United States
Environmental Protection
Agency

Solid Waste
and Emergency Response
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Criteria for Solid Waste Disposal Facilities

A Guide for Owners/Operators

To make waste management more effective, federal, state, tribal, and local governments are adopting an integrated approach to waste management. This strategic approach involves a mix of three waste management techniques: 1) decreasing the amount and/or toxicity of waste that must be disposed of by producing less waste to begin with (source reduction); 2) increasing recycling of materials such as paper, glass, steel, plastic, and aluminum, thus recovering these materials rather than discarding them; and 3) providing safer disposal capacity by improving the design and management of incinerators and landfills.

Source reduction and recycling will keep a lot of waste out of municipal landfills, but we still need landfills. The challenge is to make them safe in order to protect our communities and our environment—and that requires a strong partnership of federal, state, and tribal governments; industry; and citizens.

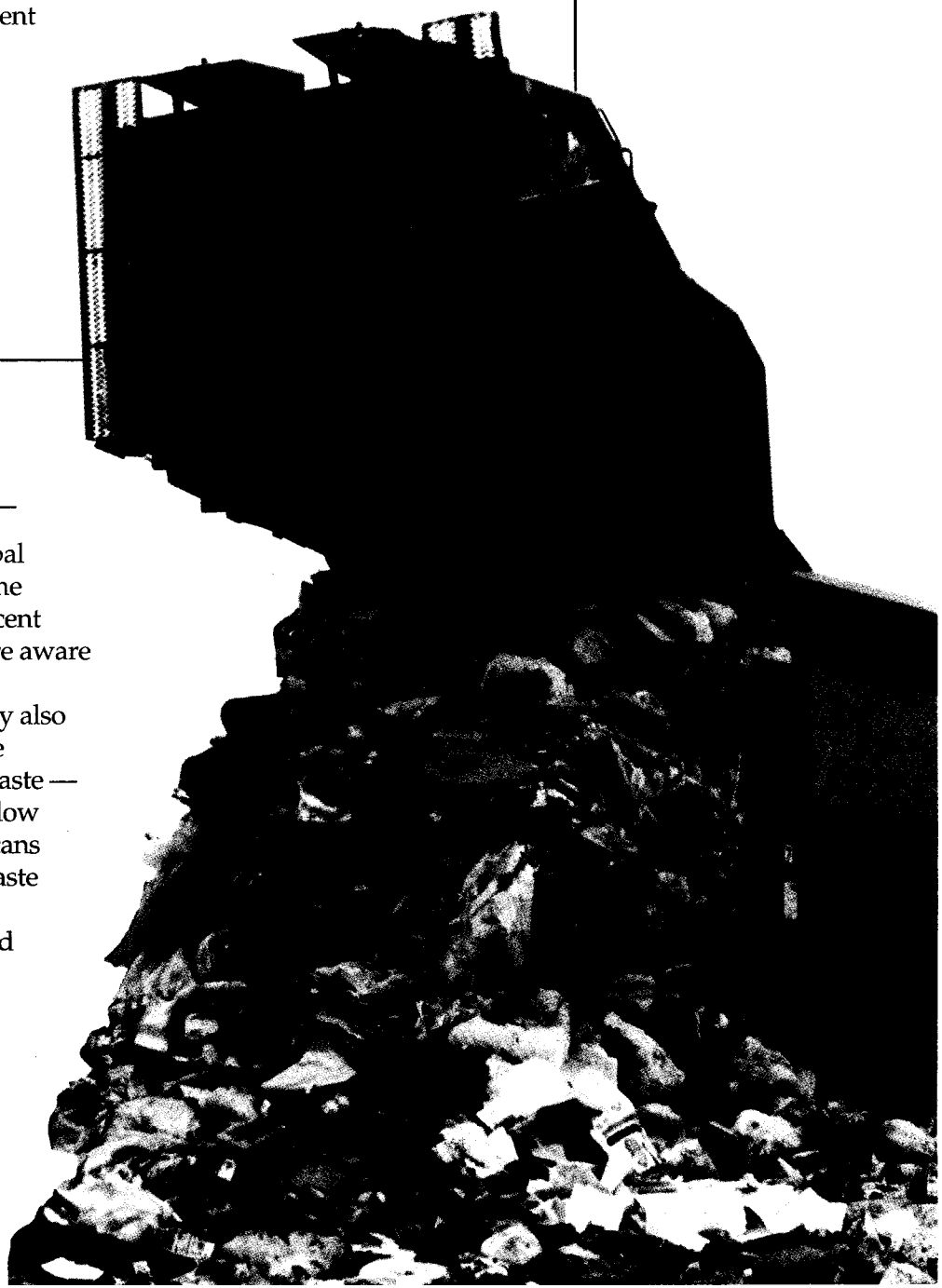
EPA's continuing mission is to minimize the risks from landfills. The criteria described in this booklet are an important part of this effort. They establish minimum national standards for landfill design, operation, and management that will enhance landfill safety and boost public confidence in landfills as a component of a workable integrated waste management system.

Owners/operators must set up a system to ensure that hazardous wastes are kept out of municipal landfills.

This booklet summarizes the provisions of the U.S. Environmental Protection Agency's (EPA's) Municipal Solid Waste Landfill (MSWLF) Criteria. It discusses the major requirements of these regulations, who is required to comply and when, how the rule will be implemented and enforced, and where to obtain more information. States and Indian tribes are expected to adopt these federal standards and implement the regulations through their own permit programs. This booklet highlights the increased flexibility given to states and tribes that develop EPA-approved programs.

This booklet provides only an overview of the federal regulations. Readers affected by them should refer to the actual regulations, which are published in Volume 40 of the *Code of Federal Regulations*, Part 258 (see the *Federal Register*, October 9, 1991, 56FR50978). The Agency encourages landfill owners/operators to work with their respective state or tribal authorities, since state and tribal programs may have different requirements.

Although written primarily for owners/operators of municipal solid waste landfills, this booklet also will be useful for others, including state and tribal government officials, who are responsible for implementing the regulations.



Introduction

The problems caused by municipal solid waste landfills have become a source of public concern in recent years. As Americans have become more aware of the potential threat to health and the environment from toxic substances, they also have become more concerned about the generation and management of solid waste — sometimes to the point of refusing to allow new landfills near their homes. Americans are generating more municipal solid waste each year, but available landfill space is declining. In 1990, Americans generated over 195 million tons of municipal solid waste, and the annual amount is expected to increase to more than 220 million tons by 2000.

The Purpose of These Regulations

Historically, landfills have been associated with some significant problems, including ground-water contamination, which partly explains the public's resistance to new facilities.

Ground-water contamination. Nearly half the country's population draws its drinking water from aquifers and other ground-water bodies. Ground water also is used extensively for agricultural, industrial, and recreational purposes. Landfills can contribute to the contamination of this valuable resource if they are not designed to prevent waste releases into ground water or detect them when they occur. Cleaning up contaminated ground water is a long and costly process and in some cases may not be totally successful. Affected communities often bear both the cleanup costs and the expense of providing other sources of potable water. By adopting a philosophy of prevention, the regulations' improved design standards will protect ground water.

Difficulties in landfill siting. The problem of managing the increased volume of municipal solid waste is compounded by rising public resistance to siting new landfills. The regulations are designed to ensure that new or expanded landfills do not contaminate ground water and thus become community burdens. As a result, they protect the intrinsic value of ground water and can help avert the pressures associated with landfills that can drive down property values.

Specific prevention measures written into the regulations include location restrictions, operating and design criteria, and requirements for final cover and post-closure care. The regulations also require ground-water monitoring to detect any releases of contaminants from landfills. Corrective action and financial assurance provisions ensure immediate and effective responses to such releases.

Some Definitions Under the Regulations

Municipal solid waste landfill (MSWLF): A discrete area of land or an excavation that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined in the law. (Household waste includes any solid waste, including garbage, trash, and septic tank waste derived from houses, apartments, hotels, motels, campgrounds, and picnic grounds.) An MSWLF unit also may receive other types of wastes as defined under Subtitle D of the Resource Conservation and Recovery Act (RCRA), such as commercial solid waste, nonhazardous sludge, small quantity generator waste, and industrial solid waste. Such a landfill may be publicly or privately owned. An MSWLF unit can be a new unit, an existing unit, or a lateral expansion (see definitions below).

Existing unit: A municipal solid waste landfill unit that is receiving solid waste as of October 9, 1993. Waste placement in existing units must be consistent with past operating practices or modified practices to ensure good management.

Lateral expansion: A horizontal expansion of the waste boundaries of an existing unit; does not include expansion in the vertical dimension.

New unit: Any municipal solid waste landfill unit that has not received waste prior to October 9, 1993.

Small landfill: A landfill serving a community that disposes of less than 20 tons of municipal solid waste per day, averaged yearly.

EPA has carefully considered the impacts of the regulations on local governments. Where possible, EPA has written the regulations to allow flexibility in both the technical requirements and their implementation. For example, the regulations provide relief from the more costly requirements for certain small landfills. Moreover, states and tribes with EPA-approved landfill permitting programs are given the opportunity to provide considerable flexibility in applying all major components of the landfill criteria, so that site-specific conditions can be considered in such areas as design and ground-water monitoring.

Who Is Covered?

The regulations apply to owners/operators of all municipal solid waste landfills that receive waste on or after October 9, 1993. Landfills that stop accepting waste between October 9, 1991, and October 9, 1993, need only comply with the requirements for final cover (see page 16). Landfills that stopped accepting waste before October 9, 1991, do not need to comply with these regulations.

Landfills receiving waste on or after October 9, 1993, must comply with the regulations.

The regulations apply to landfills that accept household waste, which means any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas). They do not apply to units (including landfills, surface impoundments, waste piles, and land application units) that accept only industrial nonhazardous waste (e.g., construction/demolition landfills). (Owners/operators of these units would be required to comply with the provisions of 40 CFR Part 257.)

As mentioned, owners/operators of certain small landfills may be eligible for exemption from the regulations governing design, ground-water monitoring, and corrective action. See the section entitled "Exemptions for Small Landfills," page 5.

When Do the Requirements Apply?

The requirements concerning *location restrictions, design criteria* (new and lateral expansion units only), *operating criteria,* and *closure/post-closure care* are effective October 9, 1993. *Ground-water monitoring and corrective action requirements* are effective three, four, or five years after October 9, 1991, depending on a unit's proximity to drinking water intakes (see sidebar, page 15). The *financial assurance requirements* are effective April 9, 1994.

These dates reflect the requirements of the federal MSWLF criteria. Contact your state or tribal authority to determine specific state/tribal effective dates.

Implementation of the Regulations: Federal, State, Tribal, and Owner/Operator Responsibilities

Implementation by approved states and Indian tribes

States and tribes are entitled to develop their own permitting programs incorporating the federal landfill criteria to ensure that owners/operators are complying. States and tribes also may establish requirements that are more stringent than those set by the federal government. EPA's role is to review and approve these programs.

EPA is developing the State/Tribal Implementation Rule, which will delineate the requirements for receiving EPA approval. For permit programs to be considered adequate, a state or tribe must have the capability of issuing permits or some other form of prior approval, and must establish conditions requiring owners/operators to comply with the landfill regulations. A state or tribe must also be able to ensure compliance through monitoring and enforcement actions and must provide for public participation.

By securing approval for its program, a state or tribe has the opportunity for more flexibility and discretion in implementing the criteria according to local needs and conditions. Owners/operators located in a jurisdiction with an approved program may benefit from this potential flexibility, which extends to all parts of the regulations (see box, page 6).

Implementation in states/tribes without approved programs

EPA expects that although most states will be approved by the effective date of the rule, some simply may not apply. In these cases, owners/operators are required to implement the federal regulations. Each owner/operator must document compliance and supply this documentation to the state or tribe on request. Owners/operators must comply with state/tribal requirements.

Citizen roles

While state, tribal, and local governments are responsible for ensuring compliance with their waste programs, private citizens play an important role, too. Individuals can help ensure that facilities comply with state or tribal rules and regulations through such activities as participating in any public meetings regarding landfill siting and permit issuance, and working closely with their responsible state, tribal, and local officials. Citizens also have the right to sue landfill owners/operators who are not in compliance with the federal regulations.

Exemptions for Small Landfills

Approximately 6,000 municipal landfills are potentially subject to the criteria. Quite a few — nearly 50 percent — are defined as "small" landfills, meaning they receive an average of no more than 20 tons of municipal solid waste per day (figured annually). These landfills generally serve communities of fewer than 10,000 people.

The landfill design, ground-water monitoring, and corrective action provisions required under the criteria are likely to be expensive. Small communities might be unable to spread these costs among many users, thereby leading to significant increases in per-capita disposal assessments.

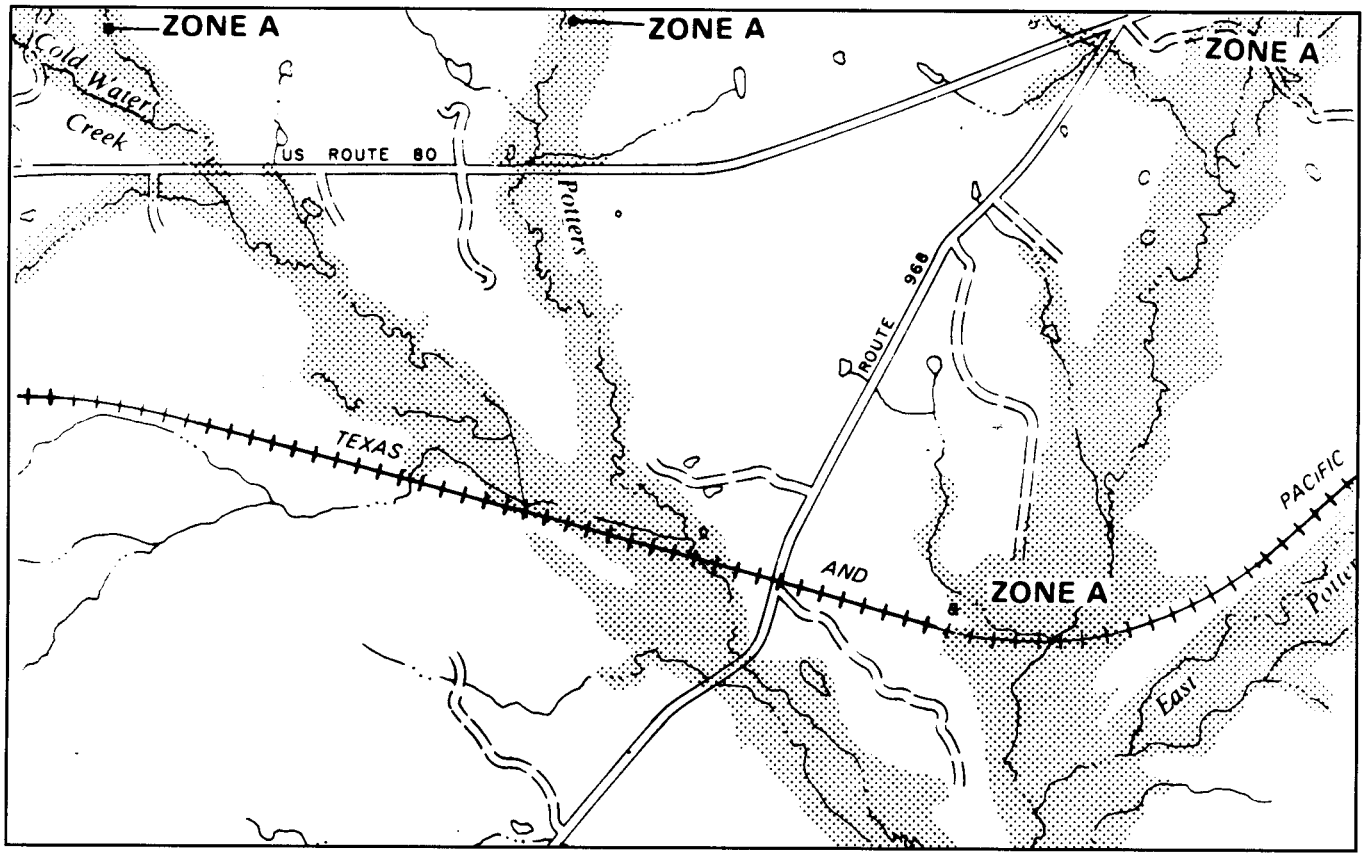
The regulations are designed to provide the opportunity for some relief from the more costly requirements without compromising human health or the environment. An owner/operator of a small landfill may be exempted from the design, ground-water monitoring, and corrective action requirements under two circumstances:

1) There is no evidence of ground-water contamination, the community has no practical waste management alternative, and the landfill is located in an area that receives less than 25 inches of precipitation annually.

2) There is no evidence of ground-water contamination and the community undergoes an annual interruption of surface transportation, lasting at least three consecutive months, that prevents access to a regional facility. This exemption is less widespread since, for example, it may be more applicable to certain communities in rural Alaska.

These exemptions are available to qualifying small landfills in all states or tribal jurisdictions, even those without EPA-approved permitting programs, providing the state or tribal program does not restrict the exemption.

Some small landfills serving small communities, such as this one in the dry, western United States, may qualify for exemption from some of the requirements.



Special restrictions apply to landfills sited in floodplains, indicated here as the shaded area.

(The exemptions supplement the flexibility in implementing the regulations given all communities in states and tribal jurisdictions with approved programs. See page 6.)

Owners/operators qualifying for exemptions must show why they qualify and include the documenting information in their operating records. Owners/operators are also required to comply with all other MSWLF regulations, including the location, operation, closure and post-closure, and financial assurance provisions.

If the owner/operator of an exempt facility learns of ground-water contamination at the site, the exemption is no longer applicable and the owner/operator must comply with the requirements for design, ground-water monitoring, and corrective action.

Complying With the Regulations

The regulations describe six categories of criteria for municipal solid waste landfills:

1) Location
2) Operation
3) Design
4) Ground-water monitoring and corrective action
5) Closure and post-closure care
6) Financial assurance

Owners/operators are responsible for reviewing the criteria to determine which of the provisions apply to their landfill(s). (Owners/operators should refer to EPA's *Technical Manual for Solid*

Waste Disposal Facility Criteria for details.) They should also bear in mind that state or tribal programs might include provisions that do not mirror the federal provisions discussed below. Owners/operators are therefore encouraged to work with their state and tribal regulators in complying with the regulations.

Location

There are six location restrictions that apply to municipal landfills. Owners/operators must demonstrate that their units meet the criteria and keep the demonstration documents in the facility operating record.

If an owner/operator cannot show compliance with the airport safety, floodplain, or unstable-area provisions, the unit must be closed by October 9, 1996. However, states and tribes with EPA-approved programs can extend this deadline by as much as two years when no alternative waste management capacity exists and there is no immediate threat to human health and the environment.

Restricted areas include:

1. Airports

The owner/operator of a municipal landfill located within 10,000 feet of the end of any airport runway used by turbojet aircraft, or within 5,000 feet of any airport runway used only by piston-type aircraft, must demonstrate that the unit does not pose a bird hazard.

Location Criteria Summary

Location	Applicability*	Closure If Demonstration Cannot Be Met?
Airport Safety	N,E,L	Yes
Floodplains	N,E,L	Yes
Wetlands	N,L	No
Fault Areas	N,L	No
Seismic Impact Zones	N,L	No
Unstable Areas	N,E,L	Yes

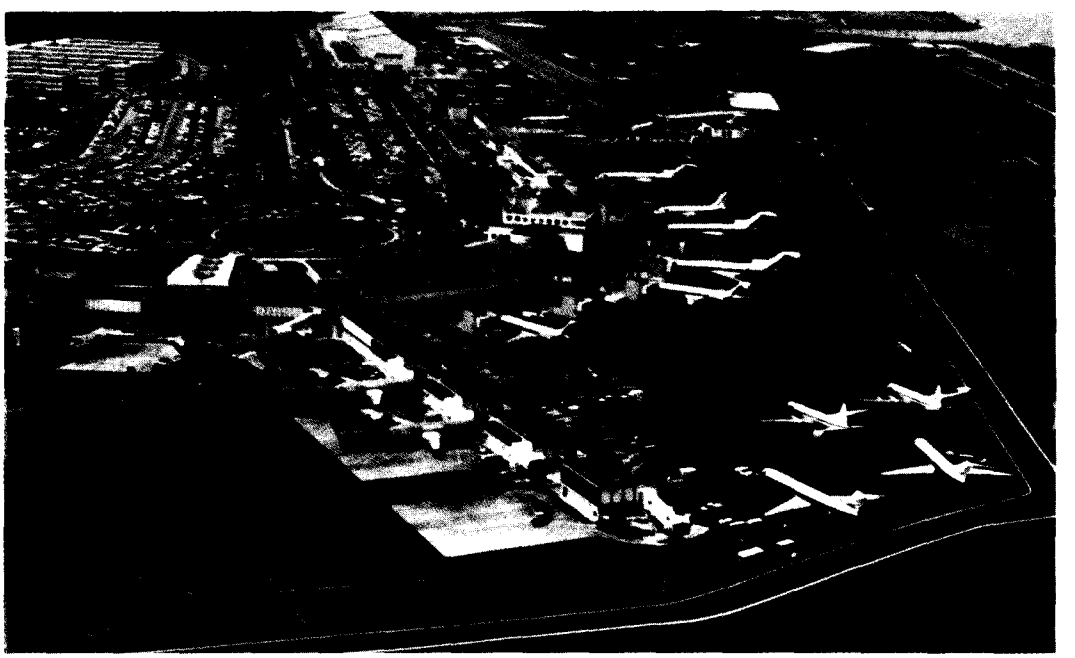
*(N=New, E=Existing, L=Lateral Expansion)

If an owner/operator plans to build a new unit or laterally expand an existing unit within 5 miles of any airport, the airport and the Federal Aviation Administration must be notified.

2. Floodplains

Units located in 100-year floodplains cannot restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or allow the washout of solid waste.

The regulations impose special requirements on landfills near airports to prevent compromises to air traffic safety.



Landfills may not be built in unstable areas prone to landslides, mudslides, or sinkholes, such as the one shown here.

3. Wetlands

In general, owners/operators of new or expanding municipal landfills may not build or expand in wetlands. However, states or tribes with EPA-approved permitting programs can make exceptions for units able to show:

- No siting alternative is available.
- Construction and operation will not (1) violate applicable state/tribal regulations on water quality or toxic effluent; (2) jeopardize any endangered or threatened species or critical habitats; or (3) violate protection of a marine sanctuary.
- The unit will not cause or contribute to significant degradation of wetlands.
- Steps have been taken to achieve no net loss of wetlands by avoiding effects where possible, minimizing unavoidable impacts, or making proper compensation (e.g., restoring damaged wetlands or creating man-made wetlands).

4. Fault areas

New units or lateral expansions are generally prohibited within 200 feet of fault areas that have shifted since the last Ice Age. However, the director of an approved state or tribal program may allow an alternative setback distance of less than 200 feet if the owner/operator can show that the unit will maintain structural integrity in the event of a fault displacement.

5. Seismic impact zones

When a new or laterally expanding unit is located in a seismic impact zone, its containment structures (liners, leachate collection systems, surface-water control systems) must be designed to resist the effects of ground motion due to earthquakes.

6. Unstable areas
All owners/operators must show that the structure of their units will not be compromised during "destabilizing events," including:

- Debris flows resulting from heavy rainfall.
- Fast-forming sinkholes caused by excessive ground-water withdrawal.
- Rockfalls set off by explosives or sonic booms.
- The sudden liquification of the soil after a long period of repeated wetting and drying.

Operation

All owners/operators must comply with the requirements for proper management of municipal solid waste landfills. These cover a range of procedures, including:

1. Receipt of regulated hazardous waste
The owner/operator must set up a program to detect and prevent disposal of regulated quantities of hazardous wastes and polychlorinated biphenyl (PCB) wastes. The program must include procedures for random inspections, record keeping, training of personnel to recognize hazardous and PCB wastes, and notification of the appropriate authorities if such waste is discovered at the facility.

2. Cover material
The owner/operator must cover disposed solid waste with at least 6 inches of earthen material at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging. An approved state or tribe may allow an owner/operator to use an alternative cover material or depth, and/or grant a temporary waiver of the cover requirement (if local climate conditions make such a requirement impractical).

3. Vectors
The owner/operator is responsible for controlling vector populations. Vectors include any rodents, flies, mosquitoes, or other animals or insects capable of transmitting disease to humans. Application of cover at the end of each operating day generally controls vectors.

4. Explosive gases
The owner/operator must set up a program to check for methane gas emissions at least every three months. If the limits specified in the regulations are exceeded, the owner/operator must immediately notify the state/tribal director (that is, the official in the state or area responsible for implementing the landfill criteria) and take immediate steps to protect human health and the environment. The owner/operator also must develop and implement a remediation plan within 60 days. States and tribal jurisdictions with approved programs may alter this interval.

5. Air quality
Open burning of waste is not permitted except for infrequent burning of agricultural waste, silvicultural waste, land-clearing debris, diseased trees, or debris from emergency clean-up operations. Owners/operators must comply with the applicable requirements of their State Implementation Plans for meeting federal air quality standards.

6. Access
The owner/operator must control public access to prevent illegal dumping, unauthorized vehicular traffic, and public exposure. Artificial and/or natural barriers may be used to control access.

Owners and operaters must ensure that each day's waste is covered to control litter and disease-bearing vermin.

7. Storm water run-on/run-off
The owner/operator must build and maintain a control system designed to prevent storm waters from running on to the active part of the landfill. The run-on control system must be able to handle water flows as heavy as those expected from the worst storm the area might undergo in 25 years.

The owner/operator also must build and maintain a surface water run-off control system that can collect and control, at a minimum, the surface water volume that results from a 24-hour, 25-year storm. Run-off waters must be managed according to the requirements of the Clean Water Act, particularly with regard to the restrictions on the discharge of pollutants into water bodies and wetlands.

8. Surface water protection
All landfills must be operated in a way that ensures they do not release pollutants that violate the Clean Water Act, which protects surface waters.

9. Liquids
A landfill cannot accept bulk or noncontainerized liquid waste unless (1) the waste is nonseptic household waste, or (2) it is leachate or gas condensate that is recirculated to the landfill, and the unit is equipped with a composite liner and leachate collection system as described below under "Design."

Containers of liquid waste may be placed in the landfill only if the containers: (1) are similar in size to those typically found in household waste, such as cleaning, automotive, or home-improvement products (i.e., containers such as 55-gallon drums are excluded); (2) are designed to hold liquids for use other than storage; or (3) hold only household waste (containers collected in routine pickups from households).

10. Record-keeping
Owners/operators are required to keep certain documents in or near the facility, including:

- Location restriction demonstrations.
- Procedures for excluding hazardous waste.
- Gas monitoring results.
- Leachate or gas condensate system design documentation.

- Ground-water monitoring and corrective action data and demonstrations.
- Closure and post-closure plans.
- Cost estimates and financial assurance documentation.

Design

The criteria for landfill design apply only to new units and lateral expansions. (Existing units are not required to retrofit liner systems.) The criteria give owners/operators two basic design options.

First, in states and tribal areas with EPA-approved programs, owners/operators may build their landfills to comply with a design approved by the state/tribal director. In approving the design, the director must ensure that it meets the EPA performance standard, i.e., that Maximum Contaminant Levels (MCLs) will not be exceeded in the uppermost aquifer at a "relevant point of compliance." This point is determined by the approved-state/tribal director, but it must be no farther than 150 meters from the landfill unit boundary and on land owned by the landfill owner. (EPA has already set MCLs for a number of solid waste constituents; see table.)

In reviewing these performance-based designs, approved states and tribes also must consider other factors, such as the hydrogeologic characteristics of the facility and surrounding land, the local climate, and the amount and nature of the leachate.

The second option is a design developed by EPA that consists of a composite liner and a leachate collection system. In general, landfills in states or tribal jurisdictions without EPA-approved programs must use this design. The composite liner system combines an upper liner of a synthetic flexible membrane and a lower layer of soil at least 2 feet thick with a hydraulic conductivity of no greater than 1×10^{-7} cm/sec. The leachate collection system must be designed to keep the depth of the leachate over the liner to less than 30 centimeters.

Maximum Contaminant Levels
(as of October 9, 1991)

Chemical	MCL (mg/l)
Arsenic	0.05
Barium	1.0
Benzene	0.005
Cadmium	0.01
Carbon tetrachloride	0.005
Chromium (hexavalent)	0.05
2,4-Dichlorophenoxy acetic acid	0.1
1,4-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007
Endrin	0.0002
Fluoride	4
Lindane	0.004
Lead	0.05
Mercury	0.002
Methoxychlor	0.1
Nitrate	10
Selenium	0.01
Silver	0.05
Toxaphene	0.005
1,1,1-Trichloromethane	0.2
Trichloroethylene	0.005
2,4,5-Trichlorophenoxy acetic acid	0.01
Vinyl chloride	0.002

The criteria also provide an option for owners/operators in nonapproved states or tribal jurisdictions to use the performance standard (rather than the EPA design described above), providing that *both* of the following conditions are met:

- EPA does not promulgate a State/Tribal Implementation Rule by October 9, 1993.
- The state or tribe determines that the alternative design meets the

performance standard in the federal criteria; the state or tribe petitions EPA to review this determination; and EPA does not deny the determination within 30 days.

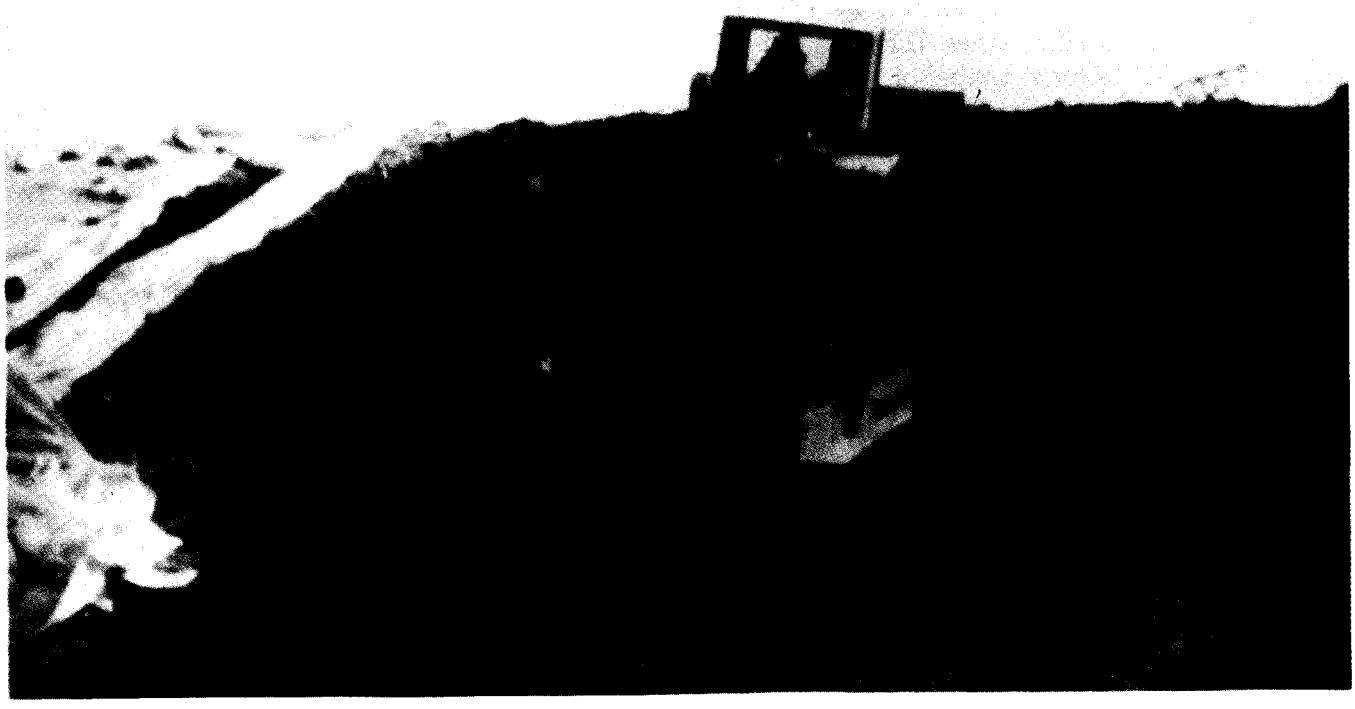
Ground-Water Monitoring and Corrective Action

This section sets criteria for ground-water monitoring systems, programs for sampling and analysis of ground water, and corrective action as necessary to ensure that human health and the environment are protected. Here, as with the other provisions in the federal criteria, approved states and tribes may adopt programs with requirements that are more stringent than the federal criteria. Again, owners/operators are encouraged to work closely with their states or tribes.

Ground-water monitoring systems

Generally, ground-water monitoring must be conducted at all MSWLF units. Owners/operators must install enough ground-water monitoring wells in the appropriate places to accurately assess the quality of the uppermost aquifer (1) beneath the landfill before it has passed the landfill boundary (to determine background quality) and (2) at a relevant point of compliance (down-gradient). Owners/operators should consider the specific characteristics of the sites when establishing their monitoring systems, but the systems must be certified as adequate by a qualified ground-water scientist or the director of an EPA-approved state/tribal program.

In approved states and tribal jurisdictions, an owner/operator may be able to obtain a variance from the ground-water monitoring requirements if the owner/operator can demonstrate that the landfill is located over a geologic structure that will prevent hazardous constituent migration to the ground water. The demonstration must show that no migration of constituents from the unit will occur during the unit's life, including the closure and post-closure care period.



Performance of a landfill cover must meet certain federal minimum criteria.

Detection and assessment monitoring programs

States and tribes with EPA-approved programs have the flexibility to design ground-water monitoring programs that are well-suited to the landfills operating in their area, and that may therefore differ from the federal program. In states/tribes without an approved permit program, owners/operators must follow the federal regulations describing detection and assessment monitoring.

During detection monitoring, owners/operators must take ground-water samples and analyze them for specific constituents (as defined in the federal regulations or by the director of an approved state/tribal program). Under the federal regulations, sampling and analysis must be conducted at least twice a year. Approved state/tribal programs may set alternative frequencies, but sampling and analysis must be done at least annually. If significant ground-water contamination is detected, owners/operators may seek to demonstrate that the results are due to contamination from other sources, sampling error, or natural variation in ground-water quality. Otherwise, owners/operators must notify the appropriate state/tribal official and begin assessment monitoring.

The purpose of assessment monitoring is to determine the nature and extent of ground-water contamination. During assessment monitoring, ground-water must be analyzed both for constituents detected initially and for other constituents (defined in the federal criteria or by the director of an approved state/tribal program). States and tribes with EPA-approved programs specify the frequency for sampling and analysis conducted during assessment monitoring. In nonapproved states and tribes, the frequency is specified in the federal regulations. As in detection monitoring, if ground-water analysis shows significant contamination, owners/operators might be able to make the determination that the landfill is not the source of the contamination. If the owner/operator cannot make this determination, then the ground water must be cleaned up (see "Corrective Action" below). In EPA-approved states and tribes, it must be cleaned up to levels specified by the state/tribal director; in nonapproved states and tribes, contamination must not exceed federal limits set for drinking water quality or background levels.

The federal ground-water monitoring requirements are more complex and technical than described here. A thorough explanation of the regulations can be found in EPA's *Technical Manual for Solid Waste Disposal Facility Criteria.*

Schedule for Implementing Ground-Water Monitoring

An EPA-approved state or tribe can set its own schedule, provided at least 50 percent of all the state's or tribe's units comply by October 9, 1994, and all are in compliance by October 9, 1996.

If a state or tribe has not been approved by EPA, owners/operators must comply with the following schedule for installing ground-water monitoring systems:

- If a site is less than 1 mile in any direction from a drinking water intake (whether surface or ground-water), by October 9, 1994.
- If the site is farther than 1 mile but less than 2 miles, by October 9, 1995.
- If the site is more than 2 miles, by October 9, 1996.

New units must install monitoring systems prior to accepting any waste.

Ground-water monitoring regulations in states and tribes with EPA-approved programs may differ somewhat from the federal regulations. Landfill owners/operators conducting ground-water monitoring in nonapproved states and tribes must comply with the federal regulations in addition to their state's or tribe's regulations. In all cases, the owner/operator is encouraged to work with his or her state or tribe to ensure compliance with all applicable regulations.

The corrective action program

Cleaning up ground water requires corrective action. The owner/operator must assess corrective measures and select the appropriate one(s). During corrective action, the owner/operator must continue ground-water monitoring in accordance with the assessment monitoring program.

While evaluating potential remedies, the owner/operator must hold a public meeting to discuss them. Once the remedy has been selected, the owner/operator is responsible for carrying it out. During this period, a ground-water monitoring program must be established to measure the effectiveness of the remedy. The owner/operator must continue corrective action until compliance with the clean-up standard has been met for three consecutive years, although the director of an approved state or tribal program may specify a different period.

Closure and Post-Closure Care

The criteria establish specific standards for all owners/operators to follow when closing a landfill and setting up a program of monitoring and maintenance during the post-closure period. The owner/operator must enter the closure and post-closure plans into the landfill's operating records by October 9, 1993, or by the initial receipt of waste, whichever is later.

Owners/operators of landfills that stop receiving waste between October 9, 1991, and October 9, 1993, must install final covers that meet the federal criteria within six months of the last receipt of waste. Here again, owners/operators should work with their state or tribal program officials to ensure that all applicable closure requirements are considered.

Some owners/operators may choose to install leachate collection systems, such as the one shown here. These systems are designed to collect any fluids that seep down through the landfill. The fluids can be recycled in the landfill or treated for disposal elsewhere.

The final cover must be designed and constructed to have a permeability less than or equal to the bottom liner system or natural subsoils, or a permeability no greater than $1x10^{-5}$ cm/sec, whichever is lower. Thus, the regulation is in the form of a performance standard that must be achieved by the owner/operator.

The final cover must be constructed of an infiltration layer composed of a minimum of 18 inches of earthen material to minimize the flow of water into the closed landfill. The cover must also contain an erosion layer to prevent the disintegration of the cover. The erosion layer must be composed of a minimum of 6 inches of earthen material capable of sustaining plant growth.

When a landfill's bottom liner system includes a flexible membrane or synthetic liner, the addition of a flexible liner in the infiltration layer cover will generally be the only design that will allow the final cover design to achieve a permeability less than or equal to the bottom liner.

The director of an approved state or tribe may approve an alternative final cover design that achieves an equivalent reduction in infiltration and protection from erosion as the design described above.

For 30 years after closure, the owner/operator is responsible for maintaining the integrity of the final cover, monitoring ground water and methane gas, and continuing leachate management. (Approved states/tribes may vary this interval.)

Financial Assurance

All units except those owned or operated by state or federal government entities must comply with the financial assurance criteria, which are effective April 9, 1994.

The owner/operator must demonstrate financial responsibility for the costs of closure, post-closure care, and corrective action for known releases. This requirement can be satisfied by the following mechanisms:

- Trust fund with a pay-in period.
- Surety bond.
- Letter of credit.
- Insurance.
- Guarantee.
- State assumption of responsibility.
- Multiple mechanisms (a combination of those listed above).

Closing a Landfill — and Beyond

Owners/operators must follow certain procedures when closing a municipal landfill, including the following:

- The state or tribe must be notified prior to closure.
- A closure plan must be prepared.
- The final cover must consist of at least 18 inches of earthen material of a specified permeability, with an erosion layer at least 6 inches thick. (An approved state/ tribe may allow an alternative cover design.)
- An independent certified engineer must certify that closure was conducted in accordance with the plan.
- The deed of property must note that the property was used as a landfill and that future use is restricted.

For 30 years following closure (or an alternative period designated by an approved state or tribe), owners/operators are responsible for maintaining the integrity of the final cover, continuing to monitor ground water and methane, and continuing leachate management.

Owners/operators of landfills in approved states or tribal jurisdictions may also use other state-approved mechanisms.

EPA is currently developing provisions for four additional financial mechanisms that owners/operators can use to satisfy the financial assurance requirements: (1) a financial test for local government owners/operators; (2) a financial test for corporate owners/operators; (3) a guarantee for local governments that wish to cover the costs of a municipal landfill for an owner/operator; and (4) a guarantee for corporations that wish to cover the costs of a landfill for an owner/operator.

Conclusion

The standards described in this booklet are federal minimum requirements for owners/operators of MSWLF units. Readers should understand that the regulation of municipal landfills is, and will continue to be, primarily a state and tribal function. States and tribes are therefore urged to revise their programs as soon as possible to incorporate these criteria, so that they can take advantage of the flexibility that accompanies program approval.

Owners/operators are again reminded that state and tribal programs may be more stringent than the federal criteria. They should work closely with state or tribal program officials and their regional EPA office to address questions about the requirements.

Areas of Flexibility for EPA-Approved States and Tribes

States and tribes with approved permitting programs have the opportunity to provide owners/operators additional flexibility. Some examples of this flexibility are listed below.

Approved states or tribes may:

Location:

- Allow siting of new and laterally expanding landfills in wetlands, providing certain conditions are met.
- Extend deadlines for closure of existing landfills that do not comply with the unstable area, floodplain, and airport safety provisions.

Operation:

- Allow use of alternative cover materials.
- Grant temporary waivers of cover requirement.

Design:

- Approve landfill designs appropriate for site-specific conditions.

Ground-water monitoring:

- Establish alternative schedules for existing landfills and lateral expansions of existing landfills to comply with ground-water monitoring.
- Establish a site-appropriate boundary (or relevant point of compliance) for ground-water monitoring (and corrective action and design).
- Allow use of a multi-unit ground-water monitoring system, instead of separate monitoring systems for each unit at a facility.
- Modify list of detection monitoring parameters (Appendix I constituents).
- Approve an alternative frequency for detection monitoring.
- Modify list of assessment monitoring parameters (Appendix II constituents).
- Specify alternative frequencies for assessment monitoring.
- Establish Ground-water Protection Standards for any constituent for which a Maximum Contaminant Level has not been established.

Corrective action:

- Determine that cleanup of a particular Appendix II constituent is not necessary.
- Specify an alternative time period defining the end of corrective action.

Closure and post-closure care:

- Approve use of an alternative final cover.
- Grant extensions beyond specified deadline for beginning closure activities.
- Grant extensions beyond specified deadline for completing closure.
- Reduce or increase the 30-year post-closure care period.

Financial assurance:

- Approve use of alternative financial assurance mechanisms.

For More Information

For more information about specific requirements for solid waste landfills in your area, contact your state solid waste agency. If you don't know how to reach them, call one of the resources listed below. The RCRA Hotline maintains current lists of all state solid and hazardous waste management officials. While these information centers are the best place to start collecting information, it may still be useful to ask these contacts if some other source may be able to give you additional help.

RCRA Hotline

Provides information about RCRA regulations and policies, and takes document requests.

Hours: Monday-Friday, 8:30 a.m. to 7:30 p.m., EST
Telephone: Toll-free — (800) 424-9346
TDD (hearing impaired) — (800) 553-7672
Washington metro area — (703) 412-9810
TDD — (703) 412-3323

EPA RCRA Information Center (Docket)

Maintains and tracks policy and guidance documents; provides nontechnical assistance and written reference services; develops and disseminates public information materials.

Hours: Monday-Friday, 9:00 a.m. to 4:00 p.m., EST
Telephone: (202) 260-9327
Address: RCRA Information Center
U.S. Environmental Protection Agency
401 M Street, SW. (OS-305)
Washington, DC 20460

Solid Waste Assistance Program

Collects and distributes information on all aspects of municipal solid waste management.

Hours: Monday-Friday, 8:30 a.m. to 5:00 p.m., EST
Telephone: Toll-free — (800) 677-9424
Address: Solid Waste Assistance Program
P.O. Box 7219
Silver Spring, MD 20910

National Response Center

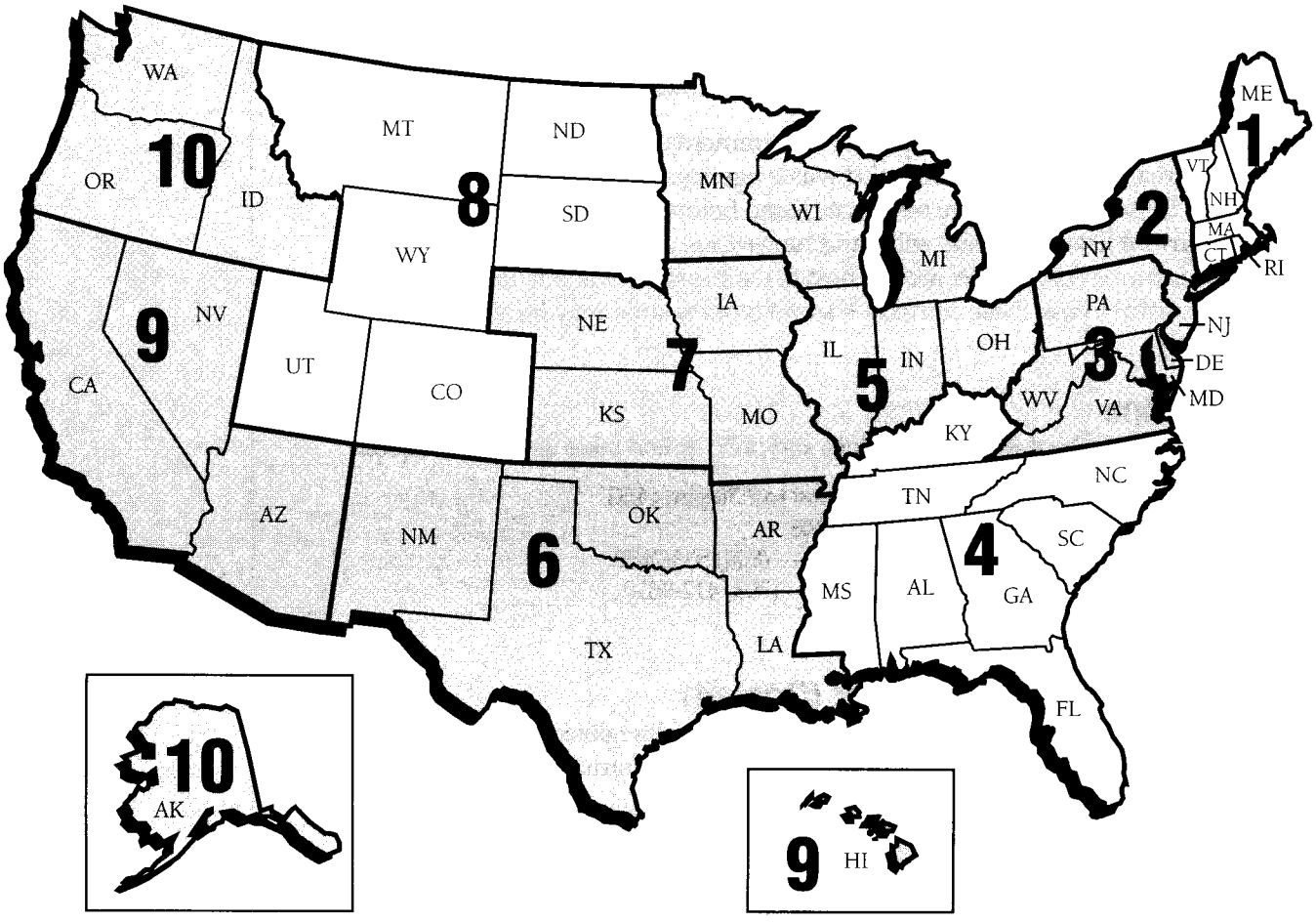
Accepts reports of oil and chemical spills or any other environmental incident.

Hours: 24 hours a day, 365 days a year.
Telephone: Toll-free — (800) 424-2675
Washington metro area — (202) 426-2675

EPA Small Business Ombudsman

Helps small businesses comply with environmental laws and EPA regulations.

Hours: Monday-Friday, 8:30 a.m. to 5:00 p.m., EST
Telephone: Toll-free — (800) 368-5888
Washington metro area — (703) 305-5938



EPA Regional Contacts

U.S. EPA Region 1
Waste Management Division (HEE-CAN 6)
JFK Federal Building
Boston, MA 02203
(617) 573-9656

U.S. EPA Region 2
Air & Waste Management Division (2AWM-SW)
26 Federal Plaza
New York, NY 10278
(212) 264-0002

U.S. EPA Region 3
RCRA Solid Waste Program (3HW53)
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-7936

U.S. EPA Region 4
Waste Management Division (4WD-RCRA-FF)
345 Courtland Street, NE
Atlanta, GA 30365
(404) 347-2091

U.S. EPA Region 5
Waste Management Division (H-7J)
77 West Jackson Blvd.
Chicago, IL 60604
(312) 353-4686

U.S. EPA Region 6
RCRA Programs Branch
First Interstate Bank Tower
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
(214) 655-6655

U.S. EPA Region 7
Waste Management Division
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7666

U.S. EPA Region 8
Hazardous Waste Management Branch (HWM-WM)
999 18th Street, Suite 500
Denver, CO 80202-2466
(303) 293-1661

EPA Region 9
Hazardous Waste Management Division (H-3-1)
75 Hawthorne Street
San Francisco, CA 94105
(415) 744-2074

U.S. EPA Region 10
Hazardous Waste Division (HW-114)
1200 Sixth Avenue
Seattle, WA 98101
(206) 553-2857

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