields are real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant.

Through this program, private parties agree to clean up a contaminated site and are offered some protection from future state and federal enforcement action at the site in the form of a “no further action” letter or “certificate of completion” from the State.

The Brownfields/Voluntary Cleanup Program issued seven certificates of completion for various sites from April through June 2013. This brings the total number of certificates of completions to 693.

Crescent Feed Company – Springfield

The Crescent Feed Company Inc. site is located at 1022 and 1100 West Phelps St. in Springfield. This site was historically used as residential property from at least the 1940s until the time the feed mill operations began in the mid 1950s. This property has operated as Crescent Feed since at least 1957 at the 1100 address. The 1022 address was occupied by a tire equipment warehouse from at least the late 1950s through the late 1960s.

A Phase I site assessment was conducted in fall 2012 to identify any recognized environmental concerns that might be present as a result of the site’s previous use history. Based on the findings of the Phase I, a Phase II was conducted to further evaluate soil and groundwater impacts. Groundwater sampling was limited due to recent drought. Lab analysis of collected samples did not detect any chemicals of concern above the default target levels. The site qualifies for unrestricted residential use.

The department determined the site is safe for its intended use.

The Laurel Site – St. Louis

The Laurel site is located at 601 Washington Ave. in St. Louis. This 11-story, one block square department store building was built in 1900 on the former site of St. Louis Gas, Fuel and Power building. It was operated as a dry goods company and a Dillard’s department store from 1908 to 1988 by Stix, Baer and Fuller.

The former manufactured gas plant located at the site was given a status of “No Further Remedial Action Planned” by the Environmental Protection Agency in 1988, so no oversight for this issue was required or provided by the program. Asbestos containing materials and lead-based paint were identified in the building, as well as fluorescent light bulbs and ballasts and various remaining cleaning and maintenance wastes. These materials were removed in accordance with an approved remedial action plan, with the exception of some asbestos containing materials and lead based paint, which were encapsulated in place. An operations and maintenance plan to manage and prevent future exposure to the encapsulated asbestos containing materials and lead based paint was approved by the program and filed in the property’s chain of title. The department determined the site is safe for its intended use. The building will be developed as a mix of residential and commercial use.

The Former Art Mint Limited Site – Kirkwood

The former Art Mint Limited site, located at 236 E. Monroe in Kirkwood, is on the northeast corner of a property currently used by Kirkwood Public Works department. Gateway Hose and Coupling Co., an asbestos firehose manufacturer, once occupied the property. In 2002, the city of Kirkwood purchased the property and a subsurface investigation revealed the presence of asbestos in the soil. The city intends to convert the site into a paved parking area for Kirkwood Public Work's equipment and vehicles.

Metals and chlorinated solvents, at levels slightly above the department's default target levels, are present in the groundwater at the site. However, after four quarters of monitoring, these levels have remained consistent and the contamination plume has been determined to be stable.

All asbestos removal at the site was performed without the oversight of the program. As such, any asbestos that may remain in the soil at the site is excluded from this certificate of completion. The department determined the site is safe for its intended use.

Agraform Facility – St. Louis

The Agraform Facility site is located at 133 East Krauss St. in St. Louis. This site is comprised of two portions - the undeveloped southern portion of the site (sold to Missouri Marine LLC) and the northern operating portion that houses the facility and includes three main buildings, two office trailers, smaller outbuildings and a primary tank farm area. The Agraform Facility has been developed residentially, commercially and industrially since at least 1916. Based on historical fire insurance maps and street directories, the site has been occupied by a foundry, the Heatmaster Furnace Oil Company, Union Carbide Chemicals Company, Rhone Poulenc Agriculture, The Columbia Southern Chemical Corporation and Bayer Crop Science. Known contaminants at the site include metals, polycyclic aromatic hydrocarbons and diesel range organics.

Investigations were conducted of groundwater, surface soil and subsurface soil. Levels of lead, polynuclear aromatic hydrocarbons and total petroleum hydrocarbons in the diesel and oil range were found in excess of risk-based target levels. A risk assessment in accordance with the 2006 Missouri Risk-Based Corrective Action, or MRBCA, guidance was conducted. Levels of lead, diesel range organics, total petroleum hydrocarbons and benzo(a)pyrene exceed the standards for residential use and lead exceeds the construction worker risk-based target levels in subsurface soils. An environmental covenant was placed on the site, restricting use of the site to non-residential purposes and putting a soil management plan in place to govern construction activities. The department determined the site is safe for its intended use. The site will continue as a pesticide packaging facility.

Missouri Marine – St. Louis

The Missouri Marine site, located on a yet unnumbered section of Quincy Street in St. Louis was originally the southern portion of the above mentioned Agraform Facility site. Known contaminants at the site include metals and polycyclic aromatic hydrocarbons.

Investigations were conducted of groundwater, surface soil and subsurface soil. Levels of lead and polynuclear aromatic hydrocarbons were found at the site in excess of risk-based target levels. A risk assessment in accordance with the 2006 MRBCA guidance was conducted. Levels of lead and benzo(a)pyrene exceed the standards for residential use and lead exceeds the construction worker risk-based target levels in subsurface soils. An environmental covenant was placed on the site, restricting use of the site to non-residential purposes and putting a soil management plan in place to govern construction activities. The department determined the site is safe for its intended use.

Cargill Tier II Properties - Kansas City

The Cargill Tier II Properties - Kansas City site located at 2306 Rochester St. in Kansas City initially consisted of nine properties immediately west of the Cargill Plant in Kansas City. The properties have been primarily used as salvage yards or residential property. Major contaminants include metals, polycyclic aromatic hydrocarbons and petroleum products. At a later point, three more properties were added to the site, bringing the total to 12 properties. These properties were also used as salvage yards and residences.

Groundwater, surface soil and subsurface soil were sampled at the site for volatile and semi-volatile organic compounds, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons and metals. Metals and polycyclic aromatic hydrocarbons were detected in surface and subsurface soil above default target levels. Volatile organic compounds and polycyclic aromatic hydrocarbons were detected in groundwater above default target levels. A Tier I risk assessment was performed and several metals and polycyclic aromatic hydrocarbons in soil were shown to be above MRBCA residential standards, however, they did not exceed non-residential standards. An environmental covenant will be put in place restricting the property to non-residential use and prohibiting the use of groundwater for domestic purposes. The department determined the site is safe for its intended use.

Sites in Brownfields/Voluntary Cleanup Program

	Active	Completed	Total
April	240	688	928
May	236	692	928
June	236	693	929

New Sites Received

April

- Family Dollar Store Property - Kingshighway, St. Louis
- Family Dollar Store Property - Natural Bridge, St. Louis
- TR Gaines Technical Building, Warrensburg

May

June

- Arvest Bank, Lebanon
- Roehrig Auto (Former), St. Louis
- Chesterfield Auto Repair (Former), Chesterfield

Sites Closed

April

- Modern Distributing - Former, Springfield
- Crescent Feed Company Inc, Springfield

May

- Laurel (The), St. Louis
- Agraform Facility, St. Louis
- Missouri Marine, St. Louis
- Art Mint Limited (former), Kirkwood

June

- Cargill Tier II Properties - Kansas City

Drycleaning Environmental Response Trust Fund

The department's Drycleaning Environmental Response Trust, or DERT, Fund provides funding for the investigation, assessment and cleanup of releases of chlorinated solvents from dry cleaning facilities. The two main sources of revenue for the fund are the dry cleaning facility annual registration surcharge and the quarterly solvent surcharge.

Registrations

The registration surcharges are due by April 1 of each calendar year for solvent used during the previous calendar year. The solvent surcharges are due 30 days after each quarterly reporting period.

Calendar Year 2012	Active Dry Cleaning Facilities	Facilities Paid	Facilities in Compliance
Jan. - March 2013	189	71	37.57%
April - June 2013	188	159	84.57%

Calendar Year 2013	Active Solvent Suppliers	Facilities Paid	Suppliers in Compliance
Jan. - March 2013	11	8	72.73%
April - June	12	11	91.7%

Cleanup Oversight

Calendar Year 2013	Active	Completed	Total
Jan. - March 2013	25	11	36
April - June 2013	23	13	36

New Sites Received

April

May

June

Sites Closed

April

Fenton Plaza 48, Fenton
Charter Dry Cleaning, Ellisville

May

June

Reimbursement Claims

The applicant may submit a reimbursement claim after all work approved in the work plan is complete and the fund project manager has reviewed and approved the final completion report for that work. The fund applicant is liable for the first \$25,000 of corrective action costs incurred.

	Received	Under Review	Paid/Processed
April	1	9	5
May	5	5	1
June	1	5	0

	Received	Under Review	Paid/Processed
April	\$20,183	\$142,128.94	\$102,428.54
May	\$25,227.55	\$99,439.02	\$325
June	\$3,297.50	\$26,766.18	\$0

Reimbursement Claims Processed:

Site Name	Location	Paid
Antioch One Hour Cleaners	Kansas City	\$34,940.21
Charter Dry Cleaning	Ellisville	\$5,333.50
Grandview Plaza	Grandview	\$624.17
Kings Highway Retail Property	Sikeston	\$31,430.45
Regal Cleaners	University City	\$325
Tri State Service Co - E. Trafficway Site	Springfield	\$30,100.21

Total reimbursements as of June 30, 2013: \$2,235,959.50

DERT Fund Balance as of June 30, 2013: \$895,615.06

Inspections and Assistance

Regional Office Hazardous Waste Compliance Efforts

- Conducted 143 hazardous waste generator compliance inspections:
 - 44 at large quantity generators.
 - 61 at small quantity generators.
 - 31 at conditionally exempt small quantity generators.
 - Three at e-waste recycling facilities.
 - Three resource recovery inspection.
 - One targeted re-inspection.
- Conducted 12 compliance assistance visits at hazardous waste generators.
- Issued 61 letters of warning and three notices of violation requiring actions to correct violations cited during the 143 inspections conducted.
- Received and investigated a total of 66 citizen concerns.

Underground Storage Tank Compliance and Technology Unit

The department is currently working to enact the final underground storage tank, or UST, requirements of the Energy Policy Act of 2005. Underground Storage Tank Compliance and Technology Unit, or CTU, staff are working to develop new regulations requiring all new UST systems installed after July 1, 2017, to be double-walled. The new regulations will also include Missouri specific improvements, as well as the federal regulation changes, which are expected to be published this winter. Staff have already begun outreach efforts through the Missouri Petroleum Storage Tank Insurance Fund, or PSTIF, and the Missouri Petroleum Marketers and Convenience Store Association. This winter, staff is planning to bring additional outreach efforts to several areas of the state.

Tank Inspection Efforts

The department has long recognized the importance of compliance inspections to assure USTs are correctly installed, operated and maintained. Inspections can help detect problems early and prevent costly spills, leaks and releases. Inspections promote practices helping extend an UST system's use and compliance with regulations to better protect the environment and especially groundwater. The federal government established a minimum three year inspection cycle in the Federal Energy Policy Act of 2005. To meet this goal, the department and the Petroleum Storage Tank Insurance Fund entered into a contract with an inspection contractor for on-site inspections. Department staff reviews the inspection reports and communicates with the tank owner and operator about actions needed to comply with the UST regulations. At the start of each state fiscal year, a list of approximately 1,000 facilities is put together and given to the contractor for inspection in that year. As of Jan. 9, 2013, all of the facilities assigned to the contractor for State fiscal 2013 were inspected. Department UST inspectors continue to inspect all new tank installations, operating facilities not insured by PSTIF and out of use tanks. All of these efforts assure Missouri stays in compliance with the inspection mandates of the Federal Energy Policy Act.

Enforcement Efforts

During April through June 2013, staff completed three settlement agreements for UST enforcement with financial responsibility violations. Using the expedited enforcement process approved by the Hazardous Waste Management Commission in 2008, UST Compliance and Technology Unit staff and the Attorney General's Office continue to keep the number of facilities without a verified financial responsibility mechanism to less than 30.

New Staff

The UST Compliance and Technology Unit is now fully staffed with the addition of two individuals who will be great assets to the unit and the regulated community.

Dan Knaebel joined this unit in May, filling our vacant inspector position. He came to us from the Division of Energy. Dan is busy learning the technical and regulatory aspects of the job. Dan is quickly learning the major elements of being an inspector and is enjoying the extensive travel required.

Coy King joined this unit in June, filling the vacant case manager position. Coy's duties include reviewing inspections, enforcement case work and conducting field work as necessary. Coy is quickly learning how to evaluate the inspections he is reviewing for compliance and how to apply the regulations.

The UST Compliance and Technology Unit is now fully staffed with the addition of these two individuals who will be great assets to the unit and the regulated community.

Special Facilities Unit

Commercial Facility Inspectors

Special facilities inspectors conducted 11 inspections of commercial hazardous waste treatment/storage/disposal facilities, three of which resulted in the issuance of notices of violation.

Polychlorinated Biphenyl Inspector

The inspector conducted 20 compliance inspections at various types of facilities throughout the state. The inspector's reports are forwarded to the U.S. EPA Region 7 office, which has authority for taking any necessary enforcement action regarding polychlorinated biphenyls according to the Toxic Substances Control Act.

Hazardous Waste Transporter Inspector

The inspector conducted 41 commercial vehicle inspections, resulting in 22 violations cited and four vehicles placed out of service. As part of the Commercial Vehicle Safety Association's protocol, the department sends the inspection reports to the Missouri State Highway Patrol. The transporter must certify to the patrol the violations were corrected.

The inspector sent 13 letters to companies that were inactive, unregistered or conditionally exempt small quantity generators that shipped either small or large quantities of hazardous waste. These facilities are required to register as generators with the department. Two notices of violation were issued to unlicensed transporters. The inspector conducted one compliance assistance visit at a used oil transporter facility.

As of June 30, 2013, there were 255 licensed hazardous waste transporters in Missouri.

Hazardous Waste Enforcement Unit

Enforcement Efforts

- Resolved and closed five hazardous waste enforcement cases.
- Finalized one settlement agreement.
- Referred one facility to the Attorney General's Office.
- Received six new enforcement cases.
- Sent two penalty negotiation letters.

Savvis Communication Corporation Inc.

Savvis Communication Corporation Inc. is a warehouse leasing company in St. Louis.

The facility failed to:

- Determine if waste was hazardous.
- Have documentation that cathode ray tubes, or CRTs, meet the exclusion.
- Use authorized hazardous waste treatment, storage or disposal facility, or TSDF.
- Obtain a permit to operate as a TSDF.
- Ensure materials were not speculatively accumulated.
- Demonstrate legitimate recycling.
- Label used, broken CRTs "Used Cathode Ray Tube(s)-Contains Leaded Glass" or "Leaded Glass from Televisions or Computers;" or label used, broken CRTs "Do Not Mix with Other Glass Materials."

As a result of the department's actions, the facility removed thousands of pounds of abandoned hazardous waste from its facility. The person who abandoned the hazardous waste pleaded guilty in federal court and was sentenced to a fine of \$2.5 million and 30 months in prison. The facility developed and implemented a new and much more extensive recycling and disposal program for hazardous waste management within the entire company.

The final penalty assessed is \$15,490, to be paid to the St. Louis County School Fund.

The actions taken by the company will result in protection of the environment and adjoining property and persons and safer working conditions for tenants.

New Staff

Nicole Eby joined the Hazardous Waste Enforcement Unit in May as the new unit chief. She joins us after eight years of doing compliance and enforcement work with the Air Pollution Control Program and is busy learning the many responsibilities of her new position including filling a final vacancy within the unit, becoming familiar with the hazardous waste regulations and getting to know her staff.

Joy Johnson also joined the Hazardous Waste Enforcement Unit in May. She comes to us from the Water Protection Program. As an Environmental Specialist III, she is busy learning the enforcement process and the hazardous waste regulations and is assisting with development and organization of some of the unit's checklists and procedures.

In addition to these new arrivals, Evan Bryant was chosen to fill the vacant Environmental Specialist IV position within the unit in May. In his new role, Evan will be responsible for many of the more complex enforcement issues within the program as well as taking over many other responsibilities such as section training coordination, clandestine drug laboratory waste disposal and collection station authorization and participation in several technical and rulemaking issues.

Federal Consent Agreement and Final Order with Wal-Mart

On May 28, 2013, EPA and Wal-Mart Stores Inc. entered into a consent agreement and final order to resolve civil violations of the Resource Conservation and Recovery Act and Federal Insecticide, Fungicide and Rodenticide Act, or FIFRA. The civil settlement requires Wal-Mart to continue to implement and develop the corporate-wide hazardous waste management program employed in 2006 and pay a penalty of \$7.628 million.

On May 28, 2013, Wal-Mart also entered guilty pleas for six counts of violating the Clean Water Act in cases filed by federal prosecutors in Los Angeles and San Francisco and violating FIFRA in a case filed by federal prosecutors in Kansas City. The California criminal cases resulted in a \$40 million dollar fine, half of which will fund various community service projects. These projects include opening a \$6 million retail compliance assistance center that will help retail stores across the nation learn how to properly handle hazardous waste. The Missouri case resulted in criminal fine of \$11 million and an additional \$3 million to the department's Hazardous Waste Program to fund a supplemental environmental project. The project is detailed in the plea - to implement a program of education about pesticide regulations for regulators, the regulated and the public and for related inspection and enforcement efforts.

- In total, Wal-Mart will pay \$81.6 million for unlawful conduct as a result of the three criminal cases brought by the Justice Department and the civil case filed by EPA.
- The violations pertained to mismanagement of hazardous waste at Wal-Mart stores across the country and mismanagement of damaged pesticide containers by Wal-Mart and its contractor, Greenleaf LLC, at the Greenleaf facilities in Neosho and Pineville.

The department and the Attorney General previously entered into an agreement with Wal-Mart, in March 2012, to resolve violations at the Neosho and Pineville facilities. The agreement included a civil penalty of \$214,378 to the Newton County School Fund, cost recovery in the amount of \$4,082 for the department's oversight, cleanup expenses, unpaid generator fees and a supplemental environmental project for \$1,050,000 to sponsor pesticide collection events in rural Missouri. With previous civil actions brought by California and Missouri, Wal-Mart will pay a combined total of more than \$110 million to resolve these cases. Wal-Mart indicated the cost of cleanup at the Neosho and Pineville sites was in excess of \$3.4 million.

Greenleaf LLC was also convicted of FIFRA violations in November 2008 which resulted in a criminal penalty of \$200,000.

Missouri Pesticide Collection Program Update

Beginning on June 9, 2012, and ending on June 29, 2013, the department's Hazardous Waste Program and Environmental Services Program staff oversaw the Missouri Pesticide Collection Program. The program was a part of a supplemental environmental project funded by Wal-Mart in settlement of a hazardous waste enforcement case and executed by a contractor, The Environmental Quality Company. The settlement agreement was signed in March 2012 and required that \$1,050,000 be spent to provide an opportunity for farmers and households in Missouri to properly dispose of their waste pesticides and herbicides.

The Hazardous Waste Program completed 17 collection events in 2012 and 2013, collecting a total of 123,046 pounds of waste pesticides and herbicides. Less than \$60,000 remains with final expenses currently being tallied. The settlement agreement provides for remaining monies to be used for additional collection events (if sufficient funds exist) or submitted to the department to fund other supplemental environmental projects. A decision will be made on expenditures when the final amount is available.

Staff from the department's Hazardous Waste Program and Environmental Emergency Response Program was present at each event; there were no injuries or releases documented at any of the 17 events.

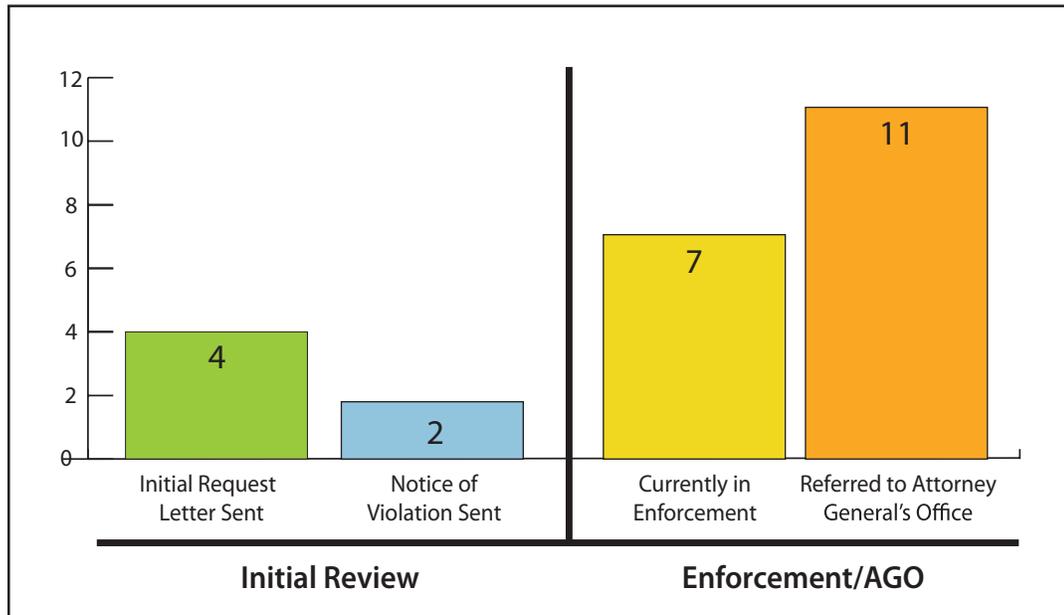
For more information about the pesticide collection program, visit the website <http://www.dnr.mo.gov/env/hwp/pesticide/> or contact Andrew Reed at 573-526-2736.

A brief overview of the completed events, locations and dates are:

Date	Location	Amount Collected
June 9, 2012	Neosho	725 lbs.
June 23, 2012	Benton	12,170 lbs.
July 7, 2012	St. Joseph	3,335 lbs.
July 21, 2012	Cameron	1,965 lbs.
Aug. 4, 2012	Bunceton	1,680 lbs.
Aug. 18, 2012	Macon	14,450 lbs.
Sept. 8, 2012	Marsha	8,930 lbs.
Sept. 22, 2012	Warrenton	25,595 lbs.
Oct. 6, 2012	Kennett	16,800 lbs.
March 9, 2013	West. Plains	6,065 lbs.
March 23, 2013	Mexico	11,915 lbs.
April 6, 2013	Maryville	2,284 lbs.
April 20, 2013	Trenton	5,675 lbs.
May 18, 2013	Troy	2,669 lbs.
June 1, 2013	Lamar	2,655 lbs.
June 15, 2013	Salem	660 lbs.
June 29, 2013	Clinton	5,473 lbs.

Underground Storage Tank Facilities with Unknown Financial Responsibility Status Report

Financial Responsibility Status	Number of Facilities
Initial Request Letter Sent	4
Notice of Violation Sent	2
Currently in Enforcement	7
Referred to Attorney General's Office	11
Total Number of Facilities with Unknown Financial Responsibility	24



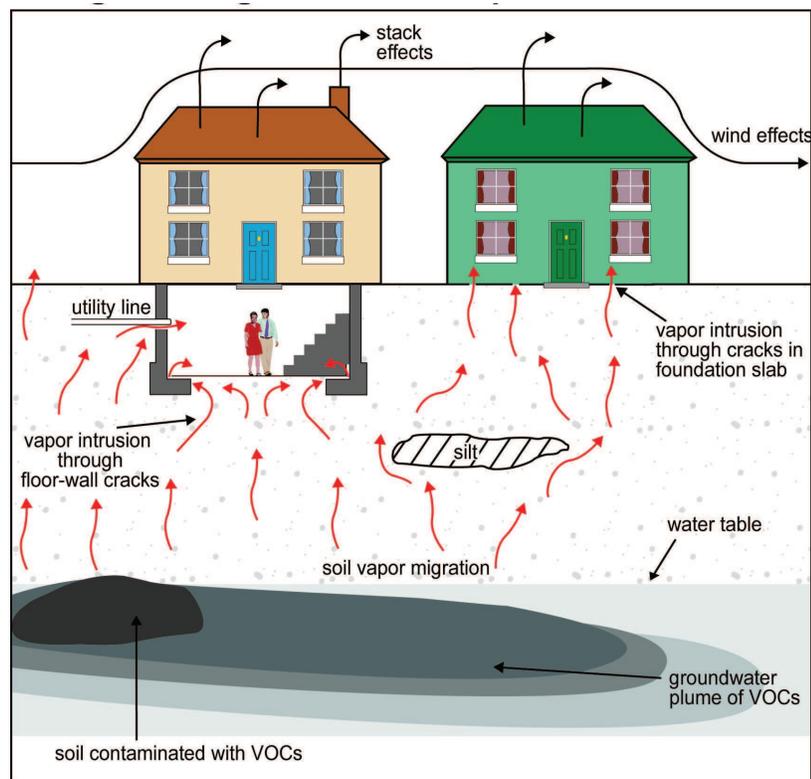
**This semi-monthly report is derived directly from a copy of the UST Database and provides a "snap shot" of the status for each active underground storage tank facility not covered by a proper Financial Responsibility Mechanism.*

What is Vapor Intrusion?

Protecting human health and the environment is the department's main mission at any hazardous waste treatment, storage or disposal facility, but even more so at facilities where hazardous wastes or hazardous waste constituents have been released to the environment. Release sources may include leaking tanks, sewer lines and pipelines, floor drains, landfills and other land disposal management units, fire-training areas, spills and discharge areas. Releases can contaminate several different media at the site, such as soil, groundwater and surfacewater. Soil and groundwater at sites are often affected where contamination has been released over a long period.

Vapor intrusion occurs when contaminants in subsurface soil or groundwater give off gases that move through soil and into homes or buildings through cracks in basement walls, crawl spaces, foundations, sewer lines or other openings. Vapor intrusion is similar to the process that occurs when radon, a naturally occurring radioactive gas, enters a home through cracks in the foundation. Vapor intrusion can occur in residential, commercial and industrial zoned areas and affect buildings with virtually any type of foundation, such as a basement, crawl space or slab on grade. The effects depend on the condition of the building. For instance, a building with more cracks in its foundation is more susceptible to vapor intrusion.

Vapor intrusion is widely recognized as a potentially significant cause of human exposure to volatile, or vapor-forming, hazardous chemicals in indoor spaces. Volatile organic compounds, commonly referred to as VOCs, are one group of chemicals that can easily become gases or vapors. Well-known examples of VOCs are petroleum products, such as gasoline or diesel fuel, dry cleaning solvents and industrial degreasers. When vapor intrusion is significant, concentrations of toxic vapors can collect indoors to a level where the health of the occupants in those buildings, such as residents and workers, could be at risk. In addition, methane and certain other volatile chemicals can create explosion hazards when they accumulate in confined spaces.



This figure depicts the migration of volatile chemicals from contaminated soil and groundwater plumes into buildings. Volatile chemicals are shown to enter buildings through cracks in the foundation and openings for utility lines. Atmospheric conditions and building ventilation are shown to influence vapor intrusion.

Identification and Investigation

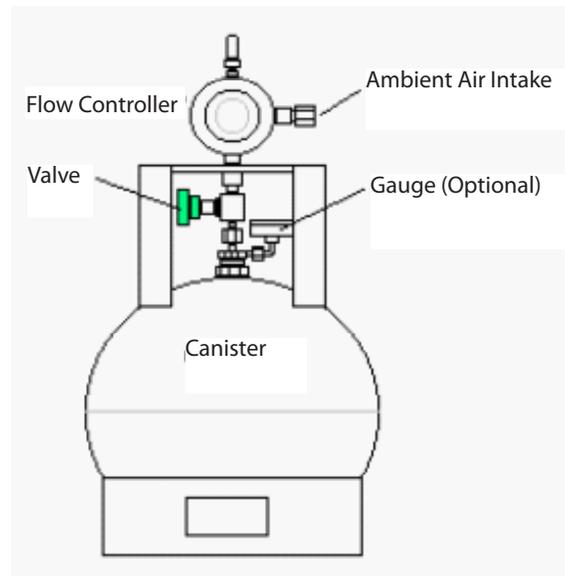
The Occupational Safety and Health Administration has jurisdiction over occupational exposures at facilities where hazardous chemicals are handled as part of manufacturing or operating activities. In this instance, vapor intrusion can occur when vapors from the hazardous chemicals enter the air in the manufacturing facilities where workers are handling the hazardous chemicals, or other buildings where chemicals are not routinely handled. Federal and State agencies often have regulatory jurisdiction in instances where a facility is operating, but is no longer handling or has never handled the hazardous chemicals detected in the vapors, or the facility is no longer operating or has a different land use. Some sites have groundwater plumes that have migrated off-site and could cause vapor intrusion in residential areas or non-residential areas such as schools, libraries, hospitals, hotels and stores. Missouri, as an EPA authorized state, operates its state hazardous waste program instead of the federal hazardous waste program. The Hazardous Waste Program's permits section works with permitted and interim status hazardous waste treatment storage and disposal facilities to address vapor intrusion issues associated with releases to the environment.

The facility and the department work together to determine what type of contaminants were released at the site and where the contamination is located. The permits section uses that information to determine possible pathways through which humans and the environment could be exposed to contamination in all media. There are three elements that must exist for the vapor intrusion pathway to be complete:

- A source of contamination, which is mainly volatile compounds.
- A potential pathway involving impacted media, such as groundwater, soil or soil gas.
- An actual or potential receptor, such as humans, near the source or pathway.

Identifying chemicals in indoor air attributable to vapor intrusion can be a complex and difficult task. The department must use several lines of evidence and professional judgment to reach conclusions regarding the source(s) of indoor air contamination. Typically vapor forming chemicals need to be present in the subsurface soil and groundwater underneath or near occupied buildings. Other evidence may include determining internal and external background sources of contamination; evaluating building construction, ventilation rates and current conditions; sampling sub-slab or near slab soil gas and sampling indoor air and outdoor air at the same time.

Traditional methods for taking sub-slab and indoor air samples involves collecting a whole air sample using summa canisters, which are stainless steel electropolished, or "summa" polished, evacuated vessels. To collect a representative sample, the summa canister is taken to a designated area and the valve is opened. The surrounding air fills the canister for a period of time, usually eight or 24 hours. The valve is then closed and the canister is sent to a laboratory for testing.



Traditional sampling methods present many uncertainties when determining the appropriate number, location, time of day, time of year and frequency of samples. The number of sample locations may depend on the size and use of the building; internal building partitions, such as walls and doors; heating, ventilation and air conditioning layout, where the contamination is located in the subsurface and observable locations of potential vapor entry. Recent research has shown continuous, time-integrated sampling, or taking several samples at different times in the same location, indicated significant daily and seasonal differences. These variations should be taken into consideration when determining the length, frequency and time of sampling.

Remediation/Cleanup

If the vapor intrusion pathway is determined to be complete, corrective action, or cleanup, activities may be required, based on the investigation results. When corrective action is required, a remedy or combination of remedies are selected, implemented, operated, maintained and monitored to control the vapor intrusion until the source of the vapors is removed. Until the remedy has met its cleanup goals, the vapor intrusion pathway must be effectively controlled in all potentially impacted and inhabited structures.

Site-wide remedies may address the source of vapors found in buildings, such as contaminated soil and groundwater, rather than controlling the entry of vapors into buildings. For site-wide remedies to be protective, exposures to unacceptable vapor concentrations must be controlled until contaminant concentrations in soil and groundwater reach acceptable levels. Site-wide remedies may be enough in situations where the vapor concentrations in buildings are very low or where the source can be removed very quickly. In most cases, site-wide remedies involve a long-term solution to vapor intrusion.

Short term remedies may be needed in the event that site-wide remedies are not immediately effective in reducing or eliminating actual and potential vapor intrusion. Institutional controls and building control technologies are often short-term remedies used until the long-term or site-wide remedy is complete. An example of an institutional control would be a restrictive covenant, which is a document recorded in a property's chain-of-title that places limitations on the use of certain parts of the property. At undeveloped sites, or at sites where land use may change in the future, institutional controls may be necessary to make sure the vapor intrusion pathway is effectively addressed in the future. An example would be to require the installation of vapor intrusion controls, such as a vapor barrier or sub-slab depressurization system, in new buildings. Taking proactive steps in the design and construction of new buildings to address potential vapor intrusion issues helps avoid some of the difficulties associated with attempting to predict the potential for vapor intrusion before building construction.

Building control technologies may include vapor barriers, limiting air infiltration into buildings or improving building ventilation. The following table includes a brief description of several building control technologies.

Technology	Typical Application	Description
Passive Barrier	New construction. Crawl spaces. Often combined with passive or active venting, sealing openings in the slab, drains, etc.	Materials or structures are installed below a building to physically block the entry of vapors. By doing this, soil gas that would otherwise enter the building under diffusion or pressure gradients instead moves sideways, beyond the building footprint.
Passive Venting System	New construction. Low soil gas flux sites. Should be convertible to active system if necessary.	A venting layer is installed below the floor slab to allow soil gas to move sideways, beyond the building footprint, under natural diffusion gradients. This is generally possible only in new construction. Passive vents are typically combined with passive barriers.
Sub-slab Depressurization System	New and existing structures. Sumps, drain tiles and block wall foundations may also be depressurized if present.	The system creates a pressure differential across the slab that favors movement of indoor air down into the subsurface. This is accomplished by pulling soil gases from beneath the slab and venting them to the atmosphere at a height well above the outdoor breathing zone and away from windows and air supply intakes.
Building Pressurization	Large commercial structures, new or existing. Sensitive receptors.	Similar to sub-slab depressurization systems, these systems use fans to push air into the soil or venting layer below the slab, instead of pull it out. The intention is to increase the sub slab air pressure above ambient levels, forcing soil gas from the subsurface to the sides of the building.
Sealing the Building Envelope	Cracks and holes in existing buildings.	Cracks and holes in the floors and foundations of existing buildings are sealed, reducing the amount of air seeping into the building. This technology works best combined with other technologies.

Examples of Vapor Intrusion Sites in Missouri

Trichloroethylene, commonly called TCE, and its breakdown components were identified in the gravel subgrade under the foundation of a former manufacturing facility that used TCE and other volatile compounds during its manufacturing processes. The chemicals in the subsurface are no longer used at the facility and the building is currently vacant. The facility owner conducted indoor air sampling in 2003 and 2010. The sample results indicated vapor intrusion into the building. Two additional rounds of indoor air and sub-slab sampling will be conducted to determine if vapor intrusion is still occurring and, if so, if the vapor levels in the indoor air are protective of human health.

Potential vapor intrusion was also a concern at a former refinery closed in the 1980s. Benzene in the soil and groundwater posed a risk for future buildings at the site. To address this risk, all new buildings on the property are required to be constructed with vapor barriers and sub-slab ventilation systems. The police and fire station also built on this property met these requirements.

Permit Updates

The permits section is nearing completion of the hazardous waste permit reissuance process for two facilities and final remedy decision process for three facilities.

Draft Permits

International Paper Co. and Mallinckrodt are in the process of renewing their Missouri Hazardous Waste Management Facility part I permit and Hazardous and Solid Waste amendments part II permit. After a thorough technical review of the permit applications, the department prepared a draft Missouri Hazardous Waste Management Facility part I permit for both International Paper and Mallinckrodt. EPA prepared a Hazardous and Solid Waste amendments part II permit for International Paper, but not Mallinckrodt, since EPA has no site-specific conditions for Mallinckrodt and Missouri is fully authorized for all permitting activities at the site.

The draft hazardous waste permits for International Paper will require continued performance of site-wide corrective action including operation, maintenance, monitoring and post-closure care activities associated with two corrective action management units and a groundwater pump and treat system. The draft hazardous waste permit for Mallinckrodt will require continued performance of corrective action investigation and remediation activities at the site. Since Mallinckrodt added a new container storage area and a new bulk storage tank for less than 90-day hazardous waste storage, Mallinckrodt no longer needs to be permitted to store hazardous waste for more than 90 days as it was in the past. The permits for both facilities will also contain contingent corrective action requirements to address any newly-identified releases of hazardous waste or hazardous constituents to the environment. The public will be invited to review and offer written comments about the draft permits before any final permitting decisions are made.

Proposed Final Remedies

The department is in the process of issuing statements of basis in support of the proposed final remedy of no further corrective action with institutional controls at the Nestle Purina PetCare Co., Alcolac Inc. and River Cement Co. facilities. The department, in consultation with the U.S. Environmental Protection Agency Region 7, proposes to release these facilities from regulation as former interim status hazardous waste treatment, storage and disposal facilities subject to the corrective action requirements of the Missouri Hazardous Waste Management Law and regulations. The public will be invited to review and offer written comments about the statements of basis, proposed final remedies and release from regulated facilities before any final decisions are made.

Cleanup Finally Complete at Former Blue Harbor Marina Site

In June 1987, the department was notified about petroleum contamination in a private drinking water well at a residence in Osage Beach. Sampling conducted by the department's Environmental Emergency Response staff confirmed the presence of petroleum contaminants in this well. A new underground storage tank, or UST, installed in spring 1987 to serve the Blue Harbor Marina was believed to be the source of this contamination. Testing of this tank found a large leak, a 12 inch hole in the bottom. Based upon inventory records, it was estimated that 3,000 gallons of gasoline were released from this tank to the subsurface.

After the release was confirmed, the UST and surrounding impacted soils were removed by the responsible party. A significant amount of released gasoline, however, had already entered the fractured bedrock beneath the site.

Within a month, two additional private drinking water wells were also found contaminated. The insurance company for the responsible party paid for the installation of three new private drinking water wells to replace those impacted. Unfortunately, a few months after the installation of these new wells, two of the new wells also became contaminated. Subsequent sampling events found 14 feet of free product floating on the groundwater in one of the old wells and free product was also found entering the lake from a seep along the shoreline.



A groundwater remediation system was installed by the department in 1993. The system equipment included an air stripper (tall standpipe) to treat the extracted groundwater and a 3,000 gallon polyethylene storage tank to contain the recovered free product.



A community well and well house was installed by the department in 1993 to provide drinking water to the affected residents.

The enormity of the situation overwhelmed the responsible party and work at the site came to a halt. Due to the failure of the responsible party to initiate the necessary investigation and cleanup of the contamination, the department declared a hazardous substance emergency. Using funding provided by the Environmental Protection Agency's Leaking Underground Storage Tank, or LUST, Trust Fund the department hired an environmental consulting firm to conduct an investigation and initiate cleanup activities, which initially consisted of pumping free product from the former drinking water wells.

In 1993, the department installed a pump and treat, or air stripping, remediation system to remediate the groundwater contamination. The department also installed a 600 foot deep community well to provide drinking water to the area residents. The community well was later sold to the Osage Water Company in 1997.

Missouri Department of Natural Resources - Hazardous Waste Program

Due to the complex geology beneath the site, which included karst features and fractured bedrock, the remediation of the contamination was slow and difficult. With the emergency situation abated in 1996, the department shut the remediation system down and directed the responsible party to take over the remediation of the site. In 2002, the responsible party hired a consultant and resumed the cleanup of the site using money from the Petroleum Storage Tank Insurance Fund. A soil vapor extraction system was installed at the site to recover the remaining free phase product from the bedrock. Then in 2006, they began conducting bioremediation activities that consisted of injecting a bioremediation-slurry into the bedrock aquifer. The responsible party operated the soil vapor extraction system until 2007 and continued the bioremediation injections until September 2009. After completion of the remediation activities, the consultant conducted a risk assessment and determined remaining contamination did not present an unacceptable level of risk to human health or the environment under current or future conditions. On April 23, 2012, nearly 25 years after the release was discovered, the department issued a no further action letter for the release at the site.

The investigation and cleanup of this release was not only complicated and lengthy, it was also expensive. The department alone spent over \$1.2 million dollars in response to this release. In accordance with the conditions for using federal LUST Trust Fund money, the department pursued cost recovery of its cleanup expenses from the responsible party. Although the department was awarded a judgment for the recovery of its cleanup costs, the responsible party was determined to be financially unable to pay the full amount. The department subsequently entered into a settlement agreement with the responsible party to resolve its cost recovery case for a total of about \$400,000. In addition to



A community well and well house was installed by the department in 1993 to provide drinking water to the affected residents.

the department's cleanup costs, the responsible party spent an unknown amount on the closure of the tank, \$10,000 to satisfy their deductible, and another unspecified amount under their claim filed with the Petroleum Storage Tank Insurance Fund.

The cleanup of the site has restored the economic value of the property and made it attractive to outside developers. Recently, the property was purchased by Surdyke Yamaha. The site is now known as Surdyke's Port 20. The facility is offering the benefits of a full service boat broker and a yacht club.

Petroleum Storage Tanks Fiscal 2013 Statistics

During fiscal 2013, the department accomplished the following work related to petroleum storage tanks:

- Properly closed 372 tanks.
- Reviewed 149 closure reports.
- Approved 143 closure notices.
- Conducted 29 closure inspections.
- Conducted five site investigations.
- Responded to 16 emergencies involving petroleum releases.
- Reviewed 1,484 remediation documents.
- Oversaw completion of 134 remediation sites.
- Issued 245 certificates of registration.

A total of 111 new releases were reported during fiscal 2013.

Department staff was notified about 71 new installations at tank sites and received 60 new site registrations.

Compliance and Enforcement Section staff resolved 76 cases involving violations.

At the end of fiscal 2013, there were 178 active enforcement cases.

Financial responsibility compliance was at 99.3 percent. This number reflects insurance coverage from both the Petroleum Storage Tank Insurance Fund and other private policies and statements.

There were 57 state or federal exempt sites. This number does not include temporary closed tanks, which are not required to have financial responsibility.

The department currently regulates 3,530 facilities with 9,221 active underground storage tanks.

**Petroleum Storage
Tanks Regulation
June 2013**

Staff Productivity	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13
Documents received for review	158	184	161	207	163	131	163	162	170	149	177	154
Remediation documents processed	91	124	146	134	113	130	118	119	141	140	99	129
Closure reports processed	8	20	16	8	14	14	17	9	18	10	9	6
Closure notices approved	16	8	16	17	12	5	11	9	11	10	15	13
Tank installation notices received	7	12	2	5	2	6	8	3	12	5	4	5
New site registrations	2	9	9	7	3	3	9	1	5	5	5	2
Facility Data												
Total in use, out of use and closed USTs	40,425	40,441	40,478	40,501	40,511	40,522	40,542	40,541	40,536	40,554	40,576	40,584
Total permanently closed USTs	31,072	31,095	31,146	31,173	31,185	31,221	31,249	31,271	31,317	31,331	31,340	31,363
In use and out of use USTs	9,335	9,341	9,346	9,343	9,324	9,299	9,288	9,265	9,219	9,223	9,236	9,221
Out of use USTs	836	843	850	837	832	840	848	847	837	842	849	867
Total hazardous substance USTs	398	398	398	398	398	398	399	399	398	399	399	398
Facilities with in use and out of use USTs	3,557	3,562	3,563	3,562	3,555	3,548	3,545	3,538	3,528	3,529	3,533	3,530
Facilities with one or more tank in use	3,260	3,260	3,259	3,263	3,263	3,258	3,254	3,249	3,243	3,242	3,245	3,234

Closures

Underground Storage Tanks	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	TOTAL	All Yrs
Closure Reports Reviewed	8	20	16	8	14	14	17	9	18	10	9	6	149	
Closure Notices Approved	16	8	16	17	12	5	11	9	11	10	15	13	143	
Number of Tanks Closed (Closure NFA)	30	23	59	28	13	31	36	30	63	27	13	19	372	

Cleanup

Underground Storage Tanks	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	TOTAL	All Yrs
UST release files opened this month	11	7	10	10	5	15	6	5	5	6	6	5	91	6,514
UST cleanups completed this month	4	13	24	11	6	6	9	5	17	13	3	11	122	5,636
Ongoing UST cleanups	907	905	894	892	892	901	899	899	887	880	884	878		
Aboveground Storage Tanks														
AST release files opened this month	3	1	1	0	3	0	2	1	0	1	1	2	15	460
AST cleanups completed this month	0	2	2	1	3	0	0	1	0	0	0	1	10	268
Ongoing AST cleanups	193	192	189	189	190	190	191	190	190	191	191	192		
Both UST and AST														
Total release files-both UST & AST	0	0	0	0	0	0	0	0	0	0	0	0	0	75
Cleanups completed-both UST & AST	1	0	1	0	0	0	0	0	0	0	0	0	2	46
Ongoing cleanups-both UST & AST	29	29	28	29	29	29	29	29	29	29	29	29		
Unknown Source														
Total release files-unknown source	0	0	0	0	0	0	0	1	1	3	0	0	5	216
Cleanups completed-unknown source	0	0	0	0	0	0	0	0	0	0	0	0	0	174
Ongoing cleanups-unknown source	18	16	15	14	13	12	11	12	13	16	16	16		
Documents Processed	91	124	146	134	113	130	118	119	141	140	99	129	1,484	
*Reopened Remediation Cases	1	1	0	0	0	0	0	0	0	0	0	0	2	76

*Reopened Remediation Cases was added Nov. 18, 2009 - the cumulative total has been queried and a running total will be tracked/reported with the FY 2010 Tanks Section Monthly Reports.

Effective December 2008 tanks with unknown substance will be included in total figures. Some measures are re-calculated each month for all previous months to reflect items added or edited after the end of the previous reporting period.