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Survey of State Programs Pertaining to Contaminated Soils

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SURVEY OF STATE PROGRAMS PERTAINING TO CONTAMINATED SOILS

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U. S. Environmental Protection Agency
Office of Underground Storage Tanks
401 M Street, S.W.
Washington, D.C. 20460

This report was prepared under the direction of Mr. Michael R. Kalinoski of the U. S. Environmental Protection Agency and was written and researched by Ms. Janet Dean, Ms. Rashne Baetz, Ms. Lori Bailey, and Mr. Lee Humphrey of Midwest Research Institute, under EPA contract No. 68-01-7383.

SURVEY OF STATE PROGRAMS PERTAINING TO CONTAMINATED SOILS

I. PURPOSE

A telephone survey of persons in each of the 50 states and the District of Columbia was conducted in order to identify current policies and procedures pertaining to soils contaminated with petroleum and hazardous substances. The purpose of this report is to describe the key findings and results of this survey.

Numerous technical and regulatory issues confront state regulatory personnel and owners and operators of underground storage tanks (USTs) containing petroleum and hazardous substances. These issues include how the soils contaminated with released substances are classified (i.e., are soils considered hazardous waste or not), how the determination is made and who makes it, and what type of treatment is allowed or required. The state contaminated soils programs described in this report are undergoing change and further refinement as more information is known on the issues described above. This survey will help the reader identify other state regulatory programs that appear to be effective and hopefully will provide some solutions to their implementation problems.

Individuals in the states were contacted by telephone and questioned about their procedures and policies pertaining to soils contaminated from leaking underground storage tanks. The same questions were asked of each participant. Questions were asked about program administration; soil classification criteria; cleanup management for spills, releases, or closure; disposal and treatment options; cleanup levels; anticipated regulatory changes; disposal and treatment effectiveness; extent of the state contaminated soils problem; tank testing; and followup tests. The results of the survey are tabulated in Section IV.

II. RESULTS

All 50 states and the District of Columbia were contacted by telephone. Summaries of the state responses for each of the question areas are presented below. The table in Section IV provides more detailed answers on a state-by-state basis. The questions are divided into administrative and technical areas.

A. Administrative

1. Responsible office. This is the state agency, department, or office that administers the contaminated soil program; if there is not a state program, this is the local administrator. Forty-eight of the 51 survey respondents had formal programs for the management of contaminated soils. The agencies responsible for the programs included state departments of water, health, natural resources, solid waste management, hazardous waste management, underground storage tanks, and environmental protection; local agencies; and state fire marshals. Three states (Florida, Nebraska, North Carolina) have separate programs for hazardous materials and petroleum products. Three states (Alaska, Arkansas, West Virginia) do not have formal programs.

2. Management of spills, releases, or closure. This is the party responsible for soil cleanup and supervision at tank closure, and for soil cleanup from spills and releases from tanks. In many cases, the department that is responsible for a state's contaminated soils program also is responsible for cleanup management of spills and releases or closure. Twenty-four states oversee the cleanup activities performed by the responsible party, either the tank owner or local agency.

3. Soil classification criteria. These are the classification criteria used by the states to determine if the soil is hazardous or nonhazardous. Most states use visibility, odor, and some analytical method to determine if soil is contaminated with petroleum products. In many states, soils are considered hazardous according to the RCRA characteristics of corrosivity, reactivity, extraction procedure (EP) toxicity (i.e., lead content), or ignitability. Some states currently are using the proposed toxicity characteristic leaching procedure (TCLP) (see 51 FR 21648 December 26, 1986) to classify soils contaminated with organic compounds. If soils contaminated with petroleum products exceed the RCRA characteristic levels, they are treated as hazardous by 46 of the 51 survey respondents.

4. Cleanup levels. These are numerical standards set by the state for soil cleanup. Twenty-one states have set numerical standards for soil cleanup. Twenty-eight states allow the local agency or owner to make site-specific judgments based on either numerical criteria or subjective

criteria such as odor or visibility to set cleanup levels. Two states (Oregon, Pennsylvania) did not provide this information.

5. Anticipated regulatory changes. Twenty-nine of the states are anticipating changes in rules and regulations governing soils contaminated from leaking underground storage tanks. Most are looking to EPA and the final UST regulations for guidelines by which to design their programs.

6. Extent of problem. The states were asked for their perspective on the extent of their contaminated soils problem. Twenty-four of the states are experiencing problems today and anticipating very significant problems in the future. These problems include the volume of contaminated soils being generated and the lack of specific treatment and disposal options for these soils. Seventeen states are unsure of the extent of their contaminated soils problems, while 10 other states do not feel their contaminated soils problem is significant.

B. Technical Categories

1. Disposal and treatment alternatives. These are the methods currently used for disposal and treatment of hazardous or nonhazardous contaminated soil. Thirty-nine states treat petroleum product contaminated soils with aeration, either on site or off site, then either dispose of the soil in a landfill or leave it on site. Most states dispose of soils contaminated with hazardous waste by transportation off site to permitted hazardous waste treatment and disposal faciilties (RCRA Subtitle C). Ten states use incineration as a disposal method for soils.

2. Followup tests. States were asked if followup tests were done to ensure that the disposal and treatment methods were effective. Ten states require followup testing at the release site after a leak has been noticed while nine states require followup tests only on a case-by-case basis. Thirteen states require no followup testing.

3. Disposal and treatment effectiveness. The states were asked for their perspective on the effectiveness from a cost and results standpoint of their current disposal and treatment alternatives. Twenty-nine states are unsure about the effectiveness of their program. Some states (18) feel their contaminated soil programs are working. Most states feel that the extent of the problem is just beginning to be known and it will take time to evaluate the effectiveness of their programs.

4. Required tank testing. States were asked if they require testing to determine if tanks are leaking. Thirty-five states surveyed require testing only if a release is confirmed. Six states require testing at tank closure. Ten states require periodic testing and monitoring of ground water or tank volumes.

III. DISCUSSION

The state agencies currently implementing contaminated soil programs expressed the most concern over the following issues. First, the majority of the states surveyed, either have or anticipate significant contaminated soils problems with the volume of soils to be generated and the availability of options to treat and dispose of them. Second, although most of these state programs are currently in place, there is some uncertainty over their effectiveness. The states without effective programs in this area are looking to the U. S. EPA to assist in program development especially through the final rule for USTs. These state agencies need information such as alternative implementation policies and technical procedures to design contaminated soils programs that are effective and best meet their individual needs.

Therefore, in order to provide information on alternative policy and technical procedures, selected state programs are described below. These programs appear to be the most comprehensive and effective in dealing with contaminated soil from both an administrative and a technical perspective. The common elements in an effective program seem to be: (1) responsibility for management and decision making is clearly established; (2) both hazardous and nonhazardous materials are regulated; (3) any effective treatment and disposal alternatives are allowed for use; and (4) cleanup criteria are established.

A. Florida

The Florida Department of Environmental Regulations administers the contaminated soils program. Petroleum product and nonpetroleum hazardous material contamination are considered separately. Soils contaminated with petroleum products are considered hazardous if they are contaminated with a listed waste or if they fail the EP toxicity test for lead or ignitability characteristic. Soils contaminated with nonpetroleum

hazardous chemicals are considered hazardous if they fail the EP toxicity test or the proposed TCLP for organic substances (including pesticides).

Soils contaminated by nonhazardous petroleum products are treated on or off site then disposed at either a municipal landfill or incinerator. On-site treatments consist of soil spreading to allow volatilization or in situ vacuum extraction. Off-site treatments include volatilization in an asphalt dryer and the use of a mobile incinerator.

Several treatments are used on hazardous material contaminated soil, including incineration, soil washing with water or methylene chloride, and solidification (mixing soil with a solidifying agent such as concrete or lime). Contaminated soils of this type are not placed in landfills in Florida; they must be shipped to another state for disposal in a Subtitle C facility.

After treatment, soils contaminated with nonhazardous petroleum products are tested and must have less than 500 parts per billion (ppb) total hydrocarbons and less than 100 ppb total aromatic hydrocarbons in order to be disposed in a municipal landfill. So far, all petroleum contaminated soils in the state have been classified as nonhazardous after treatment.

A risk assessment is performed in all cases to determine the cleanup levels for each site contaminated with hazardous material. The risk assessment is based on such factors as population in the area, future land use, and whether the ground water is the future water supply for the area. Ground-water monitoring is routinely performed as a followup test.

B. Rhode Island

The Rhode Island Department of Environmental Management administers the contaminated soils program. Soils are classified as either hazardous or nonhazardous depending upon the lead content, flammability, odor, and visibility of the contaminant. After excavation, contaminated soils that are considered hazardous may be temporarily stored on site (30 days) if covered with polyethylene and placed on an impervious base. If the soil is determined to be hazardous, it must be transported out of the state to a Subtitle C facility. Currently, discussions are being held to determine the feasibility of siting a Subtitle C facility in Rhode Island for

contaminated soils disposal. The state also is trying to determine the best possible treatment methods. Contaminated soils are no longer used in asphalt production because the state felt that such use of these soils was contributing to air pollution. Cleanup levels for the soils are established on a site-by-site basis but usually are visual.

C. Vermont

The Vermont Department of Environmental Conservation in the Agency of Natural Resources administers the state's contaminated soils program. An "HNU meter" or "Photovac" calibrated to benzene is used to determine whether the soil is hazardous. Soil may be replaced on site if the level of contamination is less than 20 parts per million (ppm). The soil is hazardous waste and must be shipped to a licensed facility under manifest if the level of contamination is greater than 100 ppm. If the soil is contaminated with between 20 and 100 ppm of benzene, then it may be disposed in a municipal landfill. The state has placed a moratorium on shipping hazardous wastes out of state because of the expense to tank owners and the possibility that some states used the hazardous soils as fill in municipal landfills. The state is currently testing several on-site programs, most notably biorestoration.

D. Wisconsin

The Wisconsin Department of Natural Resources administers the state's contaminated soil cleanup program through the Bureau of Solid Waste Management. The Wisconsin program covers three types of contamination: petroleum contamination, hazardous waste contamination, and nonpetroleum product contamination. Soil contaminated with petroleum products is considered nonhazardous but must be cleaned up to levels between 10 and 50 ppm total hydrocarbons; a lower cleanup level may be required depending upon the applicable ground-water standards. The soil is usually excavated, and any soil with lower contamination levels (<50 ppm) may be used as landfill cover. Soil with high contamination levels (>50 ppm) must go to one of the state's newer clay-lined landfills. Some contaminated soils are used in asphalt production. The only other treatment currently being used is aeration of the soil to allow volatilization and to decrease the total hydrocarbon level.

Any soil contaminated with wastes known to be hazardous is removed from the site, if practical, until the remaining soil is at background levels. The excavated material is then shipped to a Subtitle C facility out of state.

Any soils contaminated with hazardous products, such as trichloroethylene, are considered hazardous by Wisconsin's mixture rule (i.e., solid waste + hazardous waste = hazardous waste). The cleanup level may be between 1 and 10 ppm, depending upon the site and the contaminant of concern. If contamination is greater than 10 ppm, the responsible party must send the soil to a hazardous waste facility, or submit a plan for state approval to reclaim the site by "cleaning" the soil with appropriate treatment methods. Soil that is cleaned up to 1 ppm or less of the contaminant of concern may be returned to the site. Soil that cannot be cleaned up to that level must be sent to a Subtitle C facility.

As a result of implementation of this program, the amount of soil shipped to Subtitle C facilities has decreased by about 50 percent. In addition, the program administrators have developed a decision tree for their district staff to assist them in site assessment and cleanup.

IV. TABLES SUMMARIZING INDIVIDUAL STATE RESPONSES TO THE VARIOUS QUESTION CATEGORIES

The responses are organized into administrative categories (Table 1) and technical categories (Table 2).

TABLE 1. SUMMARY OF RESPONSES ON ADMINISTRATIVE ISSUES

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Alabama	Department of Environmental Management - Groundwater Section	RCRA characteristics	Owner/contractor - closure/corrective action	Site-specific; <1 ppm hydrocarbon concentration[a]	Yes	Current problem is "fairly" significant
Alaska	No formal program	RCRA characteristics	Department of Environmental Control-closure/corrective action	Appearance and odor	No	Not a significant problem at this point.
Arizona	Department of Environmental Quality	RCRA characteristics for nonpetroleum products, the soils contaminated with petroleum products are called "special waste" or nonhazardous	Hazardous - hazardous waste compliance unit; Nonhazardous - UST/water pollution compliance unit - closure/corrective action	Remedial action levels - total petroleum hydrocarbons: 10,000 ppb[b] Benzene: 67 ppb Toluene: 200 ppm Xylene: 44 ppm Ethylene dibromide: 0.05 ppb	Yes	Not a significant problem because ground water is very deep
Arkansas	No formal program	RCRA characteristics or listed waste	Environmental Field Services - Hazardous Waste Division - closure/corrective action	Case-by-case determination	No	Extent of the problem is uncertain
California	Water Quality Control Board and Department of Health Services, Toxic Substances Control Division, and Local Agency	Local agency decides if hazardous or nonhazardous - State recommendations include: ignitability, corrosivity, and toxicity	Local agency - closure/corrective action	Local agency decides	No	Since January 1984, 4,000 sites of UST leaks have been identified
Colorado	Department of Health	EP toxicity and other RCRA characteristics	Owner - closure/corrective action	None. Owner must provide state with final analysis for judgment	Yes	Approximately 0.5 percent of tanks are reported to be leaking

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Connecticut	Department of Environmental Protection	Visibility, odor, THC	Oil and chemical spills unit - corrective action Hazardous materials management unit - closure	Visibility	Yes	Extent of problem is uncertain
Delaware	Department of Natural Resources	RCRA characteristics	Consultants following state guidelines - corrective action; UST Branch - closure	<1 ppm of benzene, toluene, xylene, and ethyl benzene	Yes	There are currently 200 contaminated sites
District of Columbia	Department of Consumer and Regulatory Affairs, Environmental Control Division	Visibility, odor, ignitability	EPA - now (Environmental Control Division - soon) closure, corrective action	EPA guidance	Yes	Not a significant problem
Florida[c]	Bureau of Operations	EP toxicity/proposed TCLP (organic substances)	District offices of state agency and Bureau of Operations - closure/corrective action	Based upon risk assessment performed at each site	No	Extent of problem is uncertain
Florida[d]	Department of Environmental Regulations	On Florida list of hazardous waste EP toxicity Ignitability	District office of state agency - closure; Emergency response section of state agency - corrective action	<500 ppb THC[e] <100 ppb total aromatics	No	Very extensive problem
Georgia	Hazardous waste only - Hazardous Waste Management Division No program for petroleum products	RCRA Appendix 9 list	Hazardous Waste Management Division - closure/corrective action	Remove the worst of the contaminated soils	No	Moderate to significant problem
Hawaii	Department of Health - Hazardous Waste Department	Petroleum products - visibility, odor, some soil sampling (No problems with hazardous waste tanks)	Responsible party with state oversight - closure/corrective action	Visibility, odor, some soil sampling	No	Not very extensive problem

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Idaho	Division of Environment Water Quality Bureau	RCRA characteristics, CERCLA or otherwise EPA listed Petroleum - nonhazardous unless meets one of the above criteria	Responsible party with state oversight for corrective action Closure - State Fire Marshall's Office must issue a permit for abandonment, may require inspection by local or state fire officials	Hazardous - RCRA rules Nonhazardous - site-specific, to background levels if feasible	Yes	Not a large percentage of leaking tanks but this is the leading cause of ground-water contamination in Idaho
Illinois	State fire marshall	Hazardous - lead content, flashpoint; petroleum products are called "special waste"	State fire marshall - closure/corrective action	Analytical testing to meet health-based criteria	Yes	Not an extensive problem
Indiana	Department of Environmental Management	RCRA characteristics	Responsible party with state oversight - corrective action Responsible party - closure	Background levels, if practical	No	Problems are increasing as new laws are enforced
Iowa	Department of Natural Resources	Visibility, odor Some soil sampling, sometimes use portable GC	State - corrective action; owner-closure	None specified	No	Extent of the problem is uncertain
Kansas	Department of Health and Environment	Visibility, odor, ignitability	Bureau of Environmental Remediation - closure/corrective action	THC below 100 ppm	No	Not an extensive problem
Kentucky	Division of Waste Management	EP toxicity, ignitability, mostly site specific	Emergency response team - corrective action; Division of Waste Management - closure	Background levels on a site-specific basis, related to health and environmental considerations	No	Problem is extensive

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Louisiana	Office of Solid and Hazardous Waste Management	EP toxicity, ignitability	Responsible party with state oversight - closure/corrective action	Totals BTEX[f] around 50 to 100 ppm or lower, site specific	Yes	Currently the problem is severe
Maine	Department of Environmental Protection	Sensory observation, HNU meter	State field investigator - corrective action; certified installer and/or professional fireman - closure	Site specific-environmental and health considerations	No	Problem appears to be severe
Maryland	Department of Environment	Flashpoint	State - closure/corrective action	BTX[g] - petroleum THC - hazardous to site specific cleanup levels	No	500 to 1,100 closures last year had contaminated soils
Massachusetts	Department of Environmental Quality Engineering	Any petroleum contamination makes soil hazardous	Responsible party with state oversight - closure/corrective action	Site specific, odor detection	Yes	The problem is very extensive
Michigan	Environmental Protection Bureau	Visibility, odor If gasoline - nonhazardous (unless leaded) Waste oils-tested for lead or leachates	Responsible party - closure State - corrective action	None specified	Yes	Greater than 90 percent leakage or overfill contamination when tanks are pulled
Minnesota	Solid and Hazardous Waste Management	HNU meter	Responsible party with state oversight - closure/corrective action	Nondetectable levels of volatiles	Yes	Problem is very severe. Currently 450 sites are contaminated
Mississippi	Bureau of Pollution Control	LEL meter (lower explosive limit)	Responsible party with state oversight - closure/corrective action	<10 percent LEL	Yes	Currently problem is extensive
Missouri	Local authorities or state agency (DNR)	Reportable quantities, all RCRA characteristics	Owner/operator with state oversight - closure/corrective action	Site specific - environmental and safety considerations	Yes	Extent of problem is uncertain

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Montana	Solid and Hazardous Waste Bureau	Flashpoint, lead content	Responsible party with state oversight - closure/corrective action	None	Yes	Extent of problem is uncertain
Nebraska	Department of Environmental Control - if: Hazardous - hazardous waste section Petroleum - technical service section	Hazardous - RCRA characteristics if hazardous Petroleum - visibility, odor	Hazardous - hazardous waste section Petroleum - technical service section	Visual inspection	No	Problem is not very extensive
Nevada	Division of Underground Storage Tanks	RCRA - ignitability, lead content	Division of Underground Storage Tanks - closure/corrective action	RCRA - ignitability, lead content	No	Extent of problem uncertain
New Hampshire	Department of Environmental Services	Flashpoint, sensory observation	Water supply and pollution control division - closure/corrective action	Total volatiles, lead	Yes	Problem appears to be extensive
New Jersey	Division of Water Resources, Bureau of Hazardous Waste Management	RCRA - EP toxicity characteristics, THC, or total PCB's, or percent saturation	Bureau of Enforcement - closure/corrective action	Background levels	Yes	Problem is very extensive
New Mexico	Department of Health and Environment - Environmental Improvement Division	EP toxicity or source of contamination may cause soil to be considered hazardous. All petroleum contaminated soil has passed EP toxicity tests. No known nonpetroleum leaks in state.	Responsible party with local oversight at closure, state oversight for corrective action	Visual and olfactory observation after aeration	Yes	Problem is very extensive
New York	Department of Underground Storage Tanks	Visibility, odor (petroleum)	State - corrective action; owner-closure	None specified	No	Problem is very extensive, approximately 4,000 sites

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
North Carolina	Hazardous - Division of Health and Human Services - Solid and Hazardous Waste Management Branch Nonhazardous - Division of Environmental Management	RCRA characteristics - Leachability	Owner/contractor	THC below 100 ppm	No	400 incidents are in some phase of treatment/ disposal
North Dakota	Department of Health - Division of Waste Management Special Studies	Classify petroleum as nonhazardous	Owner/contractor	Site specific levels	No	Problem is not extensive
Ohio	State fire marshall and EPA	None established yet - considered on individual basis	Owner/operator (o/o) with state fire marshall oversight - closure/ corrective action	Site specific unless close to aquifer, then ground water (health, environmental-based) levels required	Yes	Problem is consistent with EPA projections
Oklahoma	Department of Health (program is just beginning, very few cases at this point, no set rules)					
Oregon	Department of Environmental Quality	Information not obtained	Information not obtained	Information not obtained	Information not obtained	Information not obtained
Pennsylvania	Department of Environmental Resources	EPA listed hazardous wastes	Unable to obtain this information	Unable to obtain this information	Yes	Information not obtained
Rhode Island	Department of Environmental Management	Visibility, odor, lead, flammability, some others if necessary	State - closure and corrective action	Visual observation	Yes	Problem is not extensive
South Carolina	State Department of Health and Environmental Control	Petroleum - nonhazardous Others - 100 ppm trigger level with OVA or HNU analyzer	State - with contractor hired by O/O - at closure only unless otherwise reported by O/O	100 ppm THC - arbitrary "clean" level	Yes	Will be a problem in the future

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
South Dakota	Department of Water and Natural Resources	RCRA characteristics	Owner/contractor - closure/corrective action	RCRA characteristics	No	Problem is not very extensive
Tennessee	Division of Groundwater Protection	Laboratory analysis of total BTX by GC or photo ionization	Responsible party with state oversight for corrective action	<10 ppm BTX	Yes	Approximately 130 sites
Texas	Texas Water Commission and Department of Health	Petroleum - total BTX, ignitability Hazardous - EPA listed Nonpetroleum - any amount	Responsible party with state oversight - closure/corrective action	<500 ppm BTX and nonignitable	Yes	Extent of the problem is uncertain
Utah	Regulated by local county Health Departments with variability among counties. Example: Salt Lake County Health Department, Bureau of Water Quality	Total hydrocarbons	Responsible party with county oversight for corrective action	1 mg/l THC in water, 100 mg/l THC in soil	No	Extent of the problem is uncertain
Vermont	Agency of Natural Resources, Department of Environmental Conservation	"Photovac" calibrated to benzene	State - closure, corrective action	None specified yet	Yes	High percent of closures have contaminated soils
Virginia	State Water Control Board	RCRA guidelines for leaded product	State Water Control Board Owner/contractor	RCRA guidelines for leaded (EP toxicity levels) products	No	Extent of the problem is uncertain
Washington	Department of Ecology - Four regional offices which may vary in procedure, information is from the Southwest Region	RCRA characteristics, PCB levels, EP toxicity characteristics	Responsible party with state oversight - closure/corrective action	None specified	Yes	Problem is extensive and getting worse
West Virginia	No formal program	Nonhazardous	Owner/contractor	Background levels	Yes	Problem may be severe

(continued)

TABLE 1. (continued)

State	Responsible office	Soil classification criteria	Management of spills, releases, or closure	Cleanup levels	Anticipated regulatory changes	Extent of problem
Wisconsin	Bureau of Solid Waste Management, Hazardous Waste Management Section	Petroleum - nonhazardous Hazardous waste - any amount is hazardous Hazardous "product" - any amount is hazardous by Wisconsin mixture rule	Responsible party with state oversight - closure/corrective action	Petroleum - 10 to 50 ppm THC, site specific using ground water standards Hazardous waste - background levels "Product" - 1 to 10 ppm of contaminant of concern - site and contaminant specific	Yes	Problem is extensive
Wyoming	Department of Environmental Quality - Water Quality Division	HNU meter and/or analysis of soil samples	Responsible party with state oversight - closure/corrective action	Olfactory levels	Yes	Problem is severe

[a]Parts per million in soil.
[b]Parts per billion in soil.
[c]Nonpetroleum products.
[d]Petroleum products.
[e]Total hydrocarbons.
[f]Benzene, toluene, ethylbenzene, xylene.
[g]Benzene, toluene, xylene.

TABLE 2. SUMMARY OF RESPONSES ON TECHNICAL ISSUES

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Alabama	Program currently effective but extent of the problem is uncertain.	On-site aeration then moved to Subtitle D landfill for petroleum-contaminated soils.	Only when a tank is noticed to have leaked.	No followup tests are done.
Alaska	Unsure of program's effectiveness.	Aeration both on- and off-site. Hazardous to Subtitle C facility out-of-state. Nonhazardous to Subtitle D landfill or asphalt plant.	According to Federal UST program.	No followup tests are done.
Arizona	Effective from a results standpoint, unsure about effectiveness from a cost standpoint.	Special: evaporation after placing on plastic lining, air stripping, sent to Subtitle D landfill or reuse on site. Nonhazardous: Subtitle D landfill (if they will accept it).	No routine testing is done. Testing is required if a problem is suspected.	Ground-water monitoring is required.
Arkansas	Unsure of program's effectiveness.	Aeration, evaporation by negative pressure, or incineration. Hazardous to Subtitle C facility, incinerated, injection well, or fuel blenders.	No required testing.	No followup tests are done.
California	Studies currently are being done to determine effectiveness.	If treated, taken back to site for refill, or to a Class II or Class III landfill. Hazardous to Subtitle C facility.	Precision tests done annually on existing tanks. New tanks are continuously monitored. Monthly tests done on soil underneath tanks containing hazardous chemicals.	Followup tests are site specific.
Colorado	Unsure of program's effectiveness.	Hazardous: out-of-state Subtitle C facility. Nonhazardous: landfill after solidification, volatilization, or bioreclamation.	No required testing.	Tank owner must provide final soil analysis.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Connecticut	The program is effective.	Evaporation, aeration before use in Subtitle D landfill.	Annual testing for steel tanks >12 years old and all new tanks.	No followup tests are done.
Delaware	Very effective.	Subtitle D landfill or Subtitle C facility, whichever is appropriate.	Testing when a tank is removed, abandoned, or retrofitted.	No followup tests are done.
Washington, D.C.	Unsure of program's effectiveness.	Hazardous: Subtitle C facility. Nonhazardous: Subtitle D landfill. No treatment at this time.	Unknown.	Unknown.
Florida[a]	Unsure what the long-term effectiveness will be.	Out-of-state Subtitle C facility, incineration, soil washing, solidification.	Unsure of state's testing requirements.	Ground-water monitoring required.
Florida[b]	Programs are effective.	Subtitle D landfill or incinerator, on-site volatilization, vacuum extraction, asphalt dryer, mobile incinerator.	According to Florida's tanks program: Code 1761.	Ground-water monitoring required.
Georgia	Unsure of program's effectiveness.	Landfill (Subtitle C).	No routine testing required.	Ground-water monitoring required.
Hawaii	Programs are effective.	Petroleum nonhazardous products to Subtitle D landfill after aeration.	Testing done only when problem is noticed.	No followup tests are done.
Idaho	Unsure of program's effectiveness.	Nonhazardous: to Subtitle D landfill or asphalt plant after removal of free product by pumping and any treatment that the responsible party wants to use. Hazardous: RCRA rules.	No periodic testing required.	No followup tests are done.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Illinois	Only effective on some types of pollutants.	Landfills, experimenting with aeration and soil washing.	Testing at tank closure.	No followup tests are done.
Indiana	Unsure of program's effectiveness.	Hazardous: to in- or out-of-state Subtitle C facility. Special: To licensed special waste facility after aeration.	No periodic testing required.	Recommended to owner for legal protection.
Iowa	Unsure of program's effectiveness.	Aeration then landfill or added to farmland. Hazardous waste: out-of-state Subtitle C facility.	Testing at tank closure.	No followup tests are done.
Kansas	Program is effective.	Aeration, venting, Subtitle D landfill.	Test only if a problem is suspected.	Monitoring wells are installed.
Kentucky	Unsure of program's effectiveness.	Hazardous to Subtitle C facility, petroleum products to Subtitle D facility. On-site passive aeration.	No periodic testing required.	Periodic followup tests required.
Louisiana	Program is effective at this time.	Hazardous: in-state Subtitle C facility Nonhazardous: industrial waste facility or Subtitle D landfill, aeration, venting	Testing required but details of the testing program not disclosed.	No followup tests are done.
Maine	Unsure of program's effectiveness.	Commercial landfill, public landfill, landspreading, asphalt production, road-building, venting.	New tanks must have monitoring wells.	Unknown.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Maryland	Venting is an effective option.	Hazardous: most to out-of-state Subtitle C facility. Nonhazardous: Subtitle D landfill or incinerator, on-site forced venting.	No periodic testing required.	Unknown.
Massachusetts	Unsure of program's effectiveness.	Subtitle C facilities out-of-state.	Testing done according to RCRA regulations.	Unknown.
Michigan	Unsure of program's effectiveness.	Hazardous: Subtitle C facility. Nonhazardous: Type II landfill.	No periodic testing required.	Unknown.
Minnesota	Studies on program's effectiveness currently are being done.	Petroleum-contaminated soil is used in asphalt production after incineration, some on-site venting.	No periodic testing required.	Unknown.
Mississippi	Unsure of program's effectiveness.	Ventilation, Subtitle D landfill.	No periodic testing required.	Unknown.
Missouri	Because there are no standard procedures, effectiveness cannot be determined.	Compaction/extraction - aeration.	No periodic testing required.	Site-specific continuous monitoring.
Montana	Unsure of program's effectiveness.	Hazardous: possibly incineration (have not had any HW yet). Nonhazardous: on-site venting or landfarming.	Are in the process of developing requirements.	Unknown.
Nebraska	Unsure of program's effectiveness.	Hazardous: Subtitle C facility. Nonhazardous: Subtitle D landfill.	Testing required when tank is removed.	No followup tests required.
Nevada	Unsure of program's effectiveness.	Landfill/aeration.	Testing done only when problem is noticed.	Site specific.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
New Hampshire	Unsure of program's effectiveness.	Oil contaminated is nonhazardous, use in asphalt production; gasoline contaminated is hazardous, air stripping and/or passive aeration then ship to appropriate landfill, usually in-state.	No periodic testing required.	Unknown.
New Jersey	Unsure of program's effectiveness.	Incinerators, oil recyclers, out-of-state Subtitle C landfill.	Monitoring wells set up near some tanks.	Unknown.
New Mexico	Unsure of program's effectiveness.	Saturated: remove to solid waste landfill, aerate and use for cover. Nonsaturated soil: leave in place.	No testing required.	Unknown.
New York	Unsure of program's effectiveness.	Hazardous: incineration, Subtitle C facility. Nonhazardous: Subtitle D landfill, aeration.	No testing required.	Site specific.
North Carolina	Program is effective so far.	Hazardous: removed to landfill (Subtitle C). Nonhazardous: on-site venting.	Testing only when a problem is noticed.	Some monitoring required.
North Dakota	Program is effective.	Venting/landfill.	Testing only when a problem is noticed.	Some monitoring required.
Ohio	Program is effective.	Hazardous: Subtitle C facility. Nonhazardous: aeration/biorestoration.	No periodic testing required.	Only on large spills.
Oklahoma	Program is just beginning.			

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Oregon	Information not obtained.	Information not obtained.	Information not obtained.	Information not obtained.
Pennsylvania	Information not obtained.	Aeration, Subtitle D landfill.	Information not obtained.	Information not obtained.
Rhode Island	Program is effective.	If hazardous, presently ship to Maine or Ohio.	They have ongoing tests.	Site specific.
South Carolina	Unsure of program's effectiveness.	Hazardous: incinerated. Nonhazardous: aerated and landfilled.	Testing only if problem is noticed.	No followup testing is done.
South Dakota	Program is effective for petroleum products.	Venting/landfill: if hazardous, shipped out-of-state.	Testing when tank is removed.	Some monitoring is done.
Tennessee	Program is effective.	Hazardous: >100 ppm BTX, is either shipped to out-of-state Subtitle C facility or aerated on an impermeable base and treated. Nonhazardous: <10 ppm and >100 ppm BTX, treated in place or taken to a solid waste landfill or used for asphalt. Treated by venting, biodegradation, incineration.	No testing is required.	No followup testing is done.
Texas	Program is effective.	Hazardous: Subtitle C facility in-state or treatment (aeration on an impermeable base) before going to a regular landfill. Nonhazardous: if <50 ppm BTX may go to a landfill with enough room.	No testing is required.	Unknown.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Utah	Unsure of program's effectiveness.	In situ vapor extraction or landfarming for petroleum products (have not had any nonfuel leaks).	Unknown.	Unknown.
Vermont	Program is effective.	Testing biorestoration, moratorium on shipping out until develop new regulations, nonhazardous soils taken to Subtitle D landfill or replaced on site depending on level of contamination.	When problem is noticed.	Site specific.
Virginia	Unsure of program's effectiveness.	Landfills/venting off site and some incineration.	Testing required when tanks are removed.	Periodic followup tests required.
Washington	Unsure of program's effectiveness.	Landfarming. No in-state landfill will take petroleum-contaminated soils.	No periodic testing required.	Unknown.
West Virginia	Unsure of program's effectiveness.	Venting/incineration/landfills.	Testing done only if someone notices a problem.	Unknown.
Wisconsin	Program is effective.	Petroleum: aeration, then landfill cover, or clay-lined landfill, or asphalt production. Hazardous waste to out-of-state Subtitle C facility. Hazardous "product": if >10 ppm of contaminant of concern, to Subtitle C facility; if treated to <1 ppm, may go back in hole; midrange - to landfill or asphalt production. Treatment by venting, bioreclamation, or other approved methods.	Some periodic testing of petroleum tanks may be starting soon.	Periodic followup tests required.

(continued)

TABLE 2. (continued)

State	Disposal and treatment effectiveness	Disposal and treatment alternatives	Required tank testing	Followup testing
Wyoming	Unsure of program's effectiveness.	Aeration, Subtitle D landfill for nonsaturated soils.	No periodic testing is required.	Unknown.

V. LIST OF TELEPHONE INTERVIEWS

The following persons were contacted for information about their state's policies and procedures for the treatment and disposal of contaminated soils.

1. Alabama. Massey, S., Alabama Department of Environmental Management, with Baetz, R., MRI. September 29, 1987.

2. Alaska. Miller, G. and S. Osborne, Alaska Department of Environmental Conservation, with Baetz, R., MRI. September 29, 1987.

3. Arizona. Collings, T., Arizona Department of Environmental Quality, with Baetz, R., MRI. September 30, 1987.

4. Arkansas. Dunn, E., Arkansas Department of Pollution Control and Ecology, with Baetz, R., MRI. September 30, 1987.

5. California. Patton, A., and K. Woodhouse, California Water Resources Board, Department of Health Services, with Baetz, R., MRI. September 30, 1987.

6. Colorado. Winters S., Colorado Department of Health, with Baetz, R., MRI. October 2, 1987.

7. Connecticut. Lee, C., and M. DeCaprio, Connecticut Department of Environmental Protection, with Baetz, R., MRI. September 30, 1987.

8. Delaware. Herman, K., Delaware Department of Natural Resources, with Baetz, R., MRI. October 2, 1987.

9. Washington, D.C. Padmanabha, A., Washington, D.C., Department of Consumer and Regulatory Affairs, with Baetz, R., MRI. September 30, 1987.

10. Florida. Kulakowski, Z., and J. Gentry, Florida Department of Environmental Regulations, with Baetz, R., MRI. October 1, 1987.

11. Georgia. Langley, B., Georgia Hazardous Waste Management Division, with Humphrey, L., MRI. October 5, 1987.

12. Hawaii. Lau, R., Hawaii Department of Health, with Humphrey, L., MRI. October 19, 1987.

13. Idaho. Brower, C., Idaho Water Quality Bureau, with Bailey, L., MRI. October 12, 1987.

14. Illinois. Ayers, T., Illinois Division of Land Pollutants Control, with Humphrey, L., MRI. October 1, 1987.

15. Indiana. Scranton, M., and G. Oliver, Indiana Department of Environmental Management, with Dean, J., MRI. October 16, 1987.

16. Iowa. Horne, J., Iowa Department of Natural Resources, with Bailey, L., MRI. October 5, 1987.

17. Kansas. Linn, C., Kansas Department of Health and Environment, with Humphrey, L., MRI. October 2, 1987.

18. Kentucky. Huckaby, A., Kentucky Natural Resources and Environmental Protection Cabinet, Division of Waste Management, with Dean, J., MRI. October 6, 1987.

19. Louisiana. Romanowsky, P., Louisiana Department of Environmental Quality, Office of Solid and Hazardous Waste, with Bailey, L., MRI. October 8, 1987.

20. Maine. Cogburn, P., Maine Department of Environmental Protection, with Bailey, L., MRI. October 7, 1987.

21. Maryland. Meade, H., Maryland Department of Environment, with Bailey, L., MRI. October 6, 1987.

22. Massachusetts. Benoit, E., Massachusetts Department of Environmental Quality, with Bailey, L., MRI. October 13, 1987.

23. Michigan. Couture, A., Michigan Department of Natural Resources Environmental Protection Bureau, with Bailey, L., MRI. October 6, 1987.

24. Minnesota. Kable, D., Minnesota Pollution Control Agency Solid and Hazardous Waste Management Division, with Bailey, L., MRI. October 9, 1987.

25. Mississippi. Huff, W., Mississippi Bureau of Pollution Control, with Bailey, L., MRI. October 9, 1987.

26. Missouri. Ackley, G., Missouri Department of National Resources, with Dean, J., MRI. October 6, 1987.

27. Montana. Riley, J., Montana Solid and Hazardous Waste Bureau, with Bailey, L., MRI. October 9, 1987.

28. Nebraska. Imig, B., Nebraska Department of Environmental Control, with Humphrey, L., MRI. October 5, 1987.

29. Nevada. Biaggi, A., Nevada Division of Underground Storage Tanks, with Humphrey, L., MRI. October 5, 1987.

30. New Hampshire. Woodbury, C., and R. Barry, New Hampshire Department of Environmental Services, with Bailey, L., MRI. October 6, 1987.

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