ATTACHMENT F

Demolition of Parcel #6

Lead-Based Paint
And Heavy Metals

MEMORANDUM

Missouri Department of Transportation
Construction and Materials
Central Laboratory

TO: Rolla Rentz-3de

COPY: Kathryn Harvey-de

FROM: Frank Reichart
Environmental Chemist

DATE: March 12, 2007

SUBJECT: Materials
Asbestos & Heavy Metal Paint Inspection
Route 36
Job No. J3P0410
Parcels 6
Marion County

We are providing you with the results of the requested inspection on the above referenced properties. The inspection report contains an asbestos and a heavy metals survey, unless otherwise requested. The asbestos inspection included sample collection of suspect asbestos-containing material and National Voluntary Laboratory Accreditation Program (NVLAP) accredited testing to confirm the presence of asbestos. This asbestos and heavy metal paint report includes four different report forms. Form T746 lists all of the samples taken during the asbestos inspection. Form T747 shows only those samples that tested positive for Category I nonfriable asbestos-containing materials that may remain in the structure during demolition, if kept adequately wet to avoid visible air emissions. Form T748 shows only those samples that tested positive for asbestos and require removal prior to demolition. Form C760 lists all paint samples taken during the heavy metal paint inspection and their metal content.

In accordance with the National Emissions Standard for Hazardous Air Pollutants (NESHAP), as well as city and county asbestos abatement regulations - Registration, Notification, and Performance Requirements, regulated asbestos-containing material (RACM) namely, Friable and Category II nonfriable, have a high probability of becoming friable under normal demolition forces. Practices and procedures for removal prior to demolition, disposal, and clearances should be in accordance with referenced regulations. Missouri Department of Transportation policy is to perform asbestos abatements in accordance with NESHAP.

In accordance with Missouri Department of Natural Resources' Technical Bulletin "Managing Construction and Demolition Waste" dated January 31 2003, a heavy metal paint inspection has been performed on the above referenced properties. We are providing you with the results of this inspection. The inspection includes locating painted concrete, block and/or brick surfaces, sampling the painted surface(s) and testing the paint(s) to determine if hazardous heavy metals are present. Non-hazardous painted concrete, blocks, or bricks may be used as clean fill

Form C760
Rev. 04/2003

MISSOURI DEPARTMENT OF TRANSPORTATION
CONSTRUCTION AND MATERIALS
Metals Survey Report of Painted Concrete, Block, Brick and Surfaces

ROUTE:	36	**TESTED BY:**	Frank Reichart
MODOT JOB NO.:	J3P0410	**DATE OF TESTS:**	February 28, 2007
DISTRICT:	3	**PARCEL NO.:**	6
COUNTY:	Marion	**SITE ADDRESS:**	1658 US Highway 36, Monroe City
SURVEYED BY:	Frank Reichart	**TYPE OF STRUCTURE:**	1-Story Wood Frame House with Basement and Remains of Detached Garage
DATE OF SURVEY:	February 28, 2007		

Sample ID	Color/Location of Material/Substrate	Metals (ppm)							
		As	Cr	Pb	Cd	Se	Ba	Hg	Ag
	House								
7MFJR 474	Red/Basement, Chimney/Brick			854					
7MFJR 475	Green/Basement, Fireplace/Brick			2,419					
7MFJR 476	Black/Basement, Fireplace/Brick			2,050					
7MFJR 477	Green/Interior Foundation Wall/Concrete			65					
7MFJR 478	White/Interior Foundation Wall/Concrete			354					
7MFJR 479	Gray/Exterior Porch Landing/Concrete			118					
7MFJR 480	White/Exterior Foundation Wall/Concrete			4,320					
	Remains of Detached Garage								
	No samples taken. No painted surfaces located.								

All results are by XRF unless otherwise indicated: a = USEPA SW-846 Method 3050
b = USEPA SW-846 Method 7471

Missouri Department of Natural Resources

Requirements for Asbestos and Lead Paint Abatement

Hazardous Waste Program fact sheet 1/2007

Abatement of asbestos-containing material (ACM) and lead-based paint (LBP) are regulated by various federal, state and local laws and regulations. This combined with the large volume of routine work performed across the nation has resulted in standard industry practices. Projects performed under the department's Brownfields/Voluntary Cleanup Program (B/VCP) involving ACM and LBP abatement must comply with these and other local, state and federal rules and regulations.

Because asbestos and LBP abatement projects tend to follow a standard "cookbook" approach and fall under the jurisdiction of existing inspection and enforcement programs, the department has sought to minimize additional paperwork required to perform these projects under the B/VCP. Department approval of a Remedial Action Plan (RAP) is required by the B/VCP prior to hazardous substance cleanups pursuant to 10 CSR 25.010(5). For ACM and LBP abatement, certain basic items should be included in the RAP, as described in the following sections. Not all projects may require every item. Likewise, there may be special circumstances for a given project that require responses not listed here. Those will be determined on a case-by-case basis by the B/VCP's project manager for the site.

Asbestos

In most of Missouri, ACM is regulated by the department's Air Pollution Control Program (APCP) pursuant to 40 CFR Part 61, Subpart M, *"The National Emission Standard for Asbestos,"* (NESHAP). However, there are four key areas of the state where the department has delegated asbestos-related activities to local authorities: Kansas City, St. Louis, St. Louis County and Springfield. It is very important when performing an asbestos-related project in one of these areas that you contact the appropriate agency with jurisdiction in that area to determine all applicable requirements. These local agencies enforce their own rules, which may be more stringent than state regulations. The local agencies are listed below with contact phone numbers.

Jurisdiction	Agency	Phone
St. Louis (City)	St. Louis Division of Air Pollution Control	(314) 613-7300
St. Louis (County)	St. Louis County Health Department	(314) 615-8923
Kansas City	Kansas City Health Dept., Air Quality Section	(816) 513-6314
Springfield	Springfield-Greene County Health Dept.	(417) 864-1662

B/VCP Remedial Action Plan (RAP) for Asbestos Abatement

If a Certification of Completion for a site is desired from the department under the B/VCP, the site must be enrolled in the B/VCP with a signed letter of agreement prior to remediation of any hazardous substances on the site. The B/VCP must review and approve all RAPs prior to implementation.

Asbestos abatement plans may be included as part of a general RAP for a B/VCP site in the event that other remediation is required. Asbestos abatement may also be done under a separate RAP.

The RAP should include, but not be limited to, the following information:

1. Copies of any asbestos inspection or survey reports, to include
   - Tables showing all suspect ACM tested, results including percent asbestos, type of asbestos and quantity of material (sq. ft. or linear feet),
   - Lab raw data reports
   - Maps, drawings or photos (photos should be submitted as color photocopies or original prints - no black and white photocopies please)
2. Copies of all abatement notification forms sent to the local government or the department. Kansas City, St. Louis and Springfield and St. Louis County have local air pollution control divisions to which these forms are submitted; for other areas of the state, notifications are sent to the department.
3. General description of abatement techniques to be used in each area of the building and on each different material (for example, whether the work will be done in a sealed area, using glove bags, etc.)
4. Who will perform work and a statement that contractor is a Missouri licensed asbestos abatement contractor
5. Who will perform air monitoring and clearance sampling
6. Final property use goal (i.e. residential, commercial, industrial as defined in *Cleanup Levels for Missouri* (CALM) as scenario A, B or C respectively)

Asbestos Abatement Final Report

When the asbestos abatement work is complete, submit a final report to the B/VCP, to include at a minimum

1. All air monitoring results, including final clearance testing
2. Waste disposal documentation (such as landfill tickets)
3. Description of any ACM to remain in place, along with drawings or maps of location(s)
4. Operation and Maintenance (O&M) plan for any ACM remaining
5. Document any significant deviations from the RAP

A sample O&M Plan for ACM is attached and should be used as a guide only. For B/VCP sites, the department requires that the plan be filed in the property chain of title as an institutional control to ensure that future occupants, maintenance personnel, contractors, owners and prospective buyers are aware of the presence of ACM and of the O&M requirements necessary to maintain safe conditions.

Leaving ACM In Place at B/VCP Sites

Three situations, which have all been encountered at B/VCP sites, are addressed in this section:

1. ACM inside buildings undergoing renovation
2. Random ACM contained in historically buried construction and demolition (C&D) debris onsite
3. Intentional ACM landfills

Leaving ACM In Place in Renovated Structures

While state and federal laws and regulations require proper handling and disposal by qualified personnel if asbestos is removed, there is no requirement that it be removed from a building at any given time unless a building is to be demolished or renovated in such a way that a NESHAP minimum quantity of friable asbestos is disturbed, thus requiring its removal. Other than these situations, the department does not necessarily require removal of all ACM from structures at B/VCP sites as a condition for obtaining a Certification of Completion through the B/VCP.

It may be necessary or desirable to remove some ACM and leave other material in place in a building. Some examples are asbestos floor tile, asbestos pipe insulation in areas that are inaccessible or will not be modified, and transite materials on building exteriors.

Potentially friable asbestos materials to be left in place must be "encapsulated" (coated, fully enclosed, etc.) using standard industry practices. As required by regulations, clearance sampling must be conducted following the removal and encapsulation work.

The owner must develop an Operation and Maintenance Plan (details below) for material left in place. If a Restrictive Covenant is to be executed for the site related to other aspects of a cleanup (for example, restricted use soil cleanup standards were used, or soil contamination is left on-site under a cap), the O&M plan can be included as an attachment to the covenant. If no Covenant is to be executed, the O&M plan should be a stand-alone document.

Operation and Maintenance Plan for ACM in Structures

An Operation and Maintenance Plan for ACM should include the following:

- Location of the ACM within the building(s) including maps and drawings as appropriate
- Description of material including type and quantity
- Description of accessibility (i.e. in restricted access area or not)
- Protocol and schedule for regular inspections
- Contingency plans to be implemented in the event the ACM is damaged or the material must be disturbed, for example during maintenance of insulated equipment or nearby equipment or structures.

The O & M Plan must be reviewed and approved by B/VCP. The presence of ACM and the existence of an O&M Plan will be referred to in the B/VCP Certification of Completion for the site. The Certification will be contingent upon the O&M plan being followed. Both documents must be filed in the property chain of title.

Buried Asbestos-Containing Building Debris

This section applies to ACM as a constituent of historical fill material such as from demolition of former buildings and burial of the debris in the building's basement, a situation commonly encountered at urban redevelopment sites. This on-site disposal of C&D debris, whether it contains ACM or not, is not allowed under current solid waste regulations, but was common practice

in the past. Old building debris may have poor geotechnical characteristics and sometimes must be removed to provide a suitable building pad or to install foundation footers. This may result in the excavation of ACM or ACM-contaminated debris.

In most cases, the department does not consider it necessary to excavate large volumes of buried demolition debris for the sole purpose of recovering a relatively small amount of ACM. However, any material dug up that is suspected ACM (for example, pipe insulation) should be segregated and either tested, or assumed to be ACM, and disposed of appropriately. The excavation should be overseen by, and any ACM handled by, trained asbestos abatement personnel, in accordance with current asbestos regulations. If there is no reason to suspect that large quantities of ACM were landfilled at the site and such materials are not encountered during excavation (i.e., no ACM left on-site beyond deminimus quantities in buried demolition debris), no institutional controls are necessary upon closure of the B/VCP site.

Historical Asbestos Disposal Sites

Large quantities of ACM were buried prior to the advent of landfill permitting requirements. These materials may include, but are not limited to, scrap from the production of transite building products, brake pad or drum production or refurbishing wastes, or refractory materials. These wastes were sometimes deposited near the production facility. Under the B/VCP, remedial action alternatives have included both removal and encapsulation in place. Removal must be followed by disposal in a permitted landfill in accordance with asbestos and solid waste regulations. For B/VCP sites, the installation of an engineered cap always requires placement of a restrictive covenant in the property chain of title to provide for maintenance and to prevent disturbance of the landfill, as outlined in the CALM guidance. As with all remedial actions overseen by the B/VCP, a RAP must be reviewed and approved by the department prior to implementation.

For More Information

For more information on asbestos, see:

- *Asbestos* Fact Sheet, Missouri Department of Natural Resources (pub 2077) www.dnr.mo.gov/pubs/pub2077.pdf
- U.S. Environmental Protection Agency Asbestos Home Page: www.epa.gov/asbestos/index.htm
- Contact the Air Pollution Control Program at 1-800-361-4827 or (573) 751-4817 or local authorities listed on Page 1.

Lead-Based Paint

Removal of LBP and LBP dust that may be a hazard to human health or the environment (i.e. flaking and peeling paint) is required for renovation projects overseen by the B/VCP. Paint in good condition may be left in place provided that exposures are minimized and appropriate institutional controls are put in place.

Abatement projects must follow all state and federal regulations including clearance sampling to satisfy B/VCP standards pertaining to lead based paint (CALM Appendix A).

Encapsulation usually involves recoating lead painted surfaces with suitable sealants such as epoxy paint, concrete, drywall, etc. If LBP is to be left in the building, an Operation and Maintenance (O&M) Plan must be prepared. For B/VCP sites, the department requires that the O&M

plan be filed in the property chain of title as an institutional control to ensure that future occupants, maintenance personnel, contractors, owners, and prospective buyers are aware of the presence of LBP and of the O&M requirements necessary to maintain safe conditions.

B/VCP Remedial Action Plan for Lead Paint Abatement

If a Certification of Completion is to be obtained from the department under the B/VCP, the site must be enrolled in the B/VCP with a signed letter of agreement. The B/VCP must review and approve all RAPs prior to implementation.

Lead paint abatement plans may be included as part of a general Remedial Action Plan for a B/VCP site in the event that other remediation is required. Lead paint abatement may also be done under a separate RAP.
Lead paint abatement standards for final clearance (CALM 2001) are shown in the table below (also refer to CALM Appendix B).

Table I: Lead Paint Clearance Criteria

Sample Location	Scenario A Unrestricted Use[1] Micrograms per sq. ft.	Scenario B and C Commercial and Industrial[2] Micrograms per sq. ft.
Floors	40	200
Window Sills (interior)	250	500
Window Wells (interior)	800	800

1 EPA
2 Missouri Office of Administration

The RAP should include, but not be limited to, the following information:

1. Copies of any LBP inspection or survey reports, to include:
   - Tables showing all suspect paint tested and test results including percent lead, paint color and square footage
   - Laboratory raw data reports
   - Maps, drawings or photos (photos should be submitted as color photocopies or original prints - no black and white photocopies please)
2. General description of abatement techniques to be used in each area of the building including workspace isolation, paint removal, dust suppression and final cleaning
3. Clearance sampling protocols including approximate sample locations, approximate number of samples, sample type (wall, floor, window sill, window well)
4. Clearance sampling goals
5. Who will perform abatement work, air monitoring and clearance sampling; documentation of credentials and certifications
6. Final property use goal (i.e. residential, commercial, industrial as defined in CALM as scenario A, B or C respectively)

Final Report

When the LBP abatement work is complete, submit a final report to the B/VCP, to include

1. Final clearance wipe sampling results
2. Waste disposal documentation (such as landfill tickets)
3. Whether any lead painted surfaces remain along with drawings or maps of location(s)
4. O&M plan if any LBP remains
5. Document any significant deviations from the RAP

A sample O&M Plan for LBP is attached. For B/VCP sites, the department requires that the O&M plan be filed in the property chain of title as an institutional control to ensure that future occupants, maintenance personnel, contractors, owners, and prospective buyers are aware of the presence of LBP and of the O&M requirements to maintain safe conditions.

Operation and Maintenance Plan for Lead Paint in Structures

An Operation and Maintenance (O&M) Plan for LBP should include the following:

1. Location of the LBP within the building(s) including maps and drawings showing the location of LBP
2. Description of accessibility (i.e. in restricted access area or not)
3. Protocol and schedules for regular inspections
4. Contingency plans to be referred to in the event that the LBP, or its encapsulating material, is damaged or must be disturbed during maintenance or renovation

The O&M Plan must be reviewed and approved by the B/VCP. The presence of the LBP and the existence of the O&M Plan will be referred to in the B/VCP Certification of Completion for the site. The Certification will be contingent upon the O&M plan being followed. Both documents should be filed in the property chain of title upon completion of the project.

More Information

For more information on LBP abatement, see

- *Disposal of Demolition Wastes Contaminated with Lead and/or Other Heavy Metals*, Fact Sheet, 8/2004, Missouri Department of Natural Resources (PUB2002).
- U.S. Environmental Protection Agency Office of Lead Programs, www.epa.gov/lead/
- HUD Office of Healthy Homes and Lead Hazard Control: www.hud.gov/lea/leahome.html

For further information call or write
Missouri Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
Jefferson MO 65102-0176
1-800-361-4827 or (573) 751-3176
(573) 751-7869 fax
www.dnr.mo.gov/env/hwp

Rules of
Department of Natural Resources
Division 80—Solid Waste Management
Chapter 4 —Demolition Landfill

Title		Page
10 CSR 80-4.010	Design and Operation	3

Title 10—DEPARTMENT OF NATURAL RESOURCES
Division 80—Solid Waste Management
Chapter 4—Demolition Landfill

10 CSR 80-4.010 Design and Operation

PURPOSE: This rule pertains to the design and operation of a demolition landfill.

(1) This demolition landfill rule is intended to provide for land disposal of certain solid wastes which do not present as great a potential for water pollution and public health hazards as associated with municipal solid wastes and hazardous wastes. The rule sets forth requirements and the method of satisfactory compliance to ensure that the design, construction and operation of demolition landfills will protect the public health, prevent nuisances, and meet applicable environmental standards. The requirement subsections contained in this rule delineate minimum levels of performance required of any demolition landfill operation. The satisfactory compliance subsections are presented as the authorized methods by which the objectives of the requirements can be realized. If techniques other than those listed as satisfactory compliance are used, it is the obligation of the demolition landfill owner/operator to demonstrate to the department in advance that the techniques to be employed will satisfy the requirement. Procedures for the techniques shall be submitted to the department in writing and approved by the department in writing prior to being employed. Notwithstanding any other provision of this rule, when it is found necessary to meet the objectives of the requirement subsections, the department may require changes in design or operation as the condition warrants.

(2) Solid Wastes Accepted.

(A) Requirement. Only the following solid wastes shall be accepted for disposal in a demolition landfill: demolition wastes; construction wastes; brush; wood wastes; cut, chipped, or shredded tires as defined in 10 CSR 80-8; inert plastics; soil; rock; concrete; sand; gravel; asphaltic concrete; cinder blocks and bricks. Other related inert solids relatively insoluble in water shall only be accepted in accordance with section (3) of this rule. The demolition wastes shall not contain more than a minor amount of metals.

(B) Satisfactory Compliance—Design.

1. The plans shall specify the types of solid waste to be received and these shall be listed in the application for a construction permit.

2. The plans shall specify the procedures to be employed for disposal of wastes requiring special handling.

(C) Satisfactory Compliance—Operations.

1. The list of solid wastes to be accepted shall be displayed prominently at the demolition landfill entrance.

2. Bulky waste shall be excluded from the first layer of waste placed above a composite liner to ensure that the integrity of the liner and leachate collection system has been maintained.

3. Bulky waste shall be excluded from the first layer of waste placed above a composite liner to ensure that the integrity of the liner and leachate collection system has been maintained.

(3) Solid Wastes Excluded.

(A) Requirement. All other wastes not listed or described in 10 CSR 80-4.010(2)(A) shall be excluded from disposal in a demolition landfill. Any of the solid wastes listed or described in 10 CSR 80-4.010(2)(A) which have been combined, mixed or contaminated with any other solid wastes not listed or described shall be excluded. Inert solids relatively insoluble in water which are not specifically listed in subsection (2)(A) of this rule, or in the approved engineering plans shall not be accepted for disposal.

(B) Satisfactory Compliance—Design.

1. In consultation with the department, the applicant shall determine what wastes are to be accepted and shall identify them in the plans and the application for a construction permit. The criteria used to determine whether wastes can be accepted shall include the design of the landfill, the physical and chemical characteristics of the wastes, the quantity of wastes and the proposed operating procedures.

2. The plans shall specify the operating procedures for screening and removal of wastes which are excluded from disposal according to subsection (3)(A) of this rule. Operating procedures for the screening and removal of excluded wastes shall include:

A. At a minimum, random inspections of incoming loads unless the owner/operator takes other steps to ensure that incoming solid wastes do not contain wastes excluded from disposal at demolition landfills;

B. Records of inspections;

C. Training of facility personnel to recognize waste other than those listed in subsection (2)(A); and

D. Immediate notification of the department if a regulated hazardous waste, regulated PCB waste, or infectious waste is discovered at the facility.

(C) Satisfactory Compliance—Operations.

1. The disposal of wastes approved for disposal in the permit shall be conducted in accordance with approved design and operating plans plus any additional procedures determined by the department as necessary to protect the water, air and land resources and to provide for safety of the operators and waste haulers.

2. The operating procedures for screening of wastes and for removal of wastes which are excluded from disposal according to subsection (3)(A) of this rule shall be implemented.

(4) Site Selection.

(A) Requirement. Site selection and utilization shall include study and evaluation of the geologic and hydrologic conditions and soils at the proposed demolition landfill and an evaluation of the environmental effect upon the projected use of the completed demolition landfill. Applications for demolition landfill construction permits received on or after the effective date of this rule shall document compliance with all applicable siting restriction requirements contained in paragraphs (4)(B)1. through 5. of this rule.

(B) Satisfactory Compliance—Design.

1. Floodplain. Demolition landfills located in the one hundred (100)-year floodplain shall demonstrate to the department that the demolition landfill will not restrict the flow of the one hundred (100)-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to public health or the environment.

2. Wetlands.

A. Demolition landfills shall not be located in wetlands, unless the owner/operator can make the following demonstrations to the department:

(I) The presumption that a practicable alternative to the proposed landfill is available which does not involve wetlands is clearly rebutted;

(II) The construction and operation of the demolition landfill will not—

(a) Cause or contribute to violations of any applicable state water quality standard;

(b) Violate any applicable toxic effluent standard or prohibition under section 307 of the federal Clean Water Act;

(c) Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Endangered Species Act of 1973; and

(d) Violate any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary;

(III) The demolition landfill will not cause or contribute to significant degradation of wetlands. The owner/operator shall demonstrate the integrity of the demolition landfill and its ability to protect ecological resources by addressing the following factors:

(a) Erosion, stability and migration potential of native wetland soils, muds and deposits used to support the landfill;

(b) Erosion, stability and migration potential of dredged and fill materials used to support the landfill;

(c) The volume and chemical nature of the waste disposed of in the landfill;

(d) Impacts on fish, wildlife and other aquatic resources and their habitat from potential release of solid waste from the landfill;

(e) The potential effects of contamination of the wetland and the resulting impacts on the environment; and

(f) Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected;

(IV) Steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent practicable as required by subparagraph (4)(B)2.A. of this rule, then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (for example, restoration of existing degraded wetlands or creation of man-made wetlands); and

(V) The requirements of paragraph (4)(B)2. may be satisfied by the owner/operator obtaining a United States Army Corps of Engineers permit for construction in a wetland or by demonstrating that the wetland is not regulated by the United States Army Corps of Engineers, or other appropriate agency.

3. Demolition landfills located in the seismic impact zone shall not be located within two hundred feet (200') of a fault that has had displacement in Holocene time unless the owner/operator demonstrates to the department that an alternative setback distance of less than two hundred feet (200') will prevent damage to the structural integrity of the landfill and will be protective of public health and the environment.

4. Demolition landfills shall not be located in seismic impact zones, unless the owner/operator demonstrates to the department that all containment structures, including liners, final covers, leachate collection systems and surface water control systems, are designed to resist permanent cumulative earthquake displacements not to be greater than six inches (6"), resulting from the maximum credible Holocene time earthquake event's acceleration versus time history.

5. Owners/operators of demolition landfills, located in an unstable area shall demonstrate to the department that the demolition landfill's design ensures that the integrity of the structural components of the demolition landfill will not be disrupted. The owner/operator shall consider the following factors, at a minimum, when determining whether an area is unstable:

A. On-site or local rock or soil conditions that may result in failure or significant differential settling;

B. On-site or local geologic or geomorphologic features; and

C. On-site or local human-made features or events (both surface and subsurface).

6. Plans shall include:

A. A map showing initial and proposed topographies at contour intervals of five feet (5') or less. This map shall have a scale of not less than one inch (1") equals one hundred feet (100'). If the entire site cannot be illustrated on one (1) plan sheet, an additional map with appropriate horizontal and vertical scales that allows the site to be shown on one (1) standard plan sheet is required;

B. A map showing the land use and zoning within one-fourth (1/4) mile of the demolition landfill, including location of all residences, buildings, wells, water courses, springs, lakes, roads and soil or rock borings. All electric, gas, water, sewer and other utility easements or lines that are located on, under or above the demolition landfill shall be shown on the map. This map shall have a scale of not less than one inch (1") equals four hundred feet (400');

C. A description of the projected use of the closed demolition landfill. In addition to maintenance programs and provisions, where necessary, for monitoring and controlling decomposition gases and leachate, the plans shall address the following ultimate use criteria:

(I) Structures. It is not recommended practice to construct major structures within the permitted area of a demolition landfill. If major structures are to be built within the permitted area of a demolition landfill, prior written approval from the department is required. A professional engineer shall approve their design and construction, including a provision for protection against potential hazards of solid waste decomposition gases; and

(II) Other uses. Appropriate design, construction and operating provisions for the demolition landfill shall be specified to complement the projected future use; and

D. An evaluation of the characteristics and quantity of available on-site soil with respect to its suitability for demolition landfilling operations. The engineering properties and quantity estimates of the on-site soil shall be discussed and shall include:

(I) Texture. Sieve and hydrometer analyses shall be performed to determine grain size distribution of representative soil samples. Texture may be determined by using the procedures described in ASTM method D422-63 or the procedures described in Appendix D of *Engineer Manual 1110-2-1906*, prepared by the United States Army Corps of Engineers;

(II) Plasticity. The liquid limit, plastic limit and plasticity index of representative soil samples shall be determined. Plasticity may be determined by using the procedures described in ASTM method D4318-84 or the procedures described in Appendix III of *Engineer Manual 1110-2-1906*, prepared by the United States Army Corps of Engineers;

(III) Hydraulic conductivity. Laboratory hydraulic conductivity tests shall be performed upon undisturbed representative soil samples using a flexible wall permeameter (ASTM D-5084). If an aquifer is found to be laterally continuous across the anticipated limit of the proposed landfill, the hydraulic conductivity of each significant continuous geologic unit must be determined. Examples of accepted field tests are *in situ* slug or pump tests which isolate the geologic unit of interest; and

(IV) Areal extent and depth. The areal extent and depth of soil suitable for landfill construction shall be determined. Variations in soil depth shall be clearly described.

7. If the base of the landfill liner will be in contact with groundwater, the applicant shall demonstrate to the department's satisfaction that the groundwater will not adversely impact the liner.

8. Owners/operators of demolition landfills shall demonstrate how adverse geologic and hydrologic conditions may be altered or compensated for via surface water drainage diversion, underdrains, sumps, and other structural components. All alterations of the site shall be detailed in the plans. Precipitation, evapotranspiration and climatological conditions shall be considered in site selection and design.

9. The results of the site's detailed site investigation will be the basis to determine if a geomembrane liner is required to ensure that there is no environmental impact from the landfill. Owners/operators of proposed demolition landfills shall demonstrate no impact based on the following:

A. An evaluation of the physical and/or chemical characteristics of the waste; and

B. Documentation through modeling, testing, or other research data proving that the quality of groundwater underlying the proposed site will not be affected and that there is no potential for migration of fluids from the demolition landfill.

(C) Satisfactory Compliance—Operations.

1. The demolition landfill shall be accessible to vehicles which the demolition landfill is designed to serve by all-weather roads leading from the public road system; temporary roads shall be provided as needed to deliver solid wastes to the working face.

2. The demolition landfill shall not be located in an area where the public road or access road to the demolition landfill may be flooded preventing use of the demolition landfill unless an alternate demolition landfill or sanitary landfill is available.

(5) Design.

(A) Requirement. Plans, addendums, as-built drawings, or other documents which describe the design, construction, operation or closure of a demolition landfill or which request an operating permit modification for the demolition landfill shall be prepared or approved by a professional engineer. These documents shall be stamped or sealed by the professional engineer and submitted to the department for review and approval.

(B) Satisfactory Compliance—Design.

1. Plans submitted as part of an application for a construction permit after the effective date of this rule shall provide for the maintenance of a one hundred-foot (100') buffer zone between demolition landfill operations and any property line(s) or any right of way(s) of adjoining road(s) when the property line(s) is inside the right-of-way(s) to provide room for assessment and/or remedial actions.

2. The plan shall include an operating manual describing the various tasks that shall be performed during a typical shift.

3. Owners/operators of demolition landfills shall demonstrate how adverse geologic and hydrologic conditions may be altered or compensated for via surface water drainage diversion, underdrains, sumps, and other structural components. All alterations of the site shall be detailed in the plans. Precipitation, evapotranspiration and climatological conditions shall be considered in site selection and design.

A. Precipitation, evapotranspiration and climatological conditions shall be considered in site selection and design.

B. Engineering plans and specifications that have computer models attached to them shall list the limitations and assumptions of each model used in the application.

4. Plans shall include stability analyses for all stages of landfill construction.

A. Settlement and bearing capacity analysis shall be performed on the in-place foundation material beneath the disposal area. The effect of foundation material settlement on the liner and leachate collection system shall be evaluated.

B. Stability analysis shall be performed on all liner and leachate system components.

C. Leachate collection pipe material and drainage media shall be analyzed to demonstrate that these components possess structural strength to support maximum loads imposed by overlying waste materials and equipment.

D. Waste mass stability analysis shall be performed on the disposal area at final waste grade conditions and at intermediate slope conditions.

E. Stability analysis shall be performed on all final cover system components, including an evaluation of the effect of waste settlement on the final cover system components, side-slope liner system components, surface water management system components and gas migration system components.

(C) Satisfactory Compliance—Operations.

1. Construction and operation of the demolition landfill shall be conducted in accordance with the engineering plans and specifications approved by the department.

2. The operating manual describing the various tasks that shall be performed during a typical shift shall be available to employees for reference and to the department upon request.

3. Phase development drawings shall be included with the application.

(6) Quality Assurance/Quality Control (qa/qc).

(A) Requirement. The construction, operation and closure of the demolition landfill shall include quality assurance and quality control measures to ensure compliance with approved plans and all applicable federal, state and local requirements. The permittee shall be responsible for ensuring that the qa/qc supervision is conducted by a qualified professional.

(B) Satisfactory Compliance—Design.

1. Plans shall include:

A. A detailed description of the quality assurance (qa) testing procedures that will be used for every major phase of construction. The description must include at a minimum, the frequency of inspections, field testing, laboratory testing, equipment to be utilized, the limits for test failure, and a description of the procedures to be used upon test failure; and

B. A detailed procedure for reporting and recording qa/qc activities and testing results.

2. All qa/qc reports shall be reviewed and approved by a professional engineer.

(C) Satisfactory Compliance—Operations.

1. At a minimum qa/qc testing shall include:

A. Testing of each lift of the soil component of the final cover and landfill liner for field density and field moisture once per every ten thousand (10,000) square feet and providing relatively uniform coverage over the landfill surface;

B. Laboratory hydraulic conductivity testing of the soil used for liner construction once for every five thousand (5,000) cubic yards of liner constructed;

C. Continuous visual classification of borrow soil during landfill construction by qualified qa/qc inspector(s) or certifying professional engineer;

D. Measuring the elevations of the final cover and the landfill liner on a maximum spacing of one hundred-foot (100') centers and at one hundred-foot (100') intervals along each line where a break in slope occurs—

(I) Landfill liner. Measuring the elevations of the top and bottom of the landfill liner; and

(II) Final cover. Measuring the elevations of the top and bottom of—

(a) The compacted clay layer supporting the geomembrane liner; and

(b) The soil layer supporting vegetative growth;

E. Nondestructive testing of all seams of the geomembrane in the landfill liner and final cover;

F. Random destructive testing of the seams of the geomembrane liner in the landfill liner and final cover on an average frequency of at least one (1) every five hundred (500) linear feet of seams; and

G. Verification of the thickness of the leachate collection media by qualified qa/qc inspector(s) or certifying professional engineer on one hundred-foot (100') centers.

2. All testing shall be performed under the direction of qualified qa/qc inspectors for every major phase of construction.

3. The qa/qc plan shall include the following components:

A. Leachate collection system. Reports prepared or approved by the professional engineer transmitting the results of the qa/qc procedures and stating that the leachate collection system was constructed according to the approved design or describing any deviations from the approved design; and

B. Liner. The liner specified by section (10) of this rule shall be constructed in accordance with the approved design specifications. The qa/qc procedures shall include:

(I) Evidence that the liner material(s) utilized meet the minimum design specifications;

(II) Evidence that field construction techniques are resulting in the minimum design specifications (for example, soil density tests);

(III) Evidence that the liner construction is proceeding as designed through regular verification using a predetermined system of horizontal and vertical survey controls; and

(IV) Oversight of the liner construction and qa/qc procedures by a professional engineer. This shall include reports prepared, or approved, by the professional engineer transmitting the results of the qa/qc procedures and stating that the liner was constructed according to design or describing any deviations from the design.

(7) Survey Control.

(A) Requirement. Benchmarks, horizontal controls and boundary markers shall be established by a land surveyor to check and mark the location and elevations of the demolition landfill. Construction stakes marking individual section(s) or phase(s) shall be established as necessary to ensure the construction and operation proceed in accordance with approved plans.

(B) Satisfactory Compliance—Design.

1. Boundary survey. A survey of the entire permitted acreage shall be conducted in accordance with the current Minimum Standards or Property Boundary Surveys 10 CSR 30-2.010.

2. Vertical control. The land surveyor shall establish a permanent monument as a benchmark or confirm the prior establishment of a benchmark on or adjacent to the property. The elevation shall be on the North American Vertical Datum, 1929 or similar well documented datum. If no such established datum exists within one (1) mile of the property, a project datum may be assigned to the benchmark. The location, elevation and datum of the benchmark shall be clearly shown on the survey plat.

3. Horizontal control. The land surveyor shall establish three (3) permanent monuments as horizontal control stations. These stations shall form a triangle whose sides shall not be less than one thousand feet (1000'). The location of the horizontal control will be shown on the survey plat.

4. The land surveyor shall establish boundary markers designating the entire permitted acreage which shall be composed of material which will last throughout the life of the demolition landfill.

5. Construction stakes. Stakes marking the individual section(s) or phase(s) specifically designated for the placement of solid waste are to be placed in locations and composed of material that is consistent with the operating life of the section or phase.

(C) Satisfactory Compliance—Operations.

1. All boundary markers, benchmarks, horizontal control stations and construction stakes shall be clearly marked and identified.

2. Missing or displaced benchmarks or horizontal control stations shall be replaced or reestablished by or under the supervision of a land surveyor. The land surveyor shall prepare a plat showing the replacement or reestablishment and furnish a copy to the department.

3. Missing or displaced construction stakes shall be replaced or reestablished as necessary to ensure the operations proceed in accordance with approved plans.

4. The permanent monuments designating vertical and horizontal control stations and boundary markers designating the entire permitted acreage shall be placed prior to receiving an operating permit as required by 10 CSR 80-2.020(2)(B).

5. Construction stakes marking the active area shall be placed prior to deposition of waste in individual areas, sections or phases of the demolition landfill as designated by the approved engineering plans.

(8) Water Quality.

(A) Requirement. The location, design, construction and operation of the demolition landfill shall minimize environmental hazards and shall conform to applicable ground and surface water quality standards and requirements. Applicable standards are federal, state or local standards that are legally enforceable.

(B) Satisfactory Compliance—Design.

1. Plans shall include:

A. A report on the detailed geologic and hydrologic investigation of the site as required by 10 CSR 80-2.015;

B. Current and projected use of water resources in the potential zone of influence of the demolition landfill;

C. Groundwater elevation and proposed separation between the lowest point of the lowest cell and the normal average water table elevation. The predicted maximum water table shall be indicated;

D. Potential interrelationship of the demolition landfill, local aquifers and surface waters based on historical records or other sources of information;

E. Proposed location and design of observation wells, sampling stations and testing program planned; and

F. Provisions for surface water runoff control to minimize infiltration and erosion of cover material. All applicable permits and approvals necessary to comply with requirements of the Missouri Clean Water Law and corresponding rules shall be obtained from the department.

(I) The area of the watershed which will be affected by the demolition landfill must be specified.

(II) On-site drainage structures and channels shall be designed to prevent flow onto the active portion of the demolition landfill during peak discharge from at least a twenty-five (25)-year storm. The engineering calculations and assumptions shall be included and explained in the engineering report.

(III) On-site drainage structures and channels shall be designed to collect and control at least the water volume resulting from a twenty-four (24)-hour, twenty-five (25)-year storm.

(IV) On-site drainage structures and channels shall be designed to empty expeditiously after storms to maintain the design capacity of the system.

(V) Contingency plans for on-site management of surface water which comes in contact with solid waste shall be specified.

(C) Satisfactory Compliance—Operations.

1. Surface water courses and runoff shall be diverted from the demolition landfill (especially from the working face) by devices such as ditches, berms and proper grading. The demolition landfill shall be constructed and graded so as to promote rapid surface water runoff without excessive erosion. Regrading shall be done as required during construction and after completion to avoid ponding of precipitation and to maintain cover integrity.

2. The quantity of water coming in contact with solid waste shall be minimized by the daily operational practices. Water which comes in contact with solid waste shall be managed as leachate in accordance with the approved plans.

(9) Leachate Collection Systems.

(A). Requirement. A leachate collection system shall be designed, constructed, maintained and operated to collect and/or remove leachate from the demolition landfill.

(B) Satisfactory Compliance—Design. The potential for leachate generation shall be evaluated in determining the design of the system. Leachate flow quantities shall be estimated and the method(s) of leachate treatment and/or disposal shall be outlined. Leachate storage and/or treatment facilities shall comply with all currently applicable requirements of the Missouri Clean Water Law and corresponding rules. Construction qa/qc procedures shall be included. Where a leachate treatment system is designed to have a discharge to the waters of the state, any required discharge permit(s) shall be obtained from the department in accordance with requirements of the Missouri Clean Water Law and corresponding rules.

1. Minimum design criteria for leachate collection systems shall include the following:

A. Ponds and/or tanks of sufficient capacity to store, equalize flow to disposal systems, and allow system/operating flexibility;

B. Construction materials chemically resistant to the solid wastes managed in the demolition landfill and the leachate expected to be generated;

C. Construction material of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying solid wastes, cover, leachate, and by any equipment used at the demolition landfill;

D. Design and operate systems to function without clogging through the scheduled operating life, closure and post-closure of the demolition landfill;

E. Designed to maintain less than one-foot (1') depth of leachate over the disposal area liner; and

F. Design and operate collection systems so that any leachate formed will flow by gravity into collection areas from which the leachate can be removed, treated, and disposed.

2. Leachate management by recirculation within the permitted fill area shall be conducted in accordance with an approved engineering method.

3. Any leachate collection system open to the atmosphere shall be designed to prevent discharge during a twenty-five (25)-year, twenty-four (24)-hour storm event. Plans shall include the calculations detailing the design.

4. The applicant shall provide a method of leachate management in the application. A secondary or "backup" method of leachate disposal will be required unless the applicant can demonstrate that a secondary method will not be necessary.

(C) Satisfactory Compliance—Operations.

1. The leachate collection and disposal systems specified by subsection (9)(B) shall be properly installed and operated in accordance with the permit and the approved design and plans and maintained for the thirty (30)-year post-closure care period, or as long as the department determines necessary.

2. Leachate generated by the demolition landfill shall be controlled on-site and not be allowed to discharge off the demolition landfill properly or discharge into the waters of the state, except in accordance with the approved plans and the Missouri Clean Water Law and corresponding rules.

(10) Liner System.

(A) Requirement. A liner shall be placed on all surfaces to minimize the migration of leachate from the demolition landfill.

(B) Satisfactory Compliance—Design. A composite liner shall be required at all demolition landfills applying for a construction permit after the effective date of this rule, that includes:

1. A lower component that shall consist of at least a two-foot (2') layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. A compacted soil liner at a minimum shall be constructed of six to eight-inch (6–8") lifts, compacted to ninety-five percent (95%) of standard Proctor density with the moisture content between optimum moisture content and four percent (4%) above the optimum moisture content or within other ranges of density and moisture that are shown to provide for the liner to have a hydraulic conductivity no more than 1×10^{-7} cm/sec. The design shall include a detailed explanation of the construction techniques and equipment necessary to achieve ninety-five percent (95%) of the standard Proctor density under field conditions. The design shall also include qa/qc procedures to be followed during construction of the liner. The compacted soil liner shall be protected from the adverse effects of desiccation or freeze/thaw cycles after construction, but prior to placement of waste. Traffic shall be routed so as to minimize the detrimental impact on the constructed liner prior to placement of solid waste. The soils used for this purpose shall meet the following minimum specification:

A. Be classified under the Unified Soil Classification Systems as CL, CH, or SC, (ASTM Test D2487-85);

B. Allow more than thirty percent (30%) passage through a No. 200 sieve (ASTM Test D1140);

C. Have a liquid limit equal to or greater than twenty (20) (ASTM Test D4318-84);

D. Have a plasticity index equal to or greater than ten (10) (ASTM Test D4318-84); and

E. Have a coefficient of permeability equal to or less than 1×10^{-7} cm/sec. when compacted to ninety-five percent (95%) of standard Proctor density with the moisture content between optimum moisture content and four percent (4%) above the optimum moisture content, when tested by using a flexible wall permeameter (ASTM D-5084) or other procedures approved by the department;

2. An upper component consisting of a minimum thirty (30) mil thick geomembrance shall be installed if the applicant for a proposed demolition landfill does not provide adequate demonstrations specified in subsection (4)(B) of this rule, and as determined by the department on a site-by-site basis. Geomembrance components consisting of high density polyethylene (HDPE) shall be at least sixty (60) mil thick;

3. The geomembrance component shall be installed in direct and uniform contact with the compacted soil component so as to minimize the migration of leachate through the geomembrance should a break occur; and

4. All demolition landfills shall have a minimum bottom slope in any direction of flow of at least one percent (1%).

(C) Satisfactory Compliance—Operations.

1. A test pad shall be constructed at the site and tested to verify that the proposed construction and qc procedures are adequate to ensure that the soil component of the composite liner system will meet the requirements of paragraph (10)(B)1. of this rule.

A. Construction and qc procedures to be used during test pad construction shall be described in detail in the approved engineering report, and shall be identical to those proposed for liner construction with the following additions:

(I) At least two (2) laboratory hydraulic conductivity tests shall be performed on undisturbed samples of the completed test pad;

(II) At least one (1) *in situ* hydraulic conductivity test shall be performed on the completed test pad; and

(III) At least two (2) test pits shall be excavated into the completed test pad to observe interlift bonding.

B. If test pad construction and testing shows that the proposed methods are not sufficient to meet the requirements of paragraph (10)(B)1. of this rule, a new test pad shall be

constructed using revised procedures approved by the department.

2. For phased construction, only one (1) test pad will be required.

3. A final report shall be submitted to the department which describes in detail the construction and qc procedures which were used to achieve satisfactory test pad performance.

A. The report must be approved by the department prior to beginning construction of any portion of the composite liner system in the disposal area.

B. The report shall serve as guidance for construction of the soil component of the composite liner system.

4. The requirement for a test pad may be waived provided—

A. The applicant can demonstrate to the department's satisfaction that construction and qc procedures identical to those described in the approved engineering report have resulted in construction of a liner which meets the requirements of paragraph (10)(B)1. of this rule; or

B. The soils proposed for liner construction meet the following minimum specifications:

(I) Have a plasticity index greater than fifteen (15) and less than thirty (30) (ASTM test D4318-84);

(II) Allow more than fifty percent (50%) passage through a No. 200 sieve (ASTM D11400); and

(III) Have less than ten percent (10%) by weight particle sizes greater than two (2) mm.

5. The liner specified in subsection (10)(B) of this rule shall be constructed in accordance with the approved design specifications.

(11) Groundwater Monitoring.

(A) Requirements. The owner/operator of a demolition landfill shall implement a groundwater monitoring program capable of determining the demolition landfill's impact on the quality of groundwater underlying the demolition landfill.

(B) Satisfactory Compliance—Design.

1. All demolition landfills permitted after the effective date of this rule, must be in compliance with all groundwater monitoring requirements of section (11).

2. The department may require demolition landfill's permitted prior to the effective date of this rule, to comply with part of all of section (11) if it is determined necessary by the department.

3. The owner/operator of a demolition landfill shall establish the potential for migration of fluid generated by the demolition landfill from the demolition landfill to the groundwater, by an evaluation of—

A. A water balance of precipitation, evapotranspiration, runoff and infiltration;

B. At a minimum, the following characteristics:

(I) Geologic materials;

(II) Description of soil and bedrock to a depth adequate to allow evaluation of water quality protection provided by the soil and bedrock;

(III) Groundwater elevation;

(IV) Proposed separation between the lowest point of the lowest cell and the maximum water table elevation; and

(V) Proximity of the demolition landfill to water supply wells or surface water;

(VI) Rate and direction of groundwater flow; and

(VII) Current and projected use of water resources in the potential zone of influence of the demolition landfill.

4. A groundwater monitoring system must be capable of yielding groundwater samples for analysis and must consist of—

A. Monitoring wells (at least one (1)) installed hydraulically upgradient; that is, in the direction of increasing static head from the demolition landfill. The numbers, locations and depths must be sufficient to yield groundwater samples that are—

(I) Representative of background water quality in the groundwater near the demolition landfill; and

(II) Not affected by the demolition landfill; and

B. Monitoring wells (at least three (3)) installed hydraulically downgradient; that is, in the direction of decreasing static head from the demolition landfill. The number, locations and depths must ensure that they detect any significant amounts of fluids generated by the demolition landfill that migrate from the demolition landfill to the groundwater.

5. All monitoring wells must be constructed as per 10 CSR 23-4.

(C) Satisfactory Compliance—Operations.

1. Groundwater monitoring wells.

A. Groundwater monitoring wells shall be installed so that the number, spacing and depths of monitoring systems shall be determined based upon site-specific technical information that shall include thorough characterization of—

(I) Aquifer thickness, groundwater flow rate, groundwater flow direction including seasonal and temporal fluctuations in groundwater flow; and

(II) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer; including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities and porosities.

B. The design and installation of groundwater monitoring well systems shall be observed, supervised, and certified by a qualified groundwater scientist and approved by the department.

C. All groundwater monitoring wells shall be operational prior to the acceptance of wastes, unless other arrangements are approved by the department.

D. The design, installation, development, and decommissioning of monitoring wells and piezometers must be performed in accordance with 10 CSR 23-4.

2. Sampling and reporting.

A. Each groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells installed in compliance with subsection (11)(B). The owner/operator must submit the sampling and analysis program to the department for approval. The program must include procedures and techniques for:

(I) Monitoring well maintenance;

(II) Monitoring well redevelopment;

(III) Monitoring well depth measurement and hydraulic levels;

(IV) Monitoring well purging and sampling utilizing dedicated equipment;

(V) Equipment calibration;

(VI) Decontamination and field blanks;

(VII) Sample and duplicate sample collection;

(VIII) Sample preservation;

(IX) Sample labeling;

(X) Sample handling;

(XI) Field measurements;

(XII) Field documentation;

(XIII) Chain of custody control;

(XIV) Sample shipment;

(XV) Analytical procedures;

(XVI) Qa/qc control—field and laboratory; and

(XVII) Statistical testing strategy per paragraph (11)(C)5. for each parameter's concentrations.

B. Each groundwater monitoring program shall include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents and other monitoring

parameters in groundwater samples. Analysis shall be performed on unfiltered samples.

C. The sampling procedures and frequency shall be protective of human health and the environment.

D. Groundwater elevations shall be measured in each well immediately prior to purging, each time groundwater is sampled. The owner/operator shall determine the rate and direction of groundwater flow each time groundwater is sampled. Groundwater elevations in wells which monitor the same solid waste disposal area shall be measured within a period of time short enough to avoid temporal variations in groundwater flow which could preclude accurate determination of groundwater flow rate and direction.

3. Baseline/background monitoring.

A. The owner/operator shall establish background groundwater quality for each of the monitoring parameters or constituents required under paragraph (11)(C)4. To establish background, a minimum of four (4) quarterly samples of statistically independent sample data shall be obtained and analyzed from all monitoring wells during a minimum of one (1) year following well installation.

B. The number of samples collected to establish background values for groundwater quality data shall satisfy the requirements of subsection (11)(C) and shall be consistent with the appropriate statistical procedures determined pursuant to paragraph (11)(C)5. The sampling procedures shall be those specified under paragraph (11)(C)4. for detection monitoring, paragraph (11)(C)6. for assessment monitoring and section (12) for corrective action.

4. Detection monitoring.

A. The owner/operator shall obtain and analyze water samples from the groundwater monitoring wells during the months of May and November of each calendar year.

B. The following parameters shall be analyzed each time a sample is obtained:

Chemical Oxygen Demand (COD, in milligrams per liter (mg/l));

Chlorides (Cl, mg/l);

Iron (Fe, mg/l);

pH (units);

Specific Conductance (Conductivity at twenty-five degrees Celsius (25°C) (μmho/cm));

Total Dissolved Solids (TDS, mg/l); and

All parameters listed in Appendix I of this rule.

Additionally, the water level in each well shall be measured at the time the sample is taken.

C. The sampling results and any results of statistical analysis determining statistically significant increases as per paragraph (11)(C)5. shall be submitted to the department within ninety (90) days of when samples are collected.

D. In the case of all detection monitoring requirements previously listed, the department may specify an appropriate alternative frequency for repeated sampling and analysis during the active life of the demolition landfill (including closure) and the post-closure period. The department may add additional parameters or delete parameters on a site-by-site basis through an evaluation of waste and leachate characteristics of the demolition landfill.

E. The electronic submission of groundwater data is required. This submission shall be in the format and method as prescribed by the department.

5. The owner/operator shall specify in the operating record one (1) or more of the following statistical methods to be used in evaluating groundwater monitoring data for each monitoring constituent. The statistical test chosen shall be conducted separately for each constituent.

A. A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The procedure shall include estimation and testing of the contrasts between each downgradient well's mean and the upgradient means for each parameter.

B. An ANOVA based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The procedure shall include estimation and testing of the contrasts between each downgradient well's median and the background medians for each parameter.

C. A confidence interval procedure in which an interval for each parameter in each downgradient well is constructed around the mean/median of the particular well's data or data residuals and compared to the mean/median of pooled background well data.

D. A prediction interval procedure in which an upper prediction limit for an interval for each parameter in each well is compared to subsequently obtained values from the same well.

E. A prediction interval procedure in which an upper prediction limit for an interval for each parameter constructed on the pooled background well data or data residuals is compared to subsequently obtained values from each downgradient well.

F. A tolerance interval procedure in which an upper tolerance limit for an interval for each parameter's pooled background well data is compared to each downgradient well's concentration values.

G. A multicomparison procedure utilizing any recommended U.S. Environmental Protection Agency combinations of intra-well and inter-well procedures for each parameter.

H. A control chart approach, meeting the performance standards of part (11)(C)5.J.(III), that gives control limits for each parameter.

I. A different statistical test method that meets the performance standards of subparagraph (11)(C)5.J. of this rule. The owner/operator must submit the statistical test method to the department for approval before the use of the alternative test.

J. Any statistical method chosen under paragraph (11)(C)5. of this rule shall comply with the following performance standards, as appropriate:

(I) The statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of the concentration data for the chemical parameters or hazardous constituents. If the distribution of the concentration data for the chemical parameters or hazardous constituents is shown by the owner/operator to be inappropriate for a normal data distribution theory test, then the data should be transformed or a distribution-free (nonparametric) theory test should be used. If the concentration data distributions for the constituents of each well differ, more than one (1) statistical method will be needed;

(II) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentration or a groundwater protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experiment-wide error rate for each testing period shall be no less than 0.05, however, the Type I error of no less than 0.01 for individual well comparisons shall be maintained. This performance standard does not apply to tolerance intervals, prediction intervals or control charts;

(III) If a control chart approach is used to evaluate groundwater monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The selection of this method shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern;

(IV) If a confidence interval, tolerance interval or a prediction interval is used

to evaluate groundwater monitoring data, then the level of confidence for each interval(s), and the percentage of the population that each interval contains, shall be protective of human health and the environment. Selection of one (1) or more of these methods shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern;

(V) The statistical method shall account for data below the limit of detection with one (1) or more statistical procedures that are protective of human health and the environment. Any practical quantization limit that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility; and

(VI) If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

6. Response to statistical analysis.

A. If the comparison for the upgradient wells show a statistically significant increase (or pH change) over background, the owner/operator shall submit this information to the department.

B. If the comparisons for downgradient wells show a statistically significant increase (or pH change), resulting from the landfill, over background, the owner/operator shall within ninety (90) days of the last sampling event obtain additional groundwater samples from those downgradient wells where a statistically significant difference was detected, split the samples in two (2) with the department, and obtain analyses of all additional samples to determine whether the significant statistical difference was a result of laboratory error.

C. If the additional samples show a statistically significant increase (or pH change) over background, the owner/operator must demonstrate to the department within ninety (90) days that a source other than the demolition landfill caused the contamination or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation or natural variation. If the owner/operator cannot make this demonstration to the department, the owner/operator shall submit a plan to the department for a groundwater assessment monitoring program and implement the program as described in subparagraphs (11)(C)6.D. through J. of this rule. The plan shall specify the following:

(I) The number, location and depth of wells;

(II) Sampling and analytical methods for the monitoring parameters listed in Appendix II of this rule;

(III) Evaluation procedures, including any use of previously gathered groundwater quality information;

(IV) The rate and extent of migration of the contaminant plume in the groundwater; and

(V) The concentrations of the contaminant plume in the groundwater.

D. Within ninety (90) days of beginning an assessment monitoring program, and semiannually thereafter, the owner/operator shall sample and analyze the groundwater for all constituents identified in Appendix II of this rule. A minimum of one (1) sample from each downgradient well shall be collected and analyzed during the initial sampling event. A minimum of one (1) sample from each downgradient well at which Appendix II constituents were detected shall be collected and analyzed at each subsequent sampling event. For any new constituent detected during assessment monitoring (that was not detected during detection monitoring) in the downgradient wells, a minimum of four (4) statistically independent samples from each well (upgradient and downgradient) shall be collected and analyzed to establish background for the new constituents. The department may add additional parameters or delete parameters on a site-by-site basis through an evaluation of waste and leachate characteristics of the demolition landfill.

E. The owner/operator shall establish a groundwater protection standard for each constituent specified in Appendix II of this rule and detected in the groundwater. The groundwater protection standard shall be—

(I) For constituents for which a maximum contaminant level (MCL) has been promulgated under section 1412 of the Federal Safe Drinking Water Act and found at 40 CFR part 141, the MCL for that constituent;

(II) For constituents for which MCLs have not been promulgated, the background concentration for the constituent established from wells in accordance with paragraph (11)(C)3. of this rule;

(III) For constituents for which the background level is higher than the MCL identified in part (11)(C)6.E.(I) of this rule, the background concentration; or

(IV) A level established by the department based upon a consideration of relevant factors, including: multiple contaminants in the groundwater, exposure threats to sensitive environmental receptors, and other site-specific exposure or potential exposure pathways to groundwater.

F. After obtaining the results from the initial or subsequent sampling events required in subparagraph (11)(C)6.D., the owner/operator shall—

(I) Within fourteen (14) days, notify the department and place a notice in the operating record identifying the constituents that have been detected;

(II) Within ninety (90) days, and on at least a semiannual basis after that, resample all wells and conduct analysis for all constituents listed in Appendix I to this rule and for those constituents listed in Appendix II of this rule that are detected in response to the requirements of subparagraph (11)(C)6.D. of this rule and record the concentrations of each constituent in the facility operating record and notify the department of the constituent concentrations. A minimum of one (1) sample from each well sampled (background and downgradient) shall be collected and analyzed during these sampling events;

(III) Establish background concentrations for any new constituents detected during subsequent monitoring events;

(IV) Establish groundwater protection standards for all new constituents detected during subsequent monitoring events.

G. If the concentrations of all constituents listed in Appendix II to this rule are shown to be at or below background levels as established in paragraph (11)(C)3. of this rule for two (2) consecutive sampling periods, the owner/operator may reinstate detection monitoring at the demolition landfill as specified under subparagraph (11)(C)3.C. of this rule.

H. If the concentrations of any constituents listed in Appendix II of this rule are above background values, but all concentrations are below the groundwater protection standard established under subparagraph (11)(C)6.E. of this rule using the statistical procedures in paragraph (11)(C)5. of this rule, the owner/operator shall notify the department, and the department may require the owner/operator to—

(I) Continue assessment monitoring; or

(II) Develop a corrective measures assessment, or both.

I. If one (1) or more constituent(s) listed in Appendix II of this rule are detected at levels above the groundwater protection standard as established under subparagraph (11)(C)6.E., the owner/operator shall—

(I) Provide the department with a report assessing potential corrective measures as required under subsection (11)(A);

(II) Characterize the nature and extent of the release by installing additional

monitoring wells as necessary; install at least one (1) additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with paragraph (11)(C)6. of this rule and notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site as indicated by sampling of wells; and

(III) Continue assessment monitoring as per the groundwater quality assessment plan and as per the implementation of the corrective action program specified in section (12) of this rule.

J. The results of implementation of the assessment monitoring program shall be submitted to the department at the end of each year or an alternate time period approved by the department.

(12) Corrective Action.

(A) Assessment of Corrective Measures.

1. Within ninety (90) days of finding that any of the constituents listed in Appendix II of this rule have been detected at a statistically significant level exceeding the groundwater protection standards defined under subparagraph (11)(C)6.E. of this rule, the owner/operator shall initiate an assessment of corrective measures. This assessment shall be completed within a reasonable period of time, and a report describing the assessment of corrective measures shall be submitted to the department.

2. The owner/operator shall continue to monitor in accordance with the assessment monitoring program as specified in paragraph (11)(C)6.F. of this rule.

3. The assessment shall include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under subsection (12)(B) of this rule, addressing at least the following:

A. The performance, reliability, ease of implementation and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts and control of exposure to any residual contamination;

B. The time required to begin and complete the remedy;

C. The costs of remedy implementation; and

D. The institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(ies).

4. The owner/operator shall discuss the results of the corrective measures assessment, prior to the selection of remedy, in a public meeting with interested and affected parties.

(B) Selection of Remedy.

1. Based on the results of the corrective measures assessment conducted under subsection (12)(A) of this rule, the owner/operator shall propose a remedy that, at a minimum, meets the standards listed in paragraph (12)(B)2. of this rule. The owner/operator shall submit to the department, within fourteen (14) days of selecting a proposed remedy, a report describing the proposed remedy and shall place a copy of the report in the operating record that describes how the proposed remedy meets the standards in paragraph (12)(B)2. of this rule.

2. Remedies shall—

A. Be protective of the public health and the environment;

B. Attain the groundwater protection standard as specified pursuant to subparagraph (11)(C)6.E. of this rule;

C. Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of constituents listed in Appendix II of this rule into the environment that may pose a threat to human health or the environment; and

D. Comply with standards for management of wastes as specified in paragraph (12)(C)4.

3. In proposing a remedy that meets the standards of paragraph (12)(B)2. of this rule, the owner/operator, and, in approving a remedy, the department, shall consider the following evaluation factors:

A. The long- and short-term effectiveness and protectiveness of the potential remedy, along with the degree of certainty that the remedy will prove successful based on consideration of the following:

(I) Magnitude of reduction of existing risks;

(II) Magnitude of residual risks in terms of likelihood of further releases due to waste remaining following implementation of the proposed remedy;

(III) The type and degree of long-term management required, including monitoring, operation and maintenance;

(IV) Short-term risks that might be posed to the community, workers or the environment during implementation of the remedy, including potential threats to human health and the environment associated with excavation, transportation and redisposal or containment;

(V) Time until full protection is achieved;

(VI) Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal or containment;

(VII) Long-term reliability of the engineering and institutional controls; and

(VIII) Potential need for replacement of the remedy;

B. The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:

(I) The extent to which containment practices will reduce further releases; and

(II) The extent to which treatment technologies may be used;

C. The ease or difficulty of implementing the potential remedy(ies) based on consideration of the following types of factors:

(I) Degree of difficulty associated with constructing the remedy;

(II) Expected operational reliability of the proposed technologies;

(III) Need to coordinate with and obtain necessary approvals and permits from other agencies;

(IV) Availability of necessary equipment and specialists; and

(V) Available capacity and location of needed treatment, storage and disposal services; and

D. The degree to which community concerns are addressed by the proposed remedy(ies).

4. The owner/operator shall specify as part of the proposed remedy a schedule(s) for initiating and completing remedial activities. This schedule shall require the initiation of remedial activities within a reasonable period of time taking into consideration the factors set forth in subparagraphs (12)(D)4.A. through H. of this rule. The owner/operator shall consider the following factors in determining, and the department will consider the following factors in approving, the schedule of remedial activities:

A. Extent and nature of contamination;

B. Practical capabilities of remedial technologies in achieving compliance with groundwater protection standards established under subparagraph (11)(C)6.E. of this rule and other objectives of the remedy;

C. Availability of treatment or disposal capacity for wastes managed during implementation of the remedy;

D. Desirability of utilizing technologies that are not currently available, but which may offer significant advantages over already available technologies in terms of

effectiveness, reliability, safety or ability to achieve remedial objectives;

E. Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;

F. Resource value of any aquifer affected including:

(I) Current and future uses;

(II) Proximity and withdrawal rate of users;

(III) Groundwater quantity and quality;

(IV) The potential damage to wildlife, crops, vegetation and physical structures caused by exposure to the waste constituent;

(V) The hydrogeologic characteristic of the facility and surrounding land;

(VI) Groundwater removal and treatment costs; and

(VII) The cost and availability of alternative water supplies;

G. Practicable capability of the owner/operator; and

H. Other relevant factors.

5. The department may determine that remediation of a release of any constituent listed in Appendix II of this rule from a demolition landfill is not necessary if the owner/operator demonstrates to the satisfaction of the department that—

A. The groundwater is additionally contaminated by substances that have originated from a source other than a demolition landfill, and those substances are present in concentrations such that cleanup of the release from the demolition landfill unit would provide no significant reduction in risk to actual or potential receptors;

B. The constituent(s) is present in groundwater that—

(I) Is not a current or potential source of drinking water; and

(II) Is not hydraulically connected with waters to which the hazardous constituents are migrating or are likely to migrate in a concentration(s) that represents a statistically significant increase over background concentrations;

C. Remediation of the release(s) is technically impracticable; or

D. Remediation would result in unacceptable cross-media impacts.

6. A determination by the department pursuant to paragraph (12)(B)5. of this rule shall not affect the authority of the state to require the owner/operator to undertake source control measures or other measures that may be necessary to eliminate or minimize further releases to the groundwater, to prevent exposure to the groundwater, or to remediate the groundwater to concentrations that are technically practicable and which significantly reduce threats to human health or the environment.

(C) Implementation of the Corrective Action Program.

1. Based on the schedule established under paragraph (12)(B)4. of this rule for initiation and completion of remedial activities, the owner/operator shall—

A. Establish and implement a corrective action groundwater monitoring program that—

(I) At a minimum, meets the requirements of an assessment monitoring program under paragraph (11)(C)6. of this rule;

(II) Indicates the effectiveness of the corrective action remedy; and

(III) Demonstrates compliance with groundwater protection standards pursuant to subparagraph (11)(C)6.E. of this rule;

B. Implement the corrective action remedy selected under subsection (12)(B) of this rule; and

C. Take any interim measures necessary, any measures determined to be necessary by the department, or both, to ensure the protection of human health and the environment. Interim measures shall, to the greatest extent practicable, be consistent with the objectives of and contribute to the performance of any remedy that may be required pursuant to subsection (12)(B) of this rule. The following factors shall be considered by an owner/operator, and will be considered by the department, in determining whether interim measures are necessary:

(I) Time required to develop and implement a final remedy;

(II) Actual or potential exposure of nearby populations or environmental receptors to hazardous constituents;

(III) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

(IV) Further degradation of the groundwater that may occur if remedial action is not initiated expeditiously;

(V) Weather conditions that may cause hazardous constituents to migrate or be released;

(VI) Risks of fire or explosion, or potential for exposure to hazardous constituents as a result of an accident or failure of a container or handling system; and

(VII) Other situations that may pose threats to human health and the environment.

2. The department may determine, based on information developed after implementation of the remedy has begun or other information, that compliance with requirements of paragraph (12)(B)2. of this rule are not being achieved through the remedy selected. In those cases, the owner/operator shall implement other methods or techniques that will achieve compliance with the requirements, unless the department makes the determination under paragraph (12)(C)3. of this rule.

3. If the department determines that compliance with requirements under paragraph (12)(B)2. of this rule cannot be practically achieved with any currently available methods, the owner/operator shall—

A. Obtain the certification of a qualified groundwater scientist and approval from the department that compliance with the requirements under paragraph (12)(B)2. cannot be practically achieved with any currently available methods;

B. Implement alternative measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment;

C. Implement alternative measures for control of the sources of contamination, or for removal or decontamination of equipment, units, devices or structures that are—

(I) Technically practicable; and

(II) Consistent with the overall objective of the remedy; and

D. Submit a report to the department justifying the alternative measures. The alternative measure must be approved by the department prior to implementation.

4. All solid wastes that are managed pursuant to a remedy required under subsection (12)(C) or an interim measure required under subparagraph (12)(C)1.C. of this rule, shall be managed in a manner—

A. That is protective of the public health and the environment; and

B. That complies with all applicable state and federal requirements.

5. Remedies selected pursuant to subsection (12)(B) of this rule shall be considered complete when—

A. The owner/operator complies with the groundwater protection standards established under subparagraph (11)(C)6.E. of this rule at all points within the plume of contamination;

B. Compliance with the groundwater protection standards established under subparagraph (11)(C)6.E. of this rule has been achieved by demonstrating that concentrations of all constituents listed in Appendix II of this rule have not exceeded the groundwater protection standard(s) for a period of three (3) consecutive years using the statistical procedures and performance standards in subsection (11)(C). The department may specify an alternative length of time during which the

owner/operator shall demonstrate that concentrations of all constituents listed in Appendix II of this rule have not exceeded the groundwater protection standard(s) taking into consideration—

(I) Extent and concentration of the release(s);

(II) Behavioral characteristics of the hazardous constituents in the groundwater;

(III) Accuracy of monitoring or modeling techniques, including any seasonal meteorological, or other environmental variabilities that may affect the accuracy; and

(IV) Characteristics of the groundwater; and

C. All actions required to complete the remedy have been completed.

6. Upon completion of the remedy, the owner/operator shall submit a certification to the department within fourteen (14) days after the remedy has been completed in compliance with the requirements of paragraph (12)(C)5. and shall place a copy of the certification in the facility's operating record. The certification shall be signed by the owner/operator and by a qualified groundwater scientist and approved by the department.

7. When, upon completion of the certification, the owner/operator and the department determines that the corrective action remedy has been completed in accordance with the requirements under paragraph (12)(C)5. of this rule, the owner/operator shall be released from the requirements for financial assurance for corrective action under 10 CSR 80-2.030(4)(C).

(13) Air Quality.

(A) Requirement. The design, construction and operation of the demolition landfill shall minimize environmental hazards and shall conform to applicable ambient air quality standards and source control regulations.

(B) Satisfactory Compliance—Design. Plans shall include an effective dust control program.

(C) Satisfactory Compliance—Operations. Burning of solid wastes shall be prohibited. A burning permit or exemption may be obtained from the department permitting the burning of tree trunks, tree limbs, vegetation and untreated waste lumber. In areas operating under exemption certificates authorized by Chapter 643, RSMo, approval shall be obtained from the local pollution control agency. The location and operating procedures for burning practices shall be submitted to the department for review and written approval. Burning at the demolition landfill shall be conducted in accordance with Chapter 643, RSMo, corresponding rules, the terms and/or conditions of the plans and/or permit and all local requirements.

(14) Gas Control.

(A) Requirement. Decomposition gases generated within the demolition landfill shall be controlled on-site, as necessary, to avoid posing a hazard to the environment or to public health and the safety of occupants of adjacent property.

(B) Satisfactory Compliance—Design.

1. Plans shall contain a monitoring program for decomposition gases.

A. The monitoring program must specify the type of monitoring and be based on—

(I) Soil conditions;

(II) The hydrogeologic and topographic conditions surrounding the facility; and

(III) The location of facility structures, property boundaries, and off-site features.

B. The monitoring program described in the plans must include:

(I) A written description of the monitoring system, including spacing of monitoring locations and frequency of monitoring;

(II) The results of any gas assessment that has been performed;

(III) The location of all gas monitoring wells shown on a plan sheet;

(IV) A drawing detailing the typical gas monitoring well design;

(V) The design depths and bottom elevations of the gas monitoring wells; and

(VI) Boring logs that support the design gas monitoring well depths.

C. The gas monitoring specified in the plans shall be performed at gas monitoring wells. The monitoring program shall specify how buildings on the landfill property are to be monitored. Gas monitoring wells shall be designed to monitor the unsaturated soil and rock down to an elevation equal to the bottom elevation of the landfill. Gas monitoring wells shall be placed between the landfill and off-site buildings and other features that may be harmed by landfill gas or may easily transmit gas from the landfill. Gas monitoring well locations at the property boundary shall not be more than five hundred feet (500') apart unless the permittee can show that the potential for gas migration is low.

2. Plans shall assess the need for gas control and indicate the location and design of any vents, barriers or other control measure to be provided.

A. The gas control system shall be constructed of materials that are chemically resistant to the solid wastes managed in the demolition landfill and the gas expected to be generated. These materials shall be specified in the engineering report and the choice of materials justified.

B. The gas control system shall be constructed of materials that are of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying solid wastes, cover and by any equipment used at the demolition landfill. Overburden pressure calculations, material specifications and system installation procedures shall be included in the engineering report.

C. Maintenance and repair options shall be considered in the design and specified in the engineering report.

D. All applicable permits and approvals necessary to comply with the requirements of the Air Conservation Law and rules promulgated shall be obtained from the department.

E. The plan shall estimate the maximum anticipated rate of gas generation at the disposal area and the length of time over which it is anticipated to be generated. The method by which these calculations are arrived at shall also be included.

(C) Satisfactory Compliance—Operations.

1. Decomposition gases shall not be allowed to migrate laterally from the demolition landfill to endanger public health and safety or to pose a hazard to the environment. They shall be controlled on-site, flared or vented to the atmosphere directly through the cover, cut-off trenches or ventilation systems in a way that they do not accumulate in explosive or toxic concentrations, especially within structures. (Information on the limits of flammability of gases is available in such references as the Handbook of Chemistry and Physics, 68th ed. Cleveland, Chemical Rubber Publishing Co., 1987.)

A. Within seven (7) days of sampling for landfill gases, a landfill shall submit a permit modification to the department demonstrating that there is no potential for adverse impacts on the public health and safety, and the environment, based upon but not limited to: the size of the landfill, nature and age of the refuse, projected gas generation or remoteness of the facility.

B. The landfill shall within ninety (90) days notify the department of any changes that occur which may affect the demonstration of no adverse impact. Changes which could affect the demonstration are construction of buildings within a one-quarter (1/4) mile of the property boundary, death of vegetation, etc.

C. At a minimum, continued, periodic monitoring of decomposition gases in

the soil shall be required for any demonstration of no adverse effects.

2. Decomposition gases shall not be allowed to concentrate above the following levels:

A. Twenty-five percent (25%) of the lower explosive limit (LEL) or one and one-quarter percent (1.25%) by volume for methane in buildings on the demolition landfill property;

B. Fifty percent (50%) of the LEL or two and one-half percent (2.5%) by volume for methane in the soil at the property boundary of the demolition landfill.

3. For purposes of this section, lower explosive limit (LEL) means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at twenty-five degrees Celsius (25°C) and atmospheric pressure.

4. Owners/operators of all demolition landfills shall implement a methane monitoring program to ensure that the standards of paragraph (14)(C)2. of this rule are met. Methane monitoring shall be conducted at least quarterly with equipment warranted by the manufacturer to detect explosive gases under the conditions the equipment is to be used. Facilities shall submit the results of this methane monitoring to the department at least quarterly. The electronic submission of methane monitoring data is required. This submission shall be in a format and manner as prescribed by the department.

5. If methane gas levels exceeding the limits specified in paragraph (14)(C)2. of this rule are detected, the owner/operator shall—

A. Notify the department and immediately take all necessary steps to ensure protection of public health and safety which include:

(I) When results of monitoring in on-site and off-site structures indicate levels in excess of those specified, the operator shall take appropriate action to mitigate the effects of landfill gas accumulation in those structures until a permanent remediation is completed. Actions which should be considered include:

(a) Notification of the fire department or other appropriate local authorities;

(b) Notification of adjacent property owners and/or occupants;

(c) Ventilation of any confined spaces that may trap decomposition gases;

(d) Installation of alarm systems in any confined spaces that may trap decomposition gases; and

(e) Establishment of a temporary methane monitoring program;

B. Within seven (7) days of detection, submit to the department a report describing the steps taken to protect public health and safety;

C. Within sixty (60) days of detection, submit to the department for approval a remediation plan designed by a professional engineer for the methane gas releases. A gas control system shall be designed to—

(I) Prevent methane accumulation in on-site and off-site buildings;

(II) Reduce methane concentrations at monitored property boundaries to below compliance levels; and

(III) Reduce methane concentrations off-site to below compliance levels;

D. Landfill gas corrective action plans shall describe the nature and extent of the problem and the proposed remedy. The plan shall be implemented upon departmental approval; and

E. The department may establish alternative schedules for demonstrating compliance with subparagraphs (14)(C)5.B. and C. of this rule.

6. The demolition landfill shall operate in compliance with all applicable requirements of Chapter 643, RSMo and corresponding rules.

(15) Vectors.

(A) Requirement. Conditions shall be maintained that are unfavorable for the harboring, feeding and breeding of vectors.

(B) Satisfactory Compliance—Design. Plans shall include contingency programs for vector control and the operator should be prepared at all times to implement these procedures.

(C) Satisfactory Compliance—Operations. Vector control contingency programs shall be implemented when necessary to prevent or rectify vector problems.

(16) Aesthetics.

(A) Requirement. The demolition landfill shall be designed and operated at all times in an aesthetically acceptable manner.

(B) Satisfactory Compliance—Design. Plans shall include effective litter control facilities and operating program.

(C) Satisfactory Compliance—Operations.

1. At the end of each operating day, or more often as required, litter shall be picked up and incorporated into the cell being used or containerized for disposal on the next operating day. If necessary, portable litter fences or other devices shall be used in the immediate vicinity of the working face and at other appropriate locations to control blowing litter.

2. Solid wastes that are easily moved by wind shall be covered, as necessary, to prevent becoming airborne and scattered.

3. On-site vegetation should be cleared only as necessary. Natural windbreaks, such as green belts, should be maintained where they will improve the appearance and operation of the demolition landfill.

4. Salvage operations shall be conducted in a manner so as to not detract from the appearance of the demolition landfill. Salvaged materials shall be removed from the demolition landfill daily or stored in aesthetically acceptable containers or enclosures.

(17) Cover.

(A) Requirement. Cover shall be applied to minimize fire hazards, infiltration of precipitation, odors and blowing litter; control gas venting and vectors; discourage scavenging; and provide a pleasing appearance.

(B) Satisfactory Compliance—Design. Plans shall specify—

1. Cover sources, quantities and soil classifications. (Unified Soil Classification System or United States Department of Agriculture Classification System);

2. The capability of the cover to perform the functions listed in subsection (17)(A) of this rule;

3. Surface grades and side slopes needed to promote maximum runoff, without excessive erosion, to minimize infiltration. Final side slopes should not exceed twenty-five percent (25%) unless it has been demonstrated in a detailed slope stability analysis approved by the department that the slopes can be constructed and maintained throughout the entire operational life and post-closure period of the landfill;

4. Procedures to establish and maintain vegetative growth to combat erosion and improve appearance of idle and completed areas. Procedures shall include seeding rate, fertilizer rate, soil conditioning rate and provisions for mulching;

5. Procedures to maintain cover integrity, for example, regrading and recovering;

6. Methods for borrow areas to be reclaimed so as to restore aesthetic qualities and prevent excessive erosion;

7. The final slope of the top of the demolition landfill shall have a minimum slope of five percent (5%); and

8. Shear failure analyses shall be included where intermediate or final slopes exceed twenty-five percent (25%). However, the department will waive the analysis for slopes of twenty-five percent (25%) or less, except in seismic impact zones.

(C) Satisfactory Compliance—Operations.

1. Cover shall be applied at least once every seven (7) calendar days. The thickness of the compacted cover shall not be less than twelve inches (12"). No active, intermediate or final slope shall exceed thirty-three and one-third percent (33 1/3%).

2. As each phase of the demolition landfill is completed, a final cover system shall be installed at portions of—

A. Existing demolition landfills without composite liners. This final cover shall consist of at least two feet (2') of compacted clay with a coefficient of permeability of 1×10^{-5} cm/sec or less overlaid by at least one foot (1') of uncompacted soil capable of supporting vegetative growth; and

B. Demolition landfills with composite liners. This final cover shall consist of component layers, in order from top to bottom, as follows:

(I) Two feet (2') of soil capable of sustaining vegetative growth;

(II) A drainage layer;

(III) A geomembrane liner at least as thick as the geomembrane liner described in paragraph (10)(B)2.; and

(IV) One foot (1') of compacted clay with a coefficient of permeability of 1×10^{-5} cm/sec or less; and

C. The geomembrane liner shall be in intimate contact with the underlying compacted clay.

3. The installation of the final cover systems shall include provisions for slope stability.

4. The department may approve the use of an alternative final cover system provided that the owner/operator can demonstrate to the department that the alternative design will be at least equivalent to the final cover system described in paragraph (17)(C)2.B. of this rule.

5. Surface grades and side slopes shall be maintained to promote runoff without excessive erosion.

6. Vegetation shall be established within one hundred eighty (180) days of application of the final cover. Vegetation shall be established and maintained to minimize erosion and surface water infiltration.

7. Regrading and recovering shall be performed as necessary to maintain cover slope and integrity.

8. Borrow areas shall be reclaimed in accordance with the approved plans.

9. The compacted clay portion of the final cover shall consist of soils classified under the Unified Soil Classification System as CH, CL, or SC.

(18) Compaction.

(A) Requirement. In order to conserve demolition landfill capacity, preserving land resources and minimizing moisture infiltration and settlement, solid waste and cover shall be compacted to the smallest practicable volume.

(B) Satisfactory Compliance—Design.

1. Arrangements shall be made and indicated in the plans where substitute equipment will be available to provide an uninterrupted service during routine maintenance periods or equipment breakdowns.

2. The plans shall specify the type equipment that should be available to conduct the demolition landfill operation at the projected solid waste loading.

(C) Satisfactory Compliance—Operations.

1. Solid waste handling equipment, on an operating day, shall be capable of performing and shall perform the following functions:

A. Spread the solid wastes accepted in layers no more than two feet (2') thick when practicable from the standpoint of size and shape of waste material, while confining it to the smallest practicable area;

B. Compact the spread solid wastes to the smallest practicable volume; and

C. Place, spread and compact the cover as much as practicable.

2. The equipment shall be available and operated to spread and compact the solid waste as received or at any time the quantity of solid waste has accumulated to two hundred (200) cubic yards without being spread and compacted. In no event shall the operator fail to spread, compact and cover the solid waste accepted within seven (7) calendar days.

3. A preventive maintenance program should be employed to maintain equipment in operating order.

4. No solid waste shall be disposed of in water where the presence of the water will prohibit the proper spreading and compaction of the solid waste or where a mosquito breeding problem would be created.

(19) Safety.

(A) Requirement. The demolition landfill shall be designed, constructed and operated in a manner so as to protect the health and safety of personnel and others associated with and affected by the operation.

(B) Satisfactory Compliance—Design.

1. Provisions shall be included in the plans to control and limit access to the demolition landfill in a manner that is compatible with the surrounding land use.

2. Provisions shall be included in the plans to control dust for safety purposes and to prevent a nuisance to the surrounding area.

3. The plans shall specify the facilities and methods to be provided for extinguishing fires.

(C) Satisfactory Compliance—Operation.

1. A fire extinguisher shall be provided on all solid waste handling equipment.

2. Any fires in solid wastes being delivered to the demolition landfill or which occur at the working face or within equipment or personnel facilities shall be extinguished.

3. Adequate communications equipment shall be available at the demolition landfill for emergency situations.

4. Scavenging shall be prohibited at all times to avoid injury and to prevent interference with demolition landfill operations.

5. Access to the demolition landfill shall be controlled and shall be by established roadways only. The demolition landfill shall be accessible only when operating personnel are on duty.

6. Traffic signs or markers should be provided to promote an orderly traffic pattern to and from the discharge area and, if necessary, to restrict access to hazardous areas or to maintain efficient operating conditions. Drivers of manually discharging vehicles should not hinder operation of mechanically discharging vehicles. Vehicles should not be left unattended at the working face or along traffic routes. If a regular user persistently poses a safety hazard, s/he should be barred from the demolition landfill. Large containers may be placed at the demolition landfill entrance so that users can conveniently deposit solid waste after hours. The containers and the areas around them shall be maintained in a sanitary and litter-free condition.

7. Dust control provisions shall be utilized as necessary for safety purposes and to prevent a nuisance to the surrounding area.

(20) Records.

(A) Requirement. The owner/operator of a demolition landfill shall maintain records and monitoring data as specified by the department and file appropriate documents with county recorder(s) of deeds. The records and data shall be provided to the department upon request.

(B) Satisfactory Compliance—Design. Plans shall prescribe methods to be used in maintaining records and monitoring the environmental impact of the demolition landfill. Information on recording and monitoring requirements may be obtained from the department.

(C) Satisfactory Compliance—Operations.

1. Records shall be maintained at the landfill office. Records five (5) years old or older may be stored at an alternate site if approved by the department; such stored records must be made available at the landfill upon request of department personnel. Records must cover at least the following:

A. Major operational problems, complaints or difficulties;

B. Gas monitoring results from monitoring and any remediation plans required under section (14) of this rule;

C. Any demonstration, certification, finding, monitoring, testing or analytical data required under sections (4) and (11) of this rule;

D. Vector control efforts;

E. Dust and litter control efforts;

F. Quantitative measurements of the solid waste handled and an estimate of the air space left at the facility. Every two (2) years after the date of the permit issuance and within sixty (60) days of the anniversary date of the permit issuance, the owner/operator shall submit to the department two (2) copies of a topographic map, prepared under the direction of a land surveyor or by aerial photography, showing the current horizontal and vertical boundaries of solid waste in the demolition landfill and the boundaries of the demolition landfill. Maps prepared by aerial photography shall meet the current National Map Accuracy Standards for Photogrammetry as indicated in United States Bureau of the Budget "Circular A-16 Exhibit C," dated October 10, 1958;

G. Any demolition landfill design documentation for recirculation of leachate or gas condensate in a landfill;

H. Closure and post-closure care plans and any monitoring, testing or analytical data as required under 10 CSR 80-2.030(4)(A);

I. Any cost estimates and financial assurance documentation required under 10 CSR 80-2.030(4)(B) and (C);

J. Inspection records and training procedures as required under 10 CSR 80-2.060 and subsection (3)(B) of this rule;

K. Records associated with fees as required under 10 CSR 80-2.080(2);

L. Records associated with corrective measures as required under section (10) of this rule; and

M. Effective January 1, 1998, on or before January 31 of each calendar year and annually thereafter each solid waste disposal area shall submit a report to the department specifying the amount of solid waste received for disposal from states other than Missouri. The landfill operator shall keep a detailed report of the origin of all waste received.

2. Upon closing of the demolition landfill, the existence of the demolition landfill shall be recorded with the recorder(s) of deeds in the county(ies) where the demolition landfill is located.

A. A survey and plat meeting the requirements of the current Minimum Standards of Property Boundary Survey 10 CSR 30-2.010 and detailed description of the demolition landfill shall be prepared by a land surveyor. The survey plat and detailed description shall contain at a minimum the following information:

(I) The name of the property owner as it appears on the property deed;

(II) The detailed description of the property;

(III) The general types and location of the solid wastes and the depth(s) of fill within the property; and

(IV) The location of any leachate control, gas control or water monitoring systems which must be maintained after closure and the length of time that these systems are to be maintained.

B. The owner/operator shall obtain approval from the department of the survey plat and detailed description prior to filing with the county recorder of deeds. Filing the approved plat or detailed description shall be accomplished within thirty (30) days of departmental approval. Two (2) copies of the properly recorded plat or detailed description showing the recorder of deeds' seal or stamp, the book and page numbers and the date of filing shall be submitted to the department within thirty (30) days of the date of filing.

C. Owners of demolition landfills permitted prior to January 1, 1987, and which close after January 1, 1989, shall as a part of closure of the solid waste disposal areas—

(I) Execute an easement with the department, which allows the department, its agents or its contractors to enter the premises to complete work specified in the closure plan, to monitor or maintain the demolition landfill or take remedial action during post-closure period; and

(II) Submit evidence to the department that a notice and covenant running with the land has been recorded with the recorder of deeds in the county where the demolition landfill is located. The notice and covenant shall specify the following:

(a) That the property has been permitted as a demolition landfill; and

(b) That use of the land in any manner which interferes with closure plans, and when applicable, post-closure plans filed with the department, is prohibited.

AUTHORITY: section 260.225, RSMo. Supp. 1997. Original rule filed Dec. 11, 1973, effective Dec. 21, 1973. Amended: Filed July 14, 1986, effective Jan. 1, 1987. Amended: Filed Jan. 29, 1988, effective Aug. 1, 1988. Amended: Filed March 17, 1992.** Emergency rescission of the 1992 amendment filed March 19, 1997, effective April 1, 1997, expired Sept. 27, 1997. Amended: Filed Oct. 10, 1996, effective July 30, 1997. Rescission of the 1992 amendment filed April 3, 1997, effective Aug. 30, 1997. Amended: Filed Dec. 15, 1997, effective Aug. 30, 1998.*

**Original authority 1972, amended 1975, 1986, 1988, 1990, 1993, 1995.*

The Missouri Supreme Court in* ***Missouri Coalition for the Environment, et al., v. Joint Committee on Administrative Rules, et al., *Case No. 78628, dated February 25, 1997, ordered the secretary of state to publish this amendment. The Missouri Department of Natural Resources subsequently filed an emergency rescission of this amendment as well as a proposed rescission of this amendment which became effective August 30, 1997. See the above authority section for filing dates.*

Op. Atty. Gen. No. 42, Frappier, 3-20-74. *With respect to the Solid Waste Management Law, Senate Bill No. 387, 76th General Assembly, sections 260.200–260.245, RSMo (Supp. 1973), cities and counties are required to provide for the collection and disposal of solid wastes including industrial wastes and may contract for this collection and disposal. Service charges may be imposed if not already imposed under some other law although these charges must be billed and collected directly by the cities or counties. General revenue of the city and federal revenue sharing funds may also be expended for such purposes.*

Appendix I—Constituents for Detection Monitoring

Aluminum (Al, μg/l)
Ammonia (NH_3 as N, mg/l)
Antimony (Sb, μg/l)
Arsenic (As, μg/l)
Barium (Ba, μg/l)
Beryllium (Be, mg/l)
Boron (B, μg/l)
Cadmium (Cd, μg/l)
Calcium (Ca, mg/l)
Chemical Oxygen Demand (COD, mg/l)
Chloride (Cl, mg/l)
Chromium (Cr, μg/l)
Cobalt (Co, μg/l)
Copper (Cu, μg/l)
Fluoride (Fl, mg/l)
Hardness (calculated, mg/l)
Iron (Fe, μg/l)

Lead (Pb, μg/l)
Magnesium (Mg, mg/l)
Manganese (Mn, μg/l)
Mercury (Hg, μg/l)
Nickel (Ni, mg/l)
pH (units)
Potassium (K, mg/l)
Selenium (Se, μg/l)
Silver (Ag, μg/l))
Sodium (Na, mg/l)
Specific Conductance (Conductivity at 25°C, mho/cm)
Sulfate (SO, mg/l)
Thallium (Tl, μg/l)
Total Dissolved Solids (TDS, mg/l)
Total Organic Carbon (TOC, mg/l)
Total Organic Halogens (TOX, mg/l)
Zinc (Zn, μg/l)

Appendix II—Constituents for Assessment Monitoring

Inorganic Constituents

Nitrate/Nitrite (NO_3/NO_2, mg/l)
Phosphorus (total P, mg/l)
Vanadium (V, μg/l)
Zinc (Zn, μg/l)

Organic Constituents

Acetone
Acrylonitrile
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform; Tribromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane; Ethyl chloride
Chloroform; Trichloromethane
Dibromochloromethane; Chlorodibromomethane
1,2-Dibromo-3-chloropropane; DBCP
1,2-Dibromoethane; Ethylene dibromide; EDB
o-Dichlorobenzene; 1,2-Dichlorobenzene
p-Dichlorobenzene; 1,4-Dichlorobenzene
trans-1,4-Dichloro-2-butene
1,1-Dichloroethane; Ethylidene chloride
1,2-Dichloroethane; Ethylene dichloride
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene
1,2-Dichloropropane; Propylene dichloride
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
2-Hexanone; Methyl butyl ketone
Methyl bromide; Bromomethane
Methyl chloride; Chloromethane
Methylene bromide; Dibromomethane
Methylene chloride; Dichloromethane
Methyl ethyl ketone; MEK; 2-Butanone
Methyl iodide; Iodomethane
4-Methyl-2-pentanone; Methyl isobutyl ketone
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene
Toluene
1,1,1-Trichloroethane; Methylchloroform
1,1,2-Trichloroethane
Trichloroethylene; Trichloroethene
Trichlorofluoromethane; CFC-11
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride
Xylenes

Missouri Department of Natural Resources

Managing Solid Waste Encountered During Excavation Activities

Solid Waste Management Program fact sheet 12/2006

This fact sheet is provided primarily for construction contractors involved with excavating footings, basements, utility trenches and other types of excavation. When excavating, solid or hazardous waste may be encountered due to the presence of pre-law landfills or unknown illegal dumps. This fact sheet provides information and guidance regarding the proper handling and disposal of solid waste uncovered during excavation activities.

Before starting excavation, make the required call to the Missouri One Call System, 1-800-DIG-RITE. Missouri law requires that any person making or beginning any excavation notify all underground facility owners/operators which may be affected by the excavation at least 48 hours, but not more than ten working days in advance, except in the case of emergency. Missouri law defines a "working day" as everyday, except Saturday, Sunday or a legally declared local, state or federal holiday. Missouri One Call Operators are on duty 24 hours a day, seven days a week.

It is also wise to find out as much as you can about the property to reduce the potential for putting workers or the community at risk. If you encounter buried drums, bags, cans, sacks, or soil that appear to contain, or be contaminated with hazardous materials, contractors should cease construction activity. We suggest that you make your first call to the local fire and emergency authorities and your second call to the Environmental Emergency Response 24 hour spill line at (573) 634-2436 (CHEM) to report the discovery and to receive additional direction on how to properly manage the material(s). Some characteristics of hazardous materials are unusual odors, soil staining and sometimes the presence of free product.

Note: This guidance does not apply to solid wastes legally disposed of by an individual resulting from his or her own residential activities on property owned or lawfully occupied by him or her when such wastes do not thereby create a public nuisance or adversely affect the public health as stated in §260.210.1.(1), RSMo.

Waste types

During excavation activities, you may uncover the following types of residuals:

1. Clean fill
2. Recyclable materials
3. General solid waste
4. Hazardous waste

PUB002192

Recycled Paper

Management requirements differ for each of these waste types. If prior knowledge exists of a pre-law landfill or illegal dump that is planned for excavation, the department's Solid Waste Management Program (SWMP) must be contacted prior to the excavation for determination of proper handling and disposal of uncovered wastes. Contact the Solid Waste Management Program at (573) 751-5401.

1. Clean fill is "uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinder blocks, brick, minimal amounts of wood and metal and inert solids, for fill, reclamation or other beneficial use" [§260.200(4), RSMo].

The following guidance is given concerning "minimal amounts of wood and metal and inert solids." The department's working definition for "minimal amounts" is amounts of less than 10 percent based on the total volume of excavated material. Excavated material containing a total volume of less than 10 percent solid waste may be reburied in the same location from where it was excavated.

Concrete containing wire mesh or rebar may be considered as clean fill. However, exposed rebar should be removed to the maximum extent possible before use in order to prevent a public nuisance or health and safety hazard.

Roofing shingles, sheet rock, lumber or other construction and demolition wastes are not defined as clean fill. When these materials are excavated and comprise 10 percent or greater of the total volume of excavated material they must be properly disposed of using the following guidance in sections 2. Recyclable materials and 3. General solid waste.

2. Recyclable materials are materials that can be recycled into new products (i.e. steel and aluminum). Steel and other metals should be recycled when possible. If recycling is not an option then the materials must be properly disposed of at a permitted landfill or taken to a transfer station.

If you need assistance with locating a recycling facility, contact the Planning Unit of the department's Solid Waste Management Program at (573) 751-5401.

3. General solid waste is solid waste not intended to be recycled. These wastes include non-hazardous construction and demolition waste as well as garbage and refuse. General solid waste must be disposed of at a permitted landfill or taken to a transfer station. It must not be dumped, burned or reburied (except at a permitted landfill) to avoid violating air and solid waste laws and regulations.

Note: When construction/demolition debris is discovered by excavation, workers need to be aware of the potential presence of asbestos containing materials and other types of hazardous waste. Previously demolished buildings may have asbestos containing materials (ACM).

Asbestos can be found in ceiling or floor tiles, insulation or soundproofing on ceilings, pipes, ductwork or boilers, or on the outside as transite siding or in shingles. If these materials are handled improperly tiny fibers can be released into the air, which can be harmful to construction employees and landfill operators. For information on handling and proper disposal of asbestos containing materials, contact the department's Air Pollution Control Program at (573) 751-4817.

Additional information on asbestos requirements may be found at www.dnr.mo.gov/env/apcp/Asbestos.htm. If the ACM is to go to a landfill or transfer station, contact the facility in advance to see if they accept ACM and if they have any special handling or packaging requirements.

4. Hazardous waste is any waste or combination of wastes listed or referenced in Missouri regulation that may pose threat to the health of humans or the environment. The universe of hazardous wastes is large and diverse. Hazardous wastes can be liquids, solids, contained gases or sludges. Some hazardous waste, such as mercury and dioxins, may be released as gases or vapors. Hazardous wastes can be the by-products of manufacturing processes like cyanide salts, solvents or lead dust, or simply discarded commercial products like cleaning fluids or pesticides. In regulatory terms, a hazardous waste is one that appears on one of the four hazardous waste lists (F-list, K-list, P-list, or U-list), or exhibits at least one of four characteristics, ignitability, corrosivity, reactivity or toxicity. Mixtures of certain types of wastes can compound the hazard.

If contaminated soil is discovered, workers should withdraw to a safe distance and notify their manager before proceeding. Ideally, the manager will contact environmental professionals to identify the particular hazards with proper investigation and sampling and then develop a site safety plan. In this way, worker exposure to hazardous vapors, liquids or contaminated dust can be minimized.

If the discovered waste is hazardous, it will need to be packaged, marked and labeled appropriately and shipped using a licensed hazardous waste transporter to a permitted facility for treatment or disposal.

Additional information

You may obtain additional information about properly managing excavated wastes from the sources listed below.

Regional Offices

Kansas City Regional Office (816) 622-7000
Northeast Regional Office (Macon) (660) 385-8000
St. Louis Regional Office (314) 416-2960
Southeast Regional Office (Poplar Bluff) (573) 840-9750
Southwest Regional Office (Springfield) (417) 891-4300

Environmental publications are also available at www.dnr.mo.gov/pubs/

Additional considerations and sources

Solid waste requirements are found in the Solid Waste Management Law in Sections 260.200 through 260.345 RSMo, and the regulations in Code of State Regulations, Title 10, Division 80. Copies of the Revised Statutes of Missouri are available through the Reviser of Statutes at (573) 526-1288, or are available online at www.moga.mo.gov.

Hazardous waste requirements are found in the Missouri Hazardous Waste Law in Sections 260.350-260.575, and the regulations in the Code of State Regulations, Title 10, Division 25 that incorporates and references many of the federal regulations in the Code of Federal Regulations, Title 40, Parts 260 through Part 280.

Copies of the Missouri Code of State Regulations are available through the Missouri Secretary of State at (573) 751-4015, or are available online at www.sos.missouri.gov/adrules/csr/csr.asp.

To report a discovery of hazardous materials

First contact your local fire and emergency authorities, then the Missouri Department of Natural Resources' spill line at (573) 634-2436 (CHEM).

For more information

Solid Waste Management Program
P. O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or (573) 751-5401 office
(573) 526-3902 fax
www.dnr.mo.gov/env/swmp

Air Pollution Control Program
P.O. Box 176, Jefferson City, MO 65102-017
1-800-361-4827 or (573) 751-4817 office
(573) 751-2706 fax
www.dnr.mo.gov/env/apcp

Hazardous Waste Program
P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or (573) 751-7560 office
(573) 526-5268 fax
www.dnr.mo.gov/env/hwp