OSWFR-91-004

federal register

Wednesday
October 9, 1991

Part II

Environmental Protection Agency

40 CFR Parts 257 and 258
Solid Waste Disposal Facility Criteria; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

[EPA/OSW-FR-91-004 FRL-4011-9]

40 CFR Parts 257 and 258

Solid Waste Disposal Facility Criteria

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency today is promulgating revisions to the Criteria for Classification of Solid Waste Disposal Facilities and Practices set forth in 40 CFR part 257. These revisions were developed in response to the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA). Today's rule adds a new part 258, which sets forth revised minimum federal criteria for municipal solid waste landfills (MSWLFs), including location restrictions, facility design and operating criteria, ground-water monitoring requirements, corrective action requirements, financial assurance requirements, and closure and post-closure care requirements. The rule establishes differing requirements for existing and new units (e.g., existing units are not required to remove wastes in order to install liners). In addition, today's rule amends part 257 by making conforming changes that make it consistent with the new part 258. The specific criteria by which State programs will be approved will be published in a separate rule, which is expected to be proposed in early 1992.

This rulemaking also fulfills a portion of EPA's mandate under section 405(d) of the Clean Water Act (CWA) to promulgate regulations governing the use and disposal of sewage sludge. Part 258 of today's rule is co-promulgated under the authority of the CWA and applies to all MSWLFs in which sewage sludge is co-disposed with household wastes. A separate regulation for sludge monofills (landfills in which only sewage sludge is disposed of) was proposed on February 6, 1989, under part 257 and part 503. The sludge monofill regulations are expected to be finalized by the end of 1991.

EFFECTIVE DATE: October 9, 1993, except subpart G of part 258 is effective April 9, 1994.

ADDRESSES: The public record for this rulemaking (docket number F-91-CMLF-FFFFF) is located at the RCRA Docket Information Center, (OS-305), U.S. Environmental Protection Agency Headquarters, 401 M Street, SW., Washington, DC 20460. The public docket is located at EPA Headquarters and is available for viewing from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. Appointments may be made by calling (202) 475-9327. Copies cost $0.15/page.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA/Superfund Hotline, Office of Solid Waste, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, (800) 424-9346, toll-free, or (703) 920-9810, local in the Washington, DC, metropolitan area.

For more detailed information on specific aspects of this final rule, contact Allen Geswein, Paul Cassidy, or Andrew Teplitzky, Office of Solid Waste (OS-301), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, (202) 260-1099.

SUPPLEMENTARY INFORMATION: Copies of the following document are available for purchase through NTIS, U.S. Department of Commerce, Springfield, Virginia 22161, 1 (800) 553-6847 or (703) 487-4650:

(1) U.S. EPA, Office of Solid Waste, December 1990 Regulatory Impact Analysis (RIA) and the August 1991 Addendum for the Final Criteria for Municipal Solid Waste Landfills—(40 CFR part 258)—Subtitle D of the Resource Conservation and Recovery Act (RCRA), August 1991.

Preamble Outline

I. Authority
II. Background
A. Current Solid Waste Controls Under RCRA and the CWA
1. RCRA Subtitle D Criteria
2. Sewage Sludge Criteria
B. Report to Congress on Solid Waste Disposal
C. EPA Concerns Regarding Local Government and Indian Tribe Impacts
D. EPA's Solid Waste "Agenda for Action"
1. Increasing Information
2. Improving Integrated Waste Management Planning
3. Increasing Source Reduction
4. Increasing Recycling
5. Improving Municipal Waste Combustion
6. Improving Municipal Solid Waste Landfilling
E. Summary of Proposed Rule
III. Regulatory Approach of Today's Final Rule
A. Statutory Basis
B. Regulatory Options Considered and Summary of the Regulatory Impact Analysis
1. Risk and Resource Damage Analysis
2. Other benefits
3. Costs and Economic Impacts
4. Selection of Today's Regulatory Approach
C. Pollution Prevention Aspects of Final Rule
IV. Major Issues
A. Small Landfills
B. Regulatory Structure
C. Implementation and Enforcement
1. Procedures for State Program Approval
2. Public Participation
3. Enforcement Considerations
D. Ground-Water Policy
1. Differential Protection of Ground Water
2. Well Head Protection Programs
E. Issues Pertaining to Sewage Sludge
1. Pollutant Limits for Sewage Sludge
2. Removal Credits
V. Summary of Amendments to part 257
A. Conforming Changes to part 257
B. Notification and Exposure Information Requirements
VI. Summary of part 258
A. Subpart A—General
B. Subpart B—Location Restrictions
C. Subpart C—Operating Criteria
D. Subpart D—Design Criteria
E. Subpart E—Ground-water Monitoring and Corrective Action
F. Subpart F—Closure and Post-Closure Care
G. Subpart G—Financial Assurance Criteria
VII. Implementation of Today's Rule
VIII. EPA Training on Final Rule
IX. Paperwork Reduction Act
X. References
XI. List of Subjects
A. Part 257
B. Part 258
Appendix A. [Reserved]
Appendix B. Supplemental Information for Subpart A—General
1. § 258.1 Purpose, Scope, and Applicability
a. Closed Facilities
b. Controls on Municipal Waste Combustion
c. Rule Effective Date
2. § 258.2 Definitions
3. § 258.3 Consideration of Other Federal Laws
Appendix C. Supplemental Information for Subpart B—Location Restrictions
1. § 258.10 Airport Safety
2. § 258.11 Floodplains
3. § 258.12 Wetlands
4. § 258.13 Fault Areas
5. § 258.14 Seismic Impact Zones
6. § 258.15 Unstable Areas
7. § 258.16 Closure of Existing Units
8. Other Location Areas
9. Wellhead Protection
Appendix D. Supplemental Information for Subpart C—Operating Criteria
1. § 258.20 Procedures for Excluding the Receipt of Hazardous Waste
2. § 258.21 Cover Material Requirements
3. § 258.22 Disease Vector Control
4. § 258.23 Explosive Gases Control
5. § 258.24 Air Criteria
6. § 258.25 Access Requirements
7. § 258.26 Run-on/Run-off Control Systems
8. § 258.27 Surface Water Requirements
9. § 258.28 Liquids Restrictions
10. § 258.29 Recordkeeping Requirements
Appendix E. Supplemental Information for Subpart D—Design Criteria
1. Overview of Proposed Rule
2. Summary of Comments
3. Evaluation of Proposal and Alternatives
4. Final Rule Approach

Appendix F. Supplemental Information for Subpart E—Ground-Water Monitoring and Corrective Action
Appendix G. Supplemental Information for Subpart F—Closure and Post-Closure Care
Appendix H. Supplemental Information for Subpart G—Financial Assurance Criteria

I. Authority

Today's rule is being promulgated under the authority of sections 1008, 2002 (general rulemaking authority), 4004, and 4010 of the Resource Conservation and Recovery Act of 1976, as amended. Section 1008 directs EPA to publish guidelines for solid waste management, including criteria that define solid waste management practices that constitute open dumping and are prohibited under subtitle D of RCRA. Section 4004 further requires EPA to promulgate regulations containing criteria for determining which facilities are open dumps. Section 4010, added by the Hazardous and Solid Waste Amendments of 1984 (HSWA), directs EPA to revise the criteria promulgated under section 1008 and 4004 for facilities that may receive hazardous household waste (HHW) or small quantity generator (SQG) hazardous waste.

The part 258 regulations are also being promulgated under the authority of section 405 of the CWA and will apply to municipal solid waste landfills in which sewage sludge is disposed of together with household wastes ("co-disposed sludge"). Section 405(d) requires EPA to establish sewage sludge use and disposal standards for the toxic pollutants in sewage sludge adequate to protect public health and the environment against reasonably anticipated adverse effects of the pollutants. Section 405(e) prohibits any person from disposing of sludge from a publicly-owned treatment works (POTW) or other treatment works treating domestic sewage except in accordance with the section 405(d) regulations. The regulations promulgated here today will fulfill EPA's CWA requirement to establish standards for sewage sludge that is co-disposed with municipal solid waste.

II. Background

A. Current Solid Waste Controls Under RCRA and the CWA

1. RCRA Subtitle D Criteria

Subtitle D of RCRA establishes a framework for Federal, State, and local government cooperation in controlling the management of nonhazardous solid waste. The Federal role in this arrangement is to establish the overall regulatory direction, by providing minimum nationwide standards for protecting human health and the environment, and to provide technical assistance to States for planning and developing their own environmentally sound waste management practices. The actual planning and direct implementation of solid waste programs under subtitle D, however, remain largely State and local functions, and the act authorizes States to devise programs to deal with State-specific conditions and needs. EPA retains the authority to enforce the appropriate standards in a given State.

Under the authority of sections 1008(a)(3) and 4004(a) of subtitle D of RCRA, EPA first promulgated the Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR part 257) on September 13, 1979. These subtitle D Criteria establish minimum national performance standards necessary to ensure that "no reasonable probability of adverse effects on health or the environment" will result from solid waste disposal facilities or practices. A facility or practice that meets the Criteria is classified as a "sanitary landfill." A facility failing to satisfy any of the Criteria is considered an "open dump" for purposes of State solid waste management planning. State plans developed pursuant to the Guidelines for Development and Implementation of State Solid Waste Management Plans (40 CFR part 256) must provide for closing or upgrading all existing open dumps within the State.

Practices not complying with the Criteria also constitute "open dumping" for purposes of the Federal prohibition on open dumping in section 4005(a). EPA does not have the authority to enforce the prohibition directly (except in situations involving the disposal or handling of sludge from publicly-owned treatment works, where Federal enforcement of POTW sludge-handling facilities is authorized under the CWA). However, the "open dumping" prohibition may be enforced by States and other persons under section 7002 of RCRA.

The existing part 257 Criteria include general environmental performance standards addressing eight major topics: Floodplains (§ 257.3–1), endangered species (§ 257.3–2), surface water (§ 257.3–3), ground water (§ 257.3–4), land application (§ 257.35), disease (§ 257.3–6), air (§ 257.3–7), and safety (§ 257.3–8).

2. Sewage Sludge Criteria

The existing part 257 Criteria discussed above were co-promulgated under joint authority of RCRA and section 405(d) of the CWA. The part 257 regulations thus apply to all sludge disposed of on land. Under section 405(e), it is unlawful to dispose of sludge for any use for which regulations have been established under the CWA except in accordance with these regulations.

In February 1987, Congress enacted the Water Quality Act of 1987, which amended portions of the CWA, including section 405. First, Congress expanded section 405(d) to impose new standard-setting requirements with associated deadlines. Second, Congress established new sludge permitting requirements in section 405(f) along with State program requirements.

EPA has proposed sludge regulations under section 405(d), published at 40 CFR parts 257 and 503, on February 6, 1989 (54 FR 5746–5902). The proposed part 503 regulations would establish standards for the incineration, land application, and distribution and marketing of sludge. They also would establish standards for sludge disposed of in monofills, which are landfills in which only sewage sludge is disposed of (i.e., no other type of solid waste is co-disposed with the sewage sludge) and in surface disposal units (sludge placed on the surface of the land in piles). The sludge proposal does not include standards for the co-disposal of sewage sludge with household wastes in municipal solid waste landfills. Rather, those standards for the co-disposal of sewage sludge and household wastes in landfills are established in today's final rule. By this action, the Agency seeks to achieve consistency in its regulation under two legal authorities of a single disposal practice—the co-disposal of sewage sludge and other solid wastes in municipal solid waste landfills.

B. Report to Congress on Solid Waste Disposal

In response to the 1984 Hazardous and Solid Waste Amendments, EPA completed a study on the adequacy of the existing Criteria to protect human health and the environment from all subtitle D facilities, except those addressed in other EPA reports to Congress, such as mining waste facilities. In conducting the study, EPA gathered detailed data on the characteristics and quantities of nonhazardous solid wastes, including municipal solid wastes. In addition, EPA evaluated the characteristics and potential human health and environmental impacts of solid waste disposal facilities. Finally, the Agency reviewed the Federal and State solid waste regulatory programs to identify

any areas of inadequacy. In October 1988, EPA submitted the results of the study to Congress in a report entitled, "A Report to Congress: Solid Waste Disposal in the United States." (Ref. 1) The preamble to the August 30, 1988 proposal of this rule (53 FR 33314) contained a discussion of the findings of this study.

The results of this study confirmed that the United States is in the midst of a municipal solid waste disposal crisis. EPA's most recent data show that in 1988 the nation generated nearly 180 million tons of municipal solid waste and that this quantity would likely grow to 216 million tons by the year 2000. This growing volume of waste is coupled with a steadily decreasing availability of disposal capacity. In a 1986 EPA survey (Ref. 2), 45 percent of the municipal solid waste landfill owners/operators reported that their landfills would reach capacity by 1991. Today's disposal capacity crisis is further compounded by the difficulty in siting new solid waste management facilities.

C. EPA Concerns Regarding Local Government and Indian Tribe Impacts

The municipal solid waste crisis comes at a time when local governments and Indian Tribes are faced with a wide range of competing demands for their limited financial and technical resources. Schools, roads, social programs, public health and environmental programs, including solid waste management, and other programs draw on limited local resources, forcing cities and Tribes to make tough budget decisions. EPA recognizes and is very sensitive to these difficult conditions that local governments and Indian Tribes face and is carefully considering the impacts of its environmental programs on local governments and Indian Tribes.

As part of this effort, EPA carefully considered the concerns of local government and Indian Tribes in today's rule for municipal solid waste landfills. Within the constraints established by Congress, EPA has provided in this rule extensive flexibility to States, Indian Tribes, and local governments to facilitate implementation. For example, today's rule sets forth a set of flexible, national performance standards that allow owners and operators, including local governments and Indian Tribes, to consider site-specific conditions in designing and operating their landfills to comply with the rule Today's rule also establishes a flexible compliance schedule, including the phase-in of ground-water monitoring requirements over a five-year period from the date of publi cation of today's rule. Finally, as discussed later in this preamble, today's rule provides special relief to small communities and Indian Tribes. Municipal solid waste landfills that serve small communities and Indian Tribes which meet certain criteria are exempted from certain high-cost requirements (See § 258.1(f)).

EPA also is stepping up its efforts in providing technical assistance to local governments on municipal solid waste management issues. As discussed in the next section, the Agency has developed a national strategy for addressing the nation's municipal solid waste problem that calls for action by all levels of government, industry, and the general public. In implementing this strategy, EPA has worked with the States in launching numerous new technical assistance programs aimed at local governments. For example, EPA issued a wide range of information materials on topics such as recycling and siting of solid waste management facilities, which are critical to local governments. EPA plans to continue to work with States in providing this much-needed assistance to local governments.

D. EPA's Solid Waste "Agenda for Action"

In response to the growing national concern about the solid waste disposal crisis, EPA developed a national strategy for addressing the municipal solid waste management problems. This strategy is set out in a document entitled, "The Solid Waste Dilemma: An Agenda for Action," (Ref. 3) which the Agency issued in final form in February 1989. The strategy describes a wide range of activities that must be undertaken by various parties, including government, industry, and the general public, to bring our municipal solid waste management problems under control. EPA expects to issue an update of the Agenda in the near future.

The cornerstone of the strategy is "integrated waste management," where the following solid waste reduction and management options work together to form an effective system: source reduction, recycling, combustion, and landfilling. In keeping with the Agency's policy of pollution prevention, which is discussed below, the strategy strongly encourages the use of source reduction (i.e., reduction of the quantity and toxicity of materials and products entering the solid waste stream) followed by recycling as first steps in a solid waste management system. These techniques can then be complemented by environmentally sound combustion and landfilling.

The strategy sets out three national goals for municipal solid waste management: (1) Increase source reduction and recycling; (2) increase disposal capacity and improve secondary material markets; and (3) improve the safety of solid waste management facilities. To promote the attainment of the first goal, EPA established a national goal of 25 percent source reduction and recycling of municipal solid waste by 1992.

EPA's "Agenda for Action" identifies a series of actions or activities that must be carried out to achieve the above national goals. These activities seek to (1) increase the amount of information available to all parties on municipal solid waste management; (2) increase effective integrated waste management planning by local governments, States, Indian Tribes, and industry; (3) increase use of source reduction; (4) increase recycling; and (5) improve the design and management of municipal waste combustors and landfills.

EPA has made significant progress in completing the activities and attaining the national goals outlined in the "Agenda for Action." The following describes some of the most significant actions EPA has completed in implementing the "Agenda for Action."

1. Increasing Information

The Agency has completed numerous educational materials and programs aimed at assisting State and local governments and others in dealing with municipal solid waste management problems. For example, EPA issued the first volume of the "Decision Makers Guide to Solid Waste Management," (Ref. 4) which provides essential information on all aspects of solid waste management for local government officials. The Agency also published a comprehensive bibliography of information on municipal solid waste management and a guide to public involvement in siting municipal solid waste management facilities. In addition, EPA has established an information clearinghouse and peer matching program (through which experienced solid waste professionals provide assistance to their peers). In February 1989, the Agency held a national conference to identify and discuss municipal solid waste research needs.

EPA is continuing to develop additional information materials and programs. For example, EPA sponsored a major national conference on municipal solid waste management in June 1990. The conference addressed solid waste management issues of national importance and worked to increase awareness of these issues at

local, State, and regional levels. The goal of the conference was to initiate partnerships among peers in government, and involve groups and individuals to encourage cooperation and innovation in our efforts to solve solid waste problems. Specific areas addressed at the conference included: (1) Integrated waste management, (2) source reduction and reuse, (3) recycling, (4) combustion, (5) land disposal, and (6) public education and involvement. A second national conference is planned for June of 1992.

The Agency also established SWICH (Solid Waste Information Clearinghouse), a national clearinghouse for municipal solid waste management that contains over 7,000 documents. This system is an electronic bulletin board that allows users to view the listings of journals, reports, studies, etc., to search for topics and also contains information on how to order publications. Furthermore, the Agency will soon release a "how to" manual for setting up household hazardous waste collection programs.

2. Improving Integrated Waste Management Planning

A major objective of EPA's "Agenda for Action" was to improve integrated waste management planning by States and local governments. EPA has made significant progress in achieving this objective. In April 1989, EPA, in cooperation with the National Conference of State Legislatures, held a workshop for States on solid waste management planning. In addition, through a grant to the Council of State Governments, EPA sponsored a series of five workshops on planning for States in the fall of 1989. Finally, with the Conference of Mayors, EPA produced a television video for The Learning Channel on integrated waste management.

3. Increasing Source Reduction

The highest priority in EPA's strategy for addressing the nation's solid waste problems is increasing source reduction. EPA has taken several steps to promote the reduction of the quantity and toxicity of materials entering the municipal solid waste stream. First, EPA convened, through a grant to the Conservation Foundation, a steering committee of national source reduction experts to evaluate and develop recommendations on specific opportunities for source reduction, methods for evaluating source reduction, and incentives for promoting source reduction. The results of this project were recently published in a report entitled, "Getting at the Source: Strategies for Reducing Municipal Solid Waste" (Ref. 5). The Agency also completed a review and analysis of economic incentives, including volume-based pricing schemes, to promote increased source reduction.

With regard to toxicity reduction, EPA completed a report identifying the sources of lead and cadmium in the waste stream (Ref. 6) and will soon issue a report identifying potential substitutes for these constituents in products. The Agency is currently examining mercury in the municipal waste stream. In March 1990, the Agency also completed a comprehensive report to Congress on methods for managing plastic wastes (Ref. 7). This report examined the full range of options for addressing plastic wastes, including source reduction.

4. Increasing Recycling

To increase recycling nationwide, EPA has undertaken a number of efforts to stimulate markets for secondary materials; promote increased separation, collection, processing, and recycling of waste; and establish a National Recycling Institute. In the area of markets for secondary materials, EPA produced a report examining disincentives to recycling and has conducted a series of market studies on various components of municipal solid waste (paper, glass, aluminum, tires, and compost). To improve Federal procurement of recycled materials, the Agency finalized four procurement guidelines (retread tires, building insulation products, paper and paper products containing recovered materials, and lubricating oils containing re-refined oil) in 1988 and 1989 and has begun examining future candidate materials (other building and construction materials) for additional procurement guidelines.

To promote increased, environmentally sound recycling of waste, EPA has launched a training program to support recycling. This program is developing training and assistance programs for recycling at Federal offices and, through the assistance of the State of New Jersey, is developing training materials for training State and local recycling coordinators. EPA also released publications on a number of topics (i.e., used oil recycling, yard waste composting, office paper recycling, and State and local recycling program experiences) and funded development of several public service announcements on recycling. EPA also funded the establishment of a National Recycling Institute, composed of high-level representatives from business and industry, to identify and resolve issues in recycling.

5. Improving Municipal Waste Combustion

In the past year, EPA took a major step forward in improving the design and management of municipal waste combustion facilities. In December 1989, the Agency proposed new air emission standards (54 FR 52209) for new and existing municipal waste combustors. The Agency published a final municipal waste combustion rule on February 11, 1991 (see 56 FR 5488) that included requirements for good combustion practices and air emission control of particulates, organics, NOx and acid gases.

6. Improving Municipal Solid Waste Landfilling

Today's final rule represents the culmination of a major Agency effort to improve the safety of municipal solid waste landfills. EPA issued a comprehensive proposal (summarized below) in 1988 (53 FR 33314), evaluated extensive comments, and is today promulgating the final rule. The Agency believes today's rule will significantly improve the safety of existing and future municipal solid waste landfills.

While today's final rule is comprehensive, it does not address potential concerns regarding air emissions from municipal landfills. To address concerns, the Agency proposed air emission controls for municipal landfills under the authority of section 111 of the Clean Air Act. (See 56 FR 24468; May 30, 1991.)

E. Summary of Proposed Rule

As indicated above, the 1984 Hazardous and Solid Waste Amendments (HSWA) required EPA to revise the existing solid waste disposal criteria for facilities that may receive household hazardous waste or hazardous waste from small quantity generators. The existing criteria were issued under section 4004(a) of RCRA, which specified that the criteria were to provide that a facility be classified as a sanitary landfill and not an open dump only if there is no reasonable probability of adverse effects on human health and the environment from disposal of solid waste at the facility. HSWA specified that the revised criteria shall be those necessary to protect human health and the environment and may take into account the practicable capability of owners and operators of solid waste disposal facilities.

In response to this mandate, in August 1988 EPA proposed revised criteria for

MSWLFs and new information requirements for owners and operators of industrial solid waste disposal facilities and demolition debris landfills. These are landfills that the Agency determined do or may receive household hazardous waste or hazardous waste from small quantity generators. The key provisions of the proposed revised Criteria for MSWLFs are summarized below. Today's rulemaking sets forth the final requirements for owners and operators of these facilities, including the flexibility provided to States seeking to tailor standards to meet State-specific conditions.

EPA's 1988 proposal set forth new requirements pertaining to MSWLF location, design and operation, ground-water monitoring, corrective action, closure and post-closure care, and financial responsibility. The proposed location restrictions identified six locations in which MSWLFs would be subject to special siting restrictions and performance standards: proximity to airports, 100-year floodplains, wetlands, fault areas, seismic impact zones, and unstable areas.

The design criteria proposed by EPA required owners and operators to design MSWLFs to meet a performance standard based on a State-specified ground-water carcinogenic risk level. The proposed operating criteria specified day-to-day operating practices, like daily cover, for proper landfill maintenance.

The Agency also proposed ground-water monitoring and corrective action requirements that established a ground-water monitoring system for detection of releases from landfills and corrective measures for remedying releases once they had been detected. The proposed closure and post-closure care criteria established final cover requirements and a closure performance standard and required a minimum of 30 years of post-closure care of the landfill. The proposed financial responsibility requirements specified that owners and operators must assure that funds would be available to meet closure, post-closure care, and corrective action needs.

EPA received written comments on the proposal from more than 350 commenters. The commenters included more than 130 local governments, about 60 State agencies, and 15 Federal agencies. About 80 private sector firms and 27 trade or professional organizations supplied comments. Ten environmental and/or other public interest groups and 33 private citizens commented on the proposal. In addition, EPA held four public hearings, in which commenters presented oral and written testimony. All comments were taken into consideration in developing this final rule.

Section III of the preamble, which immediately follows, sets forth the statutory basis for the final rule, describes the broad regulatory options considered, and summarizes the regulatory impact analysis. Section IV responds to general issues raised by commenters on the proposal. Sections V and VI of today's preamble summarize the major provisions of parts 257 and 258, respectively. Section VII reviews the steps that owners and operators and States must undertake to implement today's rule, while Section VIII describes EPA's plans for training on the final rule. The technical appendices provide more detailed discussion of the technical components of today's rule. Responses to comments that are not discussed in the preamble of today's rule are contained in the Comments Response Documents cited in Section X.

III. Regulatory Approach of Today's Final Rule

A. Statutory Basis

Prior to evaluating the appropriate regulatory options for the subtitle D revised Criteria, it was necessary that the Agency determine the precedential effect of the RCRA subtitle C requirements for hazardous waste facilities. These regulations are found, for the most part, at 40 CFR part 265 (interim status facilities) and 40 CFR part 264 (permitted facilities).

The Agency received many comments critical of the proposed Criteria based upon the fact that the Criteria varied from those applicable to hazardous waste facilities under RCRA subtitle C. Several commenters based their comments upon technical information contained in the docket to this rulemaking showing many similarities in the health and environmental threats posed by MSWLFs and subtitle C landfills. Like the proposed Criteria, the revised Criteria promulgated today also differ from the subtitle C requirements. EPA believes that Congress did not intend for EPA to copy the subtitle C regulations for subtitle D facilities and, furthermore, gave the Agency the discretion, through its statutory mandate, to create a separate regulatory program.

EPA agrees with commenters that data available to the Agency at this time do not provide strong support for distinguishing the health and environmental threats posed by MSWLFs and subtitle C facilities. Technical data gathered by the Agency and available in the docket to this rulemaking do not reveal significant differences in the number of toxic constituents and their concentrations in the leachates of the two categories of facilities. One study (Ref. 8) compared (1) leachates from MSWLFs that began operation before 1980 (the year EPA's regulations for hazardous waste landfills became effective) with leachates from MSWLFs that began operations after 1980 and (2) "post-1980" MSWLF leachates with hazardous waste landfill leachates. MSWLFs that began operation prior to 1980 could contain industrial hazardous waste that, starting in 1980, could only be sent to a subtitle C facility. MSWLFs that began operation after 1980 should only contain small quantity generator and household hazardous wastes in addition to nonhazardous wastes.

As commenters noted, the study did not find significant differences between the number of toxic constituents and their concentrations between leachates from post-1980 MSWLFs and leachates from pre-1980 MSWLFs and hazardous waste landfills. When comparing the mean concentrations of leachates from hazardous waste facilities and MSWLFs, for example, the Agency concluded that there was a "weak indication" in the data that hazardous waste leachate had higher concentrations of hazardous constituents than post-1980 MSWLF leachate.

It should also be noted, however, that these data are variable, and did not reflect long-term monitoring results. As a result, there is a significant possibility that they do not accurately reflect the actual toxicity of MSWLFs and subtitle C leachates at the present time. Furthermore, the Agency has many reasons to believe that the quality of the leachate from MSWLFs will improve over time. Increasingly, communities are instituting household hazardous waste programs and removing toxics from waste prior to its disposal in a municipal landfill. In addition, the Agency expects there to be positive changes in leachate resulting from the 1986 lowering of the cut-off levels for small quantity generator waste and the addition of new RCRA hazardous waste listings and characteristics. The former would reduce the amount of small quantity generator hazardous waste that may be disposed of in MSWLFs while the latter would divert waste currently disposed of at subtitle D facilities to subtitle C facilities. Each of these measures should reduce both the number and the concentration of toxic constituents present in landfill leachates. Thus, better data as well as future data should

provide a stronger technical basis for distinctions between the subtitle C and D regulatory programs.

In raising the similarity in leachates between MSWLFs and hazardous waste facilities, commenters suggested that EPA is legally obligated to promulgate revised Criteria for MSWLFs under subtitle D that are similar to existing regulatory standards for subtitle C hazardous waste facilities. The basis for such a suggestion is that the Agency may not distinguish regulatory standards under subtitles C and D except on technical grounds.

The Agency disagrees with commenters that it is legally obligated to issue revised Criteria for MSWLFs under subtitle D that are identical to subtitle C standards and believes that it has the discretion to create a different regulatory program for MSWLFs. Because this discretion is based upon the statutory language and legislative history of the RCRA provision requiring EPA to promulgate the revised Criteria, the current lack of technical information distinguishing the two universes of solid waste facilities does not affect the Agency's discretion to create two distinct regulatory programs.

The statutory language and legislative history of RCRA subtitle D reveal that Congress mandated a different standard of health and environmental protection from that mandated under subtitle C and that Congress did not intend for EPA to impose the same standards under the two programs. Subtitle C management standards for hazardous waste treatment, storage, and disposal facilities shall be those "necessary to protect human health and the environment." (See, for example, section 3004(a).) Section 4010(c) of the statute, the provision mandating promulgation of the revised Criteria, also contains this same language:

> Not later than March 31, 1988, the Administrator shall *promulgate revisions of the criteria promulgated under paragraph (1) of section 4004(a)* and under section 1008(a)(3) for facilities that may receive hazardous household wastes or hazardous wastes from small quantity generators under section 3001(d). *The criteria shall be those necessary to protect human health and the environment and may take into consideration the practicable capabilities of such facilities* (emphasis added).

However, while stating that the revised Criteria must be those "necessary to protect human health and the environment," subtitle D contains additional language not present in subtitle C, that allows the Agency to explicitly consider practicable capability in determining what is necessary to protect human health and the environment.

This discretion is found both in the language of section 4010(c), which explicitly provides that EPA may consider the "practicable capability" of facilities in revising the solid waste management criteria promulgated under section 4004(a), and in the language of section 4004(a) itself. EPA believes that these provisions, among other things, explicitly authorizes EPA to consider cost in determining appropriate criteria for subtitle D facilities. The legislative history of section 4010(c) as well as other statutory provisions further support this interpretation.

Section 4004(a) provides that EPA shall promulgate regulations containing criteria distinguishing which facilities are to be classified as sanitary landfills and which as open dumps. This provision incorporates a distinctly different standard of health and environmental protection, which may be interpreted to allow consideration of cost. The section provides that, at a minimum:

> * * * a facility may be classified as a sanitary landfill and not an open dump only if there is *no reasonable probability of adverse effects on health or the environment* from disposal of solid waste at such facility (emphasis added).

The statute suggests that the standard under section 4004(a) applies to the revised Criteria mandated under section 4010(c). Section 4010(c) explicitly states that the Administrator is to "promulgate revisions of the criteria promulgated under paragraph (1) of section 4004(a) and under section 1008(a)(3)" for subtitle D facilities that may receive hazardous wastes.[1] Thus, rather than simply directing the Agency to promulgate criteria for solid waste landfills receiving household hazardous and small quantity generator wastes, Congress directed the Agency to "revise" the existing Criteria promulgated under section 4004(a) for these facilities. Furthermore, Congress indicates in section 4005 of the statute that the revised Criteria mandated by section 4010(c) are to be promulgated under section 4004(a). Section 4005(c)(1)(B) states:

> Not later than eighteen months after the promulgation of revised criteria under subsection 4004(a) (as required by section 4010(c)), each State shall adopt and implement a permit program or other system or prior approval and conditions * * *.

[1] Section 1008 simply requires that the Administrator promulgate solid waste management information and guidelines.

Thus, the Agency believes that when promulgating revisions of criteria under the same statutory provision, it is reasonable for it to refer to the standards imposed under that statutory section in developing the revisions.

The above statutory argument is supported by the legislative history of section 4010(c). In enacting section 4010(c), Congress seems to have been aware that the costs of the regulation may cause many facilities to close. As a consequence, the legislative history suggests that Congress authorized EPA to develop regulations that would avoid massive closures among solid waste disposal facilities. Senator Randolph, in his remarks during floor debate, stated:

> (t)he requirements could also precipitate the closure of facilities with substantial capacity, but that are either unable or unwilling to accept new regulatory costs.
>
> By allowing the administrator to consider the practicable capability of solid waste disposal facilities, the Congress has expressed its desire to avert serious disruptions of the solid waste disposal industry.

130 Cong. Rec. S 13814 (daily ed. Oct. 5, 1984). From these statements, it would appear that Congress explicitly authorized EPA to consider costs under section 4010(c) as a criterion for determining if the financial impact upon the owner or operator of an MSWLF could result in the "serious disruptions within the solid waste disposal industry."

While the legislative history of the Hazardous and Solid Waste Amendments of 1984 discusses the meaning of the term "practicable capability" under section 4010(c) and indicates that it refers to cost considerations, the legislative history does not elaborate upon the meaning of section 4004(a) phrase, "no reasonable probability of adverse effects." However, case law provides support for interpreting this standard to allow EPA to consider cost.

Although it alone is not interpreted to imply economic considerations, the term "reasonable," present in section 4004(a), has been read in other contexts to imply a balancing of competing factors. (*See e.g., American Textile Manufacturers Institute, Inc.* v. *Donovan*, 452 U.S. 490 (1981); *City of New York* v. *EPA*, 543 F. Supp. 1084 (S.D.N.Y. 1981).) The legislative history indicates that Congress recognized cost versus health and environmental protection to be the competing considerations in revising the subtitle D Criteria. (*See e.g.*, 130 Cong. Rec. S 13814 (daily ed. Oct. 5, 1984)).

Furthermore, use of the word "probability" in "no reasonable

probability" implies the discretion to impose requirements that are less certain to eliminate a perceived health or environmental threat than standards that are "necessary to protect human health and the environment," thus allowing for the consideration of other factors such as cost.

Based upon these considerations, EPA believes it has the explicit discretion to interpret the phrase "practicable capability" under section 4010(c) to allow the consideration of the cost of the revised criteria to MSWLF owners and operators.

The legislative history supports the above statutory reading that EPA may impose different standards under RCRA subtitle D from those imposed under RCRA subtitle C. In the Senate Report to S.757, Congress, in discussing EPA's mandate in revising the subtitle D criteria for MSWLFs, stated:

> (t)he multiple liner-leachate collection system requirements of new section 3004(f) applicable to Subtitle C facilities are not to be automatically incorporated in revised criteria for landfills or surface impoundments which are Subtitle D facilities.

S. Rept. 98–248 at 50. Senator Stafford, in his remarks on the Senate floor, also provided for the possibility of differences between the subtitle D and C standards. He stated:

> (t)he underlying standard for facilities subject to this amendment to subtitle D remains protection of human health and the environment. Requirements imposed on facilities may vary from those for Subtitle C facilities, however, and still meet this standard.

130 Cong. Rec. at S 13814.

Finally, two aspects of the nature of Congress' regulation of MSWLFs containing household or small quantity generator hazardous waste support a Congressional intent to preserve differences between the RCRA solid and hazardous waste programs. First, Congress chose to regulate such facilities by revising the subtitle D criteria rather than subjecting them to the subtitle C requirements. Second, Congress' statutory directives in the HSWA amendments to revise the subtitle D criteria lack the prescriptiveness of similar amendments to the subtitle C program. In place of Congress' imposition of land disposal restrictions and precise liner and leachate collection requirements in the 1984 amendments, Congress merely told EPA to revise the Criteria under section 4004(a) as necessary to protect human health and the environment, taking into consideration practicable capability. Furthermore, Congress specified only the "minimums" of such a program, mandating that the revised criteria include requirements for ground-water monitoring, location standards, and corrective action.

As a consequence, EPA has determined that it has the discretion to create a regulatory program for RCRA subtitle D MSWLFs that would allow for standards that are distinct from the RCRA subtitle C program for hazardous waste facilities, and thus EPA can allow for greater flexibility in State solid waste programs.

B. Regulatory Options Considered and Summary of the Regulatory Impact Analysis

The Agency considered a number of broad regulatory options for today's final rule and, in accordance with Executive Order 12291, prepared a Regulatory Impact Analysis (RIA), December 1990, that evaluates the benefits and impacts of each of the regulatory options. The RIA also contains an analysis of the economic impact on small communities, as required by the Regulatory Flexibility Act (RFA). Complete information on RIA methodology, data, assumptions, and results is contained in the Final Regulatory Impact Analysis. Information on the availability of the RIA is provided in the Supplementary Information Section of today's preamble.

In addition to the RIA, in Spring 1991, the Agency updated and revised the Regulatory Impact Analysis to incorporate changes in state regulations as of January 1991 and to represent the increased flexibility of today's rule, referred to as the Hybrid approach. These changes in assumptions, result in a significant reduction in risk, cost and economic estimates for all options considered. Results from this revised analysis are presented below and are presented in the Addendum to the RIA, August 1991. Information on the availability of the Addendum is provided above.

The Agency considered, in addition to the original proposal, four broad regulatory options for today's final rule. These options included (1) the "Limited Option approach" (2) the "subtitle C, approach" (3) the "Hybrid approach," and (4) the "Categorical approach." Under the limited option approach, the revised Criteria would be limited to the enumerated requirements identified by the 1984 Hazardous and Solid Waste Amendments—location restrictions, ground-water monitoring, and corrective action for ground-water contamination. Rather than focusing on preventing environmental contamination in the first instance, this option relies almost exclusively on detection and expensive clean-up programs to protect human health and the environment. Other than location restrictions, owners or operators of MSWLFs would not be required to comply with any preventive measures such as proper landfill design, operation, and closure.

Under the "subtitle C" option, owners and operators of MSWLFs would be subject to a comprehensive set of facility requirements identical to those established for hazardous waste disposal facilities under subtitle C of RCRA. The final "Hybrid" option, which is the approach taken in today's final rule, combines the limited option provisions with a range of preventive measures appropriate for MSWLFs and provides States seeking to accept the program with the flexibility to adopt the preventive measures most appropriate to their State. In particular, the Hybrid approach addresses all of the categories of control included in the subtitle C option, but is less stringent and, therefore, more flexible in several respects, most notably in the landfill design and closure requirements. Thus, while differing in content, both the Hybrid and subtitle C options include requirements relating to facility location, design, operation, ground-water monitoring, corrective action, closure and post-closure care, and financial assurance.

Finally, EPA investigated a fourth approach, the categorical approach, whereby landfill design standards would be categorized based on various factors, particularly hydrogeology and precipitation. During rule development, EPA and the States attempted to develop such an approach. The approach was rejected by both Agency research and technical staff, and by the States, because it was technically infeasible to tailor categories to the wide variety of situations throughout the country. All attempts to simplify the categories led to over or under regulation. Each attempt suffered from a variety of technical deficiencies. Because the Agency rejected the categorical approach, this approach will not be discussed further in this preamble. Rather EPA's evaluation of this option is addressed in the detailed background discussion on the design criteria presented in Appendix E to today's preamble. In addition, the Regulatory Impact Analysis results for

this approach are not presented in this section because they are very similar to the Hybrid option.

In evaluating these options, the Agency's primary criterion was meeting the statutory requirement of protection of human health and the environment. In addition, consistent with the Agency's interpretation of the statutory basis for today's rule, EPA considered the practicable capability of owners and operators of MSWLFs. From the legislative history, as explained previously in this preamble, EPA determined that "practicable capability" includes both the economic and technical capabilities of owners and operators, which, if exceeded, could result in significant disruptions in current solid waste disposal practices. Because the subtitle C Approach was significantly more expensive that than the hybrid approach (four times higher), EPA determined that it was beyond the bounds of "practicable capability." For this reason, while full discussion of the subtitle C option is included in the RIA, it will not be included in the following discussion on costs and benefits. Additional information on the subtitle C approach can be found in the RIA.

In evaluating and selecting the regulatory approach for today's rule, EPA attempted to strike the most appropriate balance between considerations of human health and environmental protection and practicable capability. EPA gathered and analyzed available informaion on the health and environmental benefits and the cost and economic impacts of the various options.

1. Risk and Resource Damage Analysis

The Agency first evaluated the human health and resource damage benefits of each of the options. Where possible, the Agency developed quantitative estimates of these benefits. For example, the Agency estimated the reduction in carcinogenic health risks achieved and resource damage avoided by the various options. EPA also carefully considered and qualitatively evaluated other benefits that are difficult to quantify, such as the intrinsic value of clean ground water to future generations; non-quantified benefits are discussed in the next section.

There are several limitations to the benefits analysis that should be recognized. Only benefits concerning ground-water contamination are considered—benefits from increased protection of surface water and air are not included. Benefits beyond 300 years are also not included—additional benefits would be captured if the modeling period extended beyond 300 years. Finally, potential changes in waste toxicity and demographics are not completely factored into the analysis—a reduction in toxicity of waste going to MSWLFs would reduce the benefits of this rule, while increases in populations living near MSWLFs would increase benefits.

EPA found that both options, the Final Rule and the limited option would achieve roughly similar results for one benefit measure—reduction in human health risks from drinking contaminated ground water. As indicated in Table 1, both the Hybrid approach and the limited approach would eliminate 2 cancer cases (40 percent reduction from baseline) occurring over 300 years from one set of 3,000 replacement landfills similarly located to those now operating in the U.S.

As EPA predicted, the baseline of 5.7 cancer cases caused by one set of 3,000 replacement MSWLFs is low. This low predicted cancer incidence is due to several reasons. First, more than half (54 percent) of the landfills have no population living within a mile radius, and therefore, in this analysis, were assumed to present no human health risks. Second, EPA modeled human health risk by using the average population density near MSWLFs (i.e., 1.6 people per acre). Risk will increase if population living near landfills increases, as is very likely in the future. Third, EPA modeled risk using median leachate concentrations. If EPA had used the 90th percentile of leachate concentration in this analysis, the human health risk estimates would have increased by a factor of ten. Therefore, while near-term human exposure to contaminated ground water is clearly a concern for a portion of MSWLFs, the larger benefit of the MSWLF rule is preventing ground-water contamination that could lead to human exposure in the future, and avoiding loss of ground-water resources. Fourth, EPA assumed over half of the new landfills will be designed with liners due to current state requirements. Risk reduced by state requirements is considered baseline reductions and is not included in this analysis. The inclusion of regionalization, state requirements and increased flexibility of the rule are the major reasons the number of cancer cases are reduced from those reported in the RIA.

TABLE 1.—PREDICTED POPULATION RISK [1] ACROSS ONE SET OF REPLACEMENT MSWLFs [2] 30-YEAR POST-CLOSURE CARE PERIOD

Regulatory scenario	Total cancer cases for one set of replacement MSWLFs	Reduction of cases
Baseline	5.7	[3] NA
Hybrid Approach	3.3	2.4
Limited Approach	3.3	2.4

Regulatory scenario	Average annual cancer cases caused by one set of replacement landfills over 300 years [4]	Reduction of average annual cases
Baseline	.02	[3] NA
Hybrid Approach	.01	.01
Limited Approach	.01	.01

[1] Population risk over the 300-year simulation.

[2] Note that these numbers represent risk generated only from 20 years of landfilling modeled over 300 years. They do not represent the total risk of landfilling in perpetuity and, therefore, are not comparable to the annualized cost numbers (which represent landfilling in perpetuity) presented later in this section.

[3] Not applicable.

[4] These estimates are the total cancer cases caused by one set of new landfills divided by 300 years. EPA does not believe that those numbers are not comparable to the annualize costs estimates presented later in this section.

An alternative way to consider benefits is to look at long-term protection of both human health and the environment, i.e., prevent resource damage. EPA measured a surrogate of this resource damage by estimating the gross cost of replacing contaminated ground water at drinking wells with an alternative water supply system. (EPA recognizes that this estimate, since it is "gross costs" may be overstated; "net costs" would be somewhat lower.) Since this measure assumes that contaminated water is not used, but replaced (and therefore no human exposure occurs), this measure is not additive to the risk analysis presented earlier. It is simply a second method for measuring benefits. The Agency determined that the hybrid option would provide more effective, long-term protection (prevent resource damage) than the limited approach. Specifically, as shown in Table 2, the Agency found that the Limited option avoided less than half ($120 million) in gross resource damages than the final rule ($270 million).

TABLE 2.—TOTAL RESOURCE DAMAGES FOR ONE SET OF REPLACEMENT LANDFILLS [1]

[Present value in millions of dollars]

Regulatory scenario	Resource damage	Resource damage avoided
Baseline	$560	[2] NA
Hybrid Approach	290	$270
Limited Approach	440	120

[1] Assumes 20 year life span for landfills.
[2] Not applicable.

2. Other Benefits

EPA believes there are several benefits to using the hybrid approach other than the risk and resource damage benefits which were quantified in the RIA. First, EPA believes that the promulgation of federal municipal solid waste landfill criteria will increase public confidence that landfills are designed to protect human health and the environment. EPA believes that this increased confidence will reduce opposition to landfills and make the siting of new landfills less difficult.

Second, EPA's modeling indicates that contamination of ground water will occur at a large portion of landfills if no controls are used. While the resource damage measure presented earlier (the cost of replacing contaminated ground water for those who use it) helps quantify the lost use value of a groundwater resource, EPA believes it does not always reveal the total extent of ground-water contamination or the true impacts of that contamination. For instance, ground-water contamination has, in some communities, resulted in decreased property values. EPA believes that the final rule, by limiting contamination of ground water from landfills will protect property values located within the vicinity of new landfills. Also, there is a value that people place on pristine (non-contaminated) resources, even if they do not intend to use these resources. This value is called a "non-use value," or an "existence value." By limiting releases to the environment, EPA believes that the final rule will protect the existence value of ground water near landfills. EPA has not quantified these benefits for this rule, but is investigating these benefits of protecting ground-water and will include an analysis of these benefits for the final Corrective Action rule to be promulgated under RCRA subtitle C.

Finally, other benefits are expected from the final rule. These include minimizing the need for future cleanups and thus reducing potential economic impacts on future generations (or the federal government, as in the case of a Superfund site). The final rule, by more fully reflecting the cost of safe waste disposal, will also lead to more responsible waste management practices and promote resource conservation.

3. Costs and Economic Impacts

The Agency evaluated costs by: (1) Using the subtitle D risk model to determine design requirements for landfills under the performance-based options and to determine which landfills would trigger corrective action and (2) using the subtitle D cost model to estimate cost.

Costs are estimated for a single set of landfills which in theory could be built at precisely the same types of locations as the 6,000 MSWLFs estimated to exist in EPA's 1986 survey. EPA has not estimated the social opportunity cost of premature closure of municipal solid waste landfills. Thus, to the extent that any of the alternative regulatory scenarios cause landfills to be closed prior to the expiration of their expected useful lifetimes, EPA's estimates do not take these costs into account. Likewise, EPA did not estimate any benefits resulting from premature closure of landfills.

Compliance costs in the RIA are estimated for two scenarios: the upper-bound assumes a 40-year post-closure care period (PCC); the lower-bound assumes a 10-year PCC period, increased recycling, shifts of waste to combustion, and regionalization of small landfills. However, the Agency believes that actual costs and economic impacts of the rule will fall somewhere between the upper and lower bounds presented in the RIA. For this reason, the Addendum results (which are discussed here) presents cost and impacts for one scenario only: a best estimate which assumes partial regionalization, shifts of waste to recycling and combustion, and a split between the use of a 10 meter and a 150 meter point of compliance. In addition, changes were made to the RIA analysis to incorporate state credits (i.e., if a provision is required by state regulations, costs are not assigned to the federal options) and better represent increased flexibility in the final rule.

The Agency's best estimate for total annualized cost of the Hybrid approach is $330 million (see Table 3). These costs fall in the lower end of the range of estimated costs for the other regulatory scenarios. For example, the annualized costs for the subtitle C approach is estimated to be close to $1.3 billion while the costs for the limited option is $180 million. Meeting design standard and ground-water monitoring requirements are the major cost elements of both the Hybrid and subtitle C approaches. Corrective action and ground-water monitoring account for the majority of costs under the limited option.

The total present value cost of one set of new landfills (Table 3), as opposed to annualized costs of landfilling in perpetuity, is another way to present costs. The risk and resource damage estimates presented earlier are "total" estimates for one set of new landfills and thus are parallel to the total present value cost estimates presented in Table 3.

TABLE 3.—SUMMARY OF COMPLIANCE COSTS FOR OPTIONS BEST ESTIMATE

	Total annualized ($ in millions)	Average [1] cost per ton	Total present value [2] cost of one set of new landfills ($ in billions)
Hybrid approach	$330	$2	$5.8
Subtitle C	1,300	7	22.9
Limited approach	180	1	2.7

[1] The average cost per ton is a national weighted average figure determined by dividing total national costs by total annual tons disposed.
[2] The total present value cost for one set of new landfills presents costs of the rule in a format comparable to the risk and resource damage estimates presented earlier in the preamble. These costs do not include increased diversion of waste due to combustion and recycling because the risk and resource damage estimates (Tables 1 & 2) do not take into account this additional diversion.

The average annualized incremental cost per ton under the Hybrid approach is less than $2 per ton, compared to $7 per ton for the subtitle C approach and $1 per ton for the Limited option (see Table 3). To put these figures in perspective, the current average cost for disposal of municipal solid waste is $46 per ton. Therefore, a $2 per ton increase for the Hybrid option represents a four percent increase over current baseline costs.

The maximum and minimum cost per ton presented in Table 4 give an indication of the distribution of costs across landfills within each option. While all options have a minimum cost per ton of $1, the maximum costs per ton vary.

TABLE 4.—RANGE OF INCREMENTAL COST PER TON ACROSS OPTIONS

	Minimum cost [1]	Maximum cost [2]
Hybrid approach	$1	$24
Subtitle C approach	1	92
Limited approach	1	20

[1] The minimum cost represents costs at large landfills located in States that already have groundwater monitoring and design requirements.
[2] The maximum costs for the Hybrid approach reflects design costs of small landfills that are located in States that have few existing requirements; the maximum costs for the limited approach reflect costs for small landfills that incur high corrective action costs.

The range of incremental costs shown in Table 4 can be attributed to three factors: the wide distribution of landfill sizes, the diversity of current State regulatory programs, and the differing degrees of flexibility available to States in administering the various regulatory approaches. Landfill size is a key factor in determining the cost per ton, with larger landfills benefitting significantly from economies of scale. Landfills located in States that have already implemented comprehensive solid waste regulatory programs will face lower incremental costs than landfills in States that currently have few requirements. Finally, the flexibility available to States in the Hybrid approach gives approved States the ability to allow landfill owners and operators to choose the least-cost design that meets the performance standard.

Table 5 illustrates the importance of landfill size and a performance-based regulatory approach. Looking at an upper-bound cost scenario (i.e., 40-year post-closure care period), the cost under the Subtitle C option would drop from $73 per ton for a 10 TPD landfill to $14 per ton for a 1500 TPD landfill. This clearly demonstrates the benefits of economies of scale and further supports the trend toward larger, regional landfills. Table 6 also highlights the benefits of a performance-based approach, such as the Hybrid option. A subtitle C design approach would impose a cost of $73 per ton on all 10 TPD landfills, whereas under a flexible performance standard approach, costs could vary from $47 to $16 per ton, depending on the design necessary to meet the performance standard. Thus, under a performance-based approach owners and operators have a significant opportunity to reduce costs by siting new landfills in good locations.

TABLE 5.—LANDFILL DESIGN OPTIONS; AVERAGE INCREMENTAL COST PER TON

[No state credit included]

Landfill size	Subtitle C [1]	Performance based design options		
		Composite liner/cover [2]	Synthetic liner/cover [3]	Unlined veg. cover [4]
10 TPD	$73	$47	$37	$16
175 TPD	26	17	12	3
1500 TD	14	9	6	2

[1] Composite liner plus synthetic liner, composite cover, double leachate collection system.
[2] Composite liner synthetic cover, leachate collection system.
[3] Synthetic liner synthetic cover, no leachate collection system.
[4] Unlined, vegetative cover, no leachate collection system.

The economic impact analysis looks at cost per household, cost as a percent of median household income, and cost as a percentage of community expenditures. As shown in Table 6, the average incremental cost per household of the Hybrid approach is $4 per year. This cost is higher than the limited approach ($2 per year).

TABLE 6.—AVERAGE [1] COST PER HOUSEHOLD (CPH) PER YEAR

Regulatory scenario	Best estimate cost scenario
Hybrid Approach	$4
Limited Approach	2

[1] Average CPH estimated by dividing total national cost by total number of households.

The economic impact results in Table 7 indicate that neither the Hybrid approach or the limited approach would exceed the moderate impact threshold for individual household (defined for this analysis as an incremental increase in household costs of greater than $100 per year, or roughly $8 per month). EPA determined that impacts indicated by incremental costs as a percentage of each community's median household income are similar to cost per household results, and thus cost as a percentage of median household income results are not presented here.

TABLE 7.—ADDITIONAL MEASURES OF COST PER HOUSEHOLD (CPH) PER YEAR

[40-Year Post-Closure Care Period]

Regulatory scenario	Percent of communities with CPH>$100	Maximum CPH [1]
Hybrid Approach	0.0	$62
Limited Approach	0.0	52

[1] Maximum CPH determined by calculating CPH from landfill with highest cost per ton.

In addition to impacts on individual households, a key measure the Agency used in estimating the economic impacts of the various regulatory options was the percentage of a community's total budget that would need to be spent on solid waste disposal as a result of this rule. EPA's available data indicate that the typical community now spends approximately 0.5 percent of its total budget on solid waste disposal (1982 Census of Governments). The Agency considered a doubling of these costs—i.e., increases of solid waste disposal costs to more than 1.0 percent of a community's total budget—to be a significant economic impact that may exceed the practicable capability of many of these communities.

As indicated in Table 8, EPA found significant differences in costs as a share of the total community budget for the various options. Under the Hybrid approach and limited option costs would exceed the 1 percent impact threshold for less than 2 percent of local governments (representing less than one percent of the U.S. population).

TABLE 8.—COST AS PERCENTAGE OF EXPENDITURES (CPE)

Regulatory scenario	Percent of communities with CPE> 1% best estimate cost scenario	Maximum CPE [1] (percent)
Hybrid Approach	1.4	3.1
Limited Approach	1.4	2.6

[1] Maximum CPE represents the CPE for community with highest ratio of cost per community expenditure.

The results presented in Table 8 are significantly lower than results in the original RIA. The strong mitigation of impacts is a result of assumed increased regionalization, increased state regulations, and flexibility in groundwater monitoring requirements. These changes in the analysis have resulted in the number of significantly impacted communities being greatly reduced from RIA estimates.

EPA believes regionalization will play such a major role in mitigating the long-term impacts of all of the regulatory approaches for the following reasons. EPA's small community analysis indicates that the majority (90 percent) of impacted communities are small communities (i.e., fewer than 5,000 people). These small communities typically operate small landfills, which handle only a small portion of the total municipal solid waste stream. As shown in Table 9, small landfills (less than 17.5 TPD) represented 51 percent of the total number of landfills in 1986, yet handled only 2 percent of the total waste.

In addition, these small landfills tend to be poorly located and designed, and operate at the high end of the cost per ton scale. As a result, small communities have a number of strong incentives to regionalize and, in fact, many of them have moved or are currently moving to regional facilities. This trend is evidenced by the drop in landfills over the past twenty years. While 1970 estimates of the U.S. landfill population neared 18,000, EPA estimates that in 1986, only approximately 6,000 MSWLFs were operating—and that the total number of landfills continues to decrease. Because of this strong trend toward regionalization, the Agency believes that the long term impacts of the regulatory options will decrease over time.

TABLE 9.—1986 SIZE AND WASTE DISTRIBUTION OF MUNICIPAL SOLID WASTE LANDFILLS [1]

Landfill size (TPD)	Percentage of total landfills	Percentage of total waste handled
1-17.5	51	2
17.6-50	17	4
51-125	13	9
126-275	7	11
276-563	5	16
564-1,125	3	19
>1,125	3	40

[1] Numbers may not add due to rounding

In addition to the mitigating affection of regionalization on small community impacts, EPA has included a small community exemption in today's final rule. This exemption applies to small landfills (less than an annual average of 20 TPD) in arid (receiving less than 25 inches of rainfall a year) or remote areas which do not have any reasonable alternative for regionalization, if there is no evidence of existing ground-water contamination. The small community provision would allow these communities to be exempted from certain requirements of this rule, thereby reducing economic impacts on these communities. For more information on this exemption, see section IV.A of this preamble.

4. Selection of Today's Regulatory Approach

The Agency believes the Hybrid option strikes the appropriate balance between protection of human health and the environment and consideration of practicable capability and, therefore, has selected this approach for today's final rule.

As discussed above, preventive approaches, such as the Hybrid approach, provide more effective, long-term protection of human health and the environment than the Limited Rule option. At the same time, the Hybrid option imposes lower costs than the subtitle C option. In developing this rule, EPA was very concerned about the potential impacts on small communities, including small Indian Tribes and, therefore, carefully evaluated this issue. EPA's analysis showed that the majority of the communities that would be significantly impacted are small communities that manage relatively small MSWLFs.

To reduce impacts on small communities, EPA has added a special exemption to today's final rule directed at small landfills serving communities, including Indian Tribes, that have barriers to regionalization. This provision exempts small landfills (those that dispose of less than 20 TPD of solid waste daily on the average) in certain settings from the high-cost requirements in today's rule. This exemption is available to those small landfills in remote or arid locations that do not have evidence of ground-water contamination.

EPA believes that these limited impacts on small communities will be further reduced by two factors. First, as discussed above, many small communities are expected to reduce community landfill costs by taking advantage of larger economies of scale through participating in regionalized landfills. Second, the performance-based element of the Hybrid approach provides the option for communities to avoid high control costs by siting new landfills in non-vulnerable locations. A performance-based approach provides communities with opportunities to dramatically reduce costs by siting new MSWLFs in areas where the characteristics of the site indicate that a less costly design may be used.

EPA believes that those small communities and Indian Tribes that cannot take advantage of better siting opportunities, regionalization, or the exemption, should be subject to today's requirements to ensure protection of human health and the environment and to avoid costly future clean-up problems.

C. Pollution Prevention Aspects of Final Rule

Today's final rule establishes revised standards for MSWLFs that set in place a strong economic incentive for increased source reduction and recycling. Specifically, today's rule, by calling for communities, including public and private entities, to pay the true cost of safe landfilling, makes source reduction and recycling programs more competitive.

Specifically, today's final rule establishes this economic incentive by requiring a wide range of design and management practices aimed at preventing releases from municipal solid waste landfills. In addition, the location provisions of today's rule prevent or restrict the siting of landfills in areas that are especially vulnerable to contamination. For example, new landfills (including lateral expansions of existing landfills) are prohibited from locating in the 100-year floodplain unless special features are incorporated into the facility design. Further, today's rule requires new landfills to be equipped with a composite liner, or, in approved States, an alternative design that will prevent unacceptable releases from the landfill.

The operating criteria also contain a variety of landfill management requirements that are aimed at preventing potential environmental or public health problems. These provisions include restrictions on public access to the landfill, daily cover requirements to minimize disease vector and other problems, methane gas controls to prevent gas explosions, controls on runoff from the facility to prevent releases to surface and ground water resources, and restrictions on the landfilling of certain wastes, including hazardous waste and liquid wastes, to minimize the toxicity and quantity of leachate that may threaten ground water.

Finally, today's rule also incorporates preventive measures into the closure and long-term care of landfills. At closure, the owners or operators of all landfills must install a final cap designed to minimize leachate generation and migration, and then maintain and monitor the site for 30 years following closure (unless an approved State sets an alternative time period).

IV. Major Issues

In finalizing today's rule, EPA had to address a number of major issues. The general issues—the application of today's rule to small MSWLFs, the rule's regulatory structure, implementation of the revised Criteria, ground-water policy, and pollutant limits for sewage sludge—are discussed in this section of the preamble. The specific technical issues pertaining to facility design criteria, ground-water monitoring requirements, financial responsibility requirements, the effective date of today's rule, and the application of this rule to closed facilities are discussed later in the technical appendices to the preamble. Moreover, as discussed above, the specific criteria for EPA approval of State programs will be established in a separate rule expected to be proposed in early 1992.

A. Small Landfills

One of the most significant issues raised by commenters was the application of the revised Criteria to small landfills. This is an issue for two reasons. First, the estimated universe of approximately 6,000 MSWLFs subject to the revised Criteria includes a large number of small facilities. Data acquired by EPA through the 1986 survey of MSWLF owners and operators (Ref. 2) indicate that about 50 percent (3,000) of MSWLFs nationwide handle 20 tons or less of municipal solid waste daily. A landfill that receives 20 tons of municipal solid waste per day serves a community of approximately 10,000 people. Second, as proposed, the revised Criteria would have imposed significant costs on these small MSWLFs and the small communities, including small Indian Tribes, they serve. The most significant costs are associated with the design requirements, ground-water monitoring, and corrective action. A unique characteristic of small landfills is that they cannot benefit from the economies of scale available to larger MSWLFs.

The proposal treated all MSWLFs the same, regardless of size. EPA stated in the proposal that size represents only one factor in determining potential risk, and that other variables, such as design and operating controls, location and climate characteristics, and waste streams, can be significant determinants of risk regardless of MSWLF size. The proposal did provide States some flexibility to address particular site-specific conditions present at MSWLFs, including small facilities. In addition, the proposed 18-month rule effective date, combined with the five-year phase-in for ground-water monitoring, provided time for owners or operators of small MSWLFs to comply with the revised Criteria or to make other arrangements for solid waste management. The Agency requested public comment on whether there should be special consideration given to small landfills under the final revised Criteria.

The Agency received extensive comments that directly addressed the issue of small MSWLFs. Many commenters were concerned that small communities, including small Indian Tribes, that own small landfills would face a shortage of professionals appropriately trained in landfill design, installation, and operation that would prevent or severely hamper timely implementation of the revised Criteria. Additionally, commenters expressed concern that small communities would have insufficient financial resources to upgrade their existing small landfills to comply with the revised Criteria. They feared that residents of small communities would resist an increase in landfill tipping fees to cover the additional management and compliance costs associated with the revised Criteria. Moreover, some commenters feared a resurgence in illegal dumping if the Criteria resulted in the closure of the many small landfills now in operation.

In addition to the economic constraints faced by small communities, commenters pointed out that significant obstacles to regionalization of solid waste management exist, particularly in remote areas of the country where communities tend to be small and separated by great distances. In certain portions of Alaska, for example, villages often are separated by miles of tundra. During a large part of the year surface transportation of municipal solid waste becomes virtually impossible due to winter weather conditions, so transporting waste to a distant regional facility is not practicable. Commenters requested that these portions of Alaska not be required to comply with today's requirements. Other commenters noted that regionalization of solid waste management in rural areas of the West that are arid and have few, widely dispersed small communities would be hampered by the need to transport waste over great distances. Moreover, due to the small amounts of annual precipitation in this region there is little generation of landfill leachate, and ground waters are great distances below the surface. Commenters argued that these communities, including small Indian Tribes, should be accorded special treatment. Without such treatment, they indicated that they would be forced to close their landfills. The end result would be increased littering and open dumping, including dumping of trash in waterways.

On the other hand, a number of commenters agreed with the proposal and urged that there be no exemptions granted to small MSWLFs. They argued that even small landfills can pose significant threats to human health and the environment. These commenters believed that marginal, small MSWLFs should be closed in favor of more protective, modern facilities to promote the regionalization of solid waste management.

EPA agrees that regionalization of solid waste management in rural areas, employing larger, better located, designed, and operated MSWLFs, is preferable to continued use of small, poorly planned facilities that may pose health and environmental threats to their communities. The Agency's original thinking with respect to small MSWLFs was that the move to greater regionalization, in order to benefit from the economies of scale, would be a secondary benefit of the revised Criteria. The Agency recognizes, however, that regionalization is not a feasible alternative for some small communities and acknowledges the plight of small MSWLFs in areas of the country where few solid waste management alternatives exist.

In addition, the Agency is sensitive to the hardship the revised Criteria would create for many of these small communities, including small Indian Tribes. The Regulatory Flexibility Analysis (RFA) performed for this rule indicates that some small communities will be impacted by the costs of complying with the revised Criteria. EPA defined the significant impact threshold to be compliance costs exceeding one percent of a community's total budget (which corresponds to a doubling of solid waste disposal costs in the typical community). EPA estimated, under reasonable worst case conditions, that the majority of the communities that would exceed this significant impact threshold would be small communities. To mitigate these impacts, EPA made a number of changes in today's rule that will benefit all small MSWLFs and added a special exemption that will grant specific relief to certain small MSWLFs without practicable regional waste management alternatives. As mentioned previously in this preamble, this special exemption for small MSWLFs reduced the impact of the rule. Less than two percent of local governments exceed the significant economic impact threshold.

As a general matter, some of the changes in today's rule that are applicable to all MSWLFs will benefit small landfills. For example, today's rule allows all MSWLF owners and operators time to comply with the more costly provisions of the revised Criteria by phasing in ground-water monitoring requirements over a five-year period beginning on the date of publication of today's rule. In addition, EPA is delaying the effective date of the financial assurance requirements until 30 months after publication of this rule, which should benefit small communities. Finally, today's rule provides that States with approved programs may shorten the MSWLF post-closure care period on a case-by-case basis. EPA believes that all these measures benefit small MSWLFs.

More specifically directed to small MSWLFs, EPA granted relief in today's rule to certain small MSWLFs where compliance with the revised Criteria is beyond the practicable capability of their communities and circumstances make regional waste management impracticable. Today's rule exempts owners or operators of certain small landfills from certain portions of the criteria, including the design, ground-water monitoring, and corrective action requirements of the revised Criteria. To qualify for this exemption, the landfill must meet the following criteria: (1) The landfill receives less than 20 tons per day of solid waste on an annual average, (2) there is no evidence of existing ground-water contamination from the landfill, and (3) one of the following conditions exists: (A) The landfill serves a community that experiences an annual interruption of at least three consecutive months of surface transportation, which prevents access to a regional waste management facility, or (B) the landfill serves a community for which there is no practicable waste management alternative and the landfill is located in an area that annually receives 25 inches or less of precipitation. These terms and conditions are defined below.

Today's rule defines what the Agency considers to be a "small municipal solid waste landfill" for the purposes of the small landfill exemption. Numerous commenters suggested possible definitions for small MSWLFs, including those MSWLFs that receive less than 500–1,000 tons of municipal solid waste annually, or serve a population of between 1,000 and 20,000 persons. The Agency evaluated these wide range of comments and selected a cutoff of 10,000 persons which corresponds to a landfill size of 20 tons per day. This cut-off falls within the range suggested by commenters and captures the small communities that will be most severely impacted by the final rule. The Agency has tried to strike a balance between granting relief to the appropriate small communities versus exempting all small landfills. The Agency evaluated its existing data base to find that over 50 percent of existing landfills dispose of less than 20 TPD. These 50 percent of the landfills, however, only dispose of 2 to 3 percent of the total waste disposed. Therefore, only a small amount of the total waste disposed is affected by the exemption. For the above reasons, the Agency determined that landfills serving communities (including Indian Tribes) of fewer than 10,000 best defined a "small" MSWLF for the purpose of granting relief from the most costly requirements in the revised Criteria.

In order to facilitate implementation, today's rule defines "small MSWLFs" in terms of the amount of the waste received at the landfill rather than the population served by the landfill. Because population and waste generation patterns will vary over time, EPA believes a definition based on quantity of waste received at the landfill will be more direct and easier to implement. The amount of waste disposed at a MSWLF is either readily available or can be easily estimated. Therefore, the Agency chose a cut-off of 20 tons per day on an annual average, which corresponds to the waste generation of a community of 10,000. Specifically, this figure was derived by multiplying the average amount of solid waste generated daily per person in the United States (4.0 lbs.) by the community size (10,000). The 4.0 lbs. per person figure is contained in the EPA Report "Characterization of Municipal Solid Waste in the United States: 1990 Update" (Ref. 9). In setting the 20 ton per day limit, the Agency specifically included the phrase "on an annual average" to address situations in which small landfills operate only certain days of the week. In such situations, a small landfill serving a population of fewer than 10,000 may receive more than 20 tons of municipal solid waste per day provided the average amount received by the landfill does not exceed 20 tons/day over a one-year period.

Therefore, § 258.1(f) of today's rule defines "small municipal solid waste landfill" as a landfill at which 20 tons or less of municipal solid waste is disposed of daily on an annual average. A landfill that falls within this definition is eligible for the exemption from complying with the design criteria and ground-water and corrective action requirements of today's rule, if there is no evidence of existing ground-water contamination from the landfill and if the community it serves is not practicably capable of regionalizing because of one or two specific conditions described below.

EPA decided to limit the exemption in today's rule to small landfills so long as there is no evidence of ground-water contamination from the facility because the Agency sees no justification for providing relief to landfills that are contaminating ground water. Such contamination may be indicated by contamination of neighboring drinking water wells or other means. In the Agency's view, owners and operators of these landfills should be responsible for taking appropriate corrective action if contamination is present. Therefore, the exemption for small landfills in today's rule is not available to existing landfills for which there is evidence of existing ground-water contamination. Furthermore, today's rule requires that if contamination is discovered at some future date, the owner or operator must notify the State Director and, thereafter, comply with the design, ground-water monitoring, and corrective action provisions in today's rule.

As previously mentioned, today's rule sets forth two situations in which a small MSWLF may qualify for an exemption. The first situation is one in which the MSWLF serves a community that experiences an annual interruption of three consecutive months of surface transportation that prevents access to a regional facility. This provision was developed based on data submitted by commenters from Alaska, where access to some rural villages is restricted by extreme winter climatic conditions. Typically, surface transportation to and from these villages is impossible three months out of the year due to snow and ice accumulation. Consequently, solid waste may only be transported short distances, for all practical purposes prohibiting the use of regional facilities.

The second situation includes MSWLFs that serve communities for which there are no practicable waste management alternatives and are located in areas that annually receive 25 inches or less of precipitation. Long distances between communities are particularly common in the West and often put the regionalization of waste management beyond the practicable capability of small communities, while arid conditions reduce the likelihood of ground-water contamination.

As used in this second situation, EPA considers the term "practicable waste management alternative" to mean another landfill, transfer station,

restrictions, the disease vector and explosive gas controls, recordkeeping, and closure and post-closure planning requirements." (53 FR 33382.)

In response to the two-stage effective date proposal, the Agency received many comments on the implementation of the regulations, especially commenters' views of the capabilities of State authorities to undertake the responsibilities required by EPA's proposed implementation approach. EPA received numerous comments from States as well as owners and operators of MSWLFs stating that 18 months was not a sufficient period of time for States to obtain the necessary statutory and regulatory authorities necessary to implement the rule as proposed. According to these commenters, the consequence of the 18-month effective date would be widespread noncompliance with the revised Criteria and a backlog of permits and closure and corrective action plans awaiting State approval.

For instance, citing the insufficiency of the 18-month time period, one industry commenter stated that: "once the effective date 'kicks in', States will be confronted with not only issuing new permits for new facilities but also revisiting permits for facilities that will continue to operate," and added, "obviously, States will not be able to issue new or revised permits all at once and will have to set priorities." To address this problem, this commenter suggested a way in which to increase the self-implementing nature of the rule, the approach used by the Agency in many of the proposed criteria, through development of largely self-implemented class permits.

Several State agency commenters echoed this concern with the burden placed upon State agencies under the revised Criteria's proposed implementation approach. One State agency commented: "It is unreasonable to expect the States to have the framework in place to approve the gas detection system design and monitoring plans, evaluate and approve the closure plans, and approve the mechanisms chosen for financial assurance within eighteen months of the final rule." Other States commented that the resources and expertise necessary to implement the revised criteria far exceeded those presently available to the State agencies that would be responsible for implementing the revised criteria under the proposed rule.

EPA had proposed a uniform effective date (except for ground water monitoring) of 18 months. The Agency received numerous comments from the public which argued that this 18 month effective date did not provide sufficient time for either owners or operators of MSWLFs to comply with the rule or for states to adopt and implement permit programs to ensure that owners or operators do comply with the rule provisions. EPA still believes that a uniform effective date, except for ground-water monitoring and financial responsibility requirements, is an important aspect of the rule's implementation. However, after closely evaluating the comments received which questioned the wisdom of imposing an 18 month effective date for most provisions of the rule, EPA has decided to extend the effective date by six additional months. As a result, other than for ground-water monitoring and financial assurance requirements, all provisions of the rule will become effective 24 months after the rule is published in the Federal Register.

The Agency is adopting a 24 months effective date instead of the 18 month period contained in the proposed rule for two reasons. First, owners and operators and other commenters stated that the 18 month period did not provide sufficient time for facilities to have sufficient capital and resources to comply with the rule requirements. To deal with these concerns, commenters suggested that the rule become effective in anywhere from 24 to 48 months from the date of publication. EPA has decided to provide an additional six months before the rule becomes effective to assure that owners and operators have sufficient time to comply with the extensive requirements contained in the final rule. As explained elsewhere, EPA has also decided that the ground-water monitoring requirements will be phased in over a five year period and that the financial responsibility requirements will become effective in 30 months.

Secondly, while RCRA section 4005(c) requires states to adopt and implement a permit program or other system of prior approval within 18 months after the revised landfill criteria are promulgated, EPA recognizes that even if states are able to meet that statutory deadline the Agency will still need time to evaluate and make a determination as to the adequacy of the state permit program in accordance with RCRA section 4005(c)(1)(C). Obtaining EPA's approval of a state permit program is an important element in the implementation of the revised Criteria because many of the rule's provisions are tied to whether a state has a permit program which has been approved by the Agency. Six additional months will provide EPA with time that may be necessary to review the adequacy of state permit programs.

EPA also believes that it would be unreasonable to require owners and operators of MSWLFs to comply with newly revised State programs by the same date that the States must have adopted and implemented such programs (i.e., 18 months). By extending the effective date of the revised Criteria by an additional six months, EPA believes that owners and operators will have adequate time to comply with these new State programs.

At the same time, however, the Agency believes it necessary, based upon the significant comments addressing the issue, to provide for a means by which implementation of revised, more protective Criteria can occur within 24 months of today's date. As a result of the numerous comments from both States and owners and operators detailing the lack of State resources for solid waste management programs and the need for more time to implement or revise State permitting programs, the Agency determined that a plan that relied solely on State oversight or interaction with the State could not assure the implementation of the revised Criteria by the rule's effective date. The Agency also realized that without State oversight, the regulations as proposed could not be effectively implemented, because they relied upon a standard that must be developed by the State (e.g., the design standard). In summary, were the revised Criteria promulgated as proposed, EPA determined that the public would not be adequately assured of the implementation of the revised Criteria and the concomitant increases in health and environmental protection in States without approved programs.

In response to the above concerns, the Agency has developed a final rule that provides for effective implementation not only in approved States, where State oversight will be present, but also in States without approved programs. For approved States, today's rule is based on performance standards that allow States to consider local conditions in setting appropriate controls for municipal landfills. This performance standard approach preserves the traditional State role in defining appropriate standards to the greatest extent possible, while having a protective national standard.

Performance standards have been incorporated throughout today's rule. For example, the design criteria in Section 258.40 provides that approved States may approve landfill designs that will ensure that the maximum contaminant levels will be met at the relevant point of compliance in ground water. Under this approach, approved

materials or resource recovery facility that may serve as a reasonable substitute for the MSWLF currently employed for disposal. EPA encourages owners/operators to employ their knowledge of the universe of solid waste management options currently and potentially available when evaluating the merits of available practicable alternatives. Owners/operators may also want to consider the economic implications of long haul distances. As an example, owners/operators might want to consider how much a community must increase its percentage of total budget spent on solid waste disposal to cover costs for waste hauling to a regional facility. The Agency believes that the determination of what haul distances would be considered unreasonable for a community must be made considering local or regional geographical and climatic constraints.

For this second situation, EPA set the 25-inch cap on annual precipitation to ensure that the exemption would be available only to small MSWLFs where the risk of ground-water contamination is reduced because of lessened leachate generation and slower contaminant migration. In selecting a precipitation cut-off, EPA considered comments on the proposal, which used 40 inches of precipitation as the cut-off for the categorical approach to the design criteria. All commenters suggested that the Agency use a precipitation cut-off less than 40 inches of rainfall per year. EPA considered precipitation cut-off values greater than 25 inches per year, but rejected them because EPA believes that the risk of ground-water contamination is too great in these areas. The Agency decided on 25 inches, which represents the lower range of commenters' suggestions and offers a conservative number for determining the availability of the exemption. In addition, this number is generally supported by landfill case studies derived from State data. These data indicate that little leachate is generated in areas where the precipitation does not exceed 25 inches annually, which suggests that precipitation is an indicator of the potential of a landfill to contaminate ground water.

Today's small MSWLF exemption applies to new as well as existing small MSWLFs. Because logistical barriers to regionalization will not likely change over time for many communities, EPA believes that small communities will have as much difficulty meeting the compliance costs for their new MSWLFs as for their existing facilities. However, the Agency considered allowing waivers for new MSWLFs for only a limited period of time (e.g., five years), but rejected this option for two reasons. First, Alaskan villages likely will always have seasonal interruptions of surface transportation. Second, many western communities and Indian Tribes will continue to be geographically isolated and continue to face long haul distances to regional facilities. The Agency does recognize that in some instances the practicability of regionalization will change over time, improving as rural areas develop and gain financial resources.

The small community exemption in today's rule exempts qualifying small MSWLFs from the design, ground-water monitoring, and corrective action requirements of today's rule. The RIA for this rule identified these requirements as the biggest cost items of the final rule for small MSWLFs. Small MSWLFs will still have to comply with the location standards, the operating criteria, closure and post-closure care requirements (excluding ground-water monitoring), and the financial assurance requirements appropriate to these activities. The Agency believes that even small MSWLFs should be subject to these criteria because they are less expensive (relative to other requirements in today's rule) procedures that protect human health and the environment.

EPA believes that exempting small landfills from the ground-water monitoring and corrective action requirements of today's rule comports with the statute (i.e., section 4010 (c)) and the Congressional intent for a number of reasons. First, to address Congressional concern for ground-water contamination, EPA has narrowly drawn the exemption such that only those small MSWLFs for which there is no evidence of ground-water contamination are eligible for the exemption (in addition to one of the other two criteria). Second, as stated above, the exemption is a conditional one such that the owner/operator is no longer eligible for the exemption when there is evidence of ground-water contamination associated with the facility. As such, the facility cannot escape corrective action for known releases. Third, the 25-inch cap on annual precipitation contained in the second criterion ensures that this exemption will be limited to those small MSWLFs where the risk of ground-water contamination is considerably reduced. Finally, both the surface transportation difficulties and the "no practicable waste management alternatives" criteria for obtaining an exemption reflect the "practicable capabilities" evaluation that the statutory language of section 4010(c) and the legislative history indicate Congress intended EPA to conduct when revising the criteria under section 4004(a).

Small communities, including Indian Tribes, whose small landfills do not qualify for a waiver under today's rule should consider regionalization to mitigate costs. Due to economies of scale, small landfills operate at higher cost per ton than larger, regional facilities.

B. Regulatory Structure

Under the regulatory structure of the proposed rule, approval by or interaction with the State regulatory agency by the owner or operator was necessary for implementation of many requirements of the revised Criteria. For example, the proposed design criteria required the owner or operator to design the MSWLF to meet a design goal established by the State. Also, the closure criteria required the owner or operator to close the MSWLF in accordance with a closure plan approved by the State. Although these provisions did not propose an alternative implementation scheme where a State was unable or unwilling to perform the necessary approvals or establish particular standards such as the design goal, the Agency anticipated the limitations of an implementation approach significantly reliant upon State implementation. Under section X.D.1. of the proposed rule preamble, the Agency specifically requested comments on "What is an appropriate and practical EPA role if the States do not adopt and implement the revised Criteria?" (53 FR 33383.)

The proposed rule did suggest an alternative implementation scheme for certain of the revised criteria. Many of the proposed standards were "self-implementing," in that they could be implemented directly by an owner or operator without the supervision or intervention of a State regulatory authority. The self-implementing provisions of the proposed rule were discussed in section X.A.2. of the proposal preamble in the context of a discussion of a suggested two-stage approach to effective dates whereby "self-implementing" aspects of the regulations would become effective in 6 to 12 months and those regulations requiring the participation of a State authority would become effective in 18 months. There the Agency listed the self-implementing provisions of the rule to include the "general operating criteria such as the liquids management

to disapprove the petition because insufficient information was provided.

Thus, as promulgated, every standard in today's rule may be implemented by the owner or operator without State oversight or participation where a State program has not been developed. A self-implementing approach has also been incorporated into the revised Criteria for the wetlands and unstable area location restrictions, the daily cover requirements, explosive gas control requirements, the groundwater monitoring and corrective action provisions, the closure and post closure care requirements, and the financial assurance provisions.

EPA is promulgating self-implementing standards because there may be States which do not act to adopt and implement an adequate program within 24 months. In most States, EPA does not expect this will be a problem. Moreover, to facilitate the expeditious preparation and approval of State programs, the Agency as noted above, will shortly propose a regulation detailing the required elements of an approvable State program. The next section of today's preamble describes the effort.

Despite the promulgation of self-implementing standards in today's rulemaking, EPA continues to believe that requirements such as those pertaining to landfill design, ground-water monitoring, corrective action, and closure should optimally be implemented under the oversight of a State implementing agency. Today's rule does not represent a shift away from the longstanding Agency policy of requiring regulatory oversight of such important procedures. Rather, the inclusion of self-implementing standards in today's rule is a recognition that, due to resource limitations, States may not have adequate programs in place by the effective date of the revised Criteria. This scheme will insure that in States that do not act to establish adequate programs, human health and the environment will be protected and the Federal requirements will be enforceable.

EPA recognizes that self-implemented standards possess certain drawbacks. First, self-implemented standards, such as corrective action plans, may be lacking in certain detail because they lack the input of a qualified and trained State regulatory official. Second, without qualified State oversight, owners and operators intent upon circumventing the regulations may find it easier to do so.

EPA has attempted to mitigate these drawbacks as much as possible in today's self-implementing standards. The final rule establishes, where possible, specific self-implementing requirements that are easy for the owner and operator to interpret and citizens to enforce through citizen suits. (For example, the cover material requirements of § 258.21 specify that landfills must be covered with at least six inches of earthen materials at the end of each operating day, or more frequent intervals if necessary to control disease vectors, fires, odors, blowing litter, and scavenging). This approach, however, was not possible for certain provisions, such as the number, spacing, and location of ground-water wells, where it was impossible for the Agency to set uniform standards because the appropriate approval was highly dependent on site-specific conditions. In these instances, the Agency has established performance criteria that the owner or operator must meet and, in many cases, requires that the owner or operator obtain third party certifications that document the decisions made or action taken to comply with the performance criteria. This certification must be placed in the operating record and made available to the State upon request. The Agency believes that to the extent many of the functions performed by the State under the proposed rule were essentially technical in nature, they may be performed by a third party who is not necessarily employed by or an agent of the State agency. EPA believes that such third-party oversight mitigates the danger of owners or operators abusing the self-implementing system. Finally, today's final rule requires the owner or operator to provide an opportunity for public review of potential corrective action remedies and to notify the State of the selected remedy.

C. Implementation and Enforcement

Another major issue EPA considered in today's rulemaking was the actual implementation and enforcement of the revised Criteria. This involves the procedures by which EPA will determine the adequacy of State programs for implementation of the Criteria, public participation in these programs, and enforcement considerations.

1. Procedures for State Program Approval

As noted above, section 4005(c) of RCRA requires that each State adopt and implement, not later than 18 months after promulgation of the revised Criteria, "a permit program or other system of prior approval and conditions" (State permit program) adequate to assure that each facility that may receive HHW or SQG waste will comply with the revised Criteria. Under section 4005(c) the primary responsibility for implementing and enforcing the revised Criteria rests with the States. EPA is required to "determine whether each State has developed an adequate program" pursuant to section 4005(c).

EPA's approach to State program approval recognizes the traditional State role in implementing landfill standards and protecting groundwater. EPA fully intends that States will maintain the lead role in implementing this program. EPA's goal is for all States to apply for and receive approval of their programs. Under this rule States will have the flexibility to tailor standards to meet their state-specific conditions. The rule's standard requires that an approved State's design be capable of protecting ground water at the specified point of compliance. In selecting a design to meet this performance standard, an approved State may adopt its own performance standard, it may use the rule's specific liner design, or it may use any design it determines would be capable of preventing contamination of ground water beyond the drinking water standards. In short, whenever a State develops a program to deal with local conditions, the Federal liner design alternative would have only the legal status of "guidance" and would not be mandatory. EPA will not require states to obtain a "waiver" of the liner requirement to obtain program approval.

EPA's State program approval rule will also set forth the Agency's proposed approach for implementing the revised Criteria on Indian lands. EPA plans to propose that Indian Tribes be eligible for permit program approval. The full discussion of this issue and rationale for EPA's proposed approach will be included in EPA's proposed State program approval rule.

2. Public Participation

The proposal did not specifically require States to afford interested citizens the opportunity for a public hearing with respect to most of the elements of today's rule. (Consideration of public concerns was proposed and retained in today's final rule, however, in the context of corrective action remedy selection.) Several commenters criticized the proposal because it lacked public participation requirements for MSWLF permitting and closure plan approval; they suggested that the Agency require States to provide for public participation in the implementation of today's rule. The Agency believes that public

States may consider a wide range of site-specific factors in determining the appropriate design that meets the performance standard. At sites where ground water is vulnerable due to the hydrogeologic conditions present, a State may require a composite liner system, similar to that required in today's rule for landfills located in States without approved programs. On the other hand, in areas where the ground water is less vulnerable (e.g., in arid areas), the State will likely determine that a less comprehensive design is fully protective of ground water. In fact, under certain climatic and hydrogeologic conditions, liner systems may not be needed because the hydrogeology at the site may provide adequate protection of ground water.

The rule's standard requires that an approved State's program be capable of protecting ground water that is currently used or reasonably expected to be used for drinking water at the relevant point of compliance. In determining the appropriate mix of prevention and remediation strategies to incorporate into their programs, States are expected to consider the use, value, and vulnerability of potentially affected ground-water resources, as well as the social and economic values of these resources, ensuring that the environmental and public health benefits of each dollar spent are maximized. For landfills located where ground water is currently used or reasonably expected to be used for drinking water, the performance standard requires States to prevent contamination from exceeding drinking water standards. In selecting a program to meet this rule's performance standard, an approved State may use the rule's specific comprehensive design; or it may use any program it determines would be capable of meeting the performance standard. In short, whenever a State develops a program to deal with local conditions, the Federal comprehensive design alternative would have only the legal status of "guidance" and would not be mandatory. EPA will not require States to obtain a "waiver" of the comprehensive design requirement to obtain program approval. States are provided substantial flexibility to consider local site-specific conditions in determining how to address variable ground-water quality or location. For example, if ground water is located several hundred feet below a landfill, or the aquifer is separated from the landfill by a substantial impermeable layer, the State may determine that the comprehensive liner design is not necessary to meet the performance standard. The specific criteria by which State programs will be approved will be published in a separate rule (the "State Implementation Rule"). That rule will set forth specific conditions where State flexibility is appropriate.

As provided in section 4005(c)(1)(B), within 18 months of the promulgation of this rule, States must adopt and implement a permit program or other system of prior approval and conditions that complies with the performance standard announced today. As discussed above, states need not adopt the EPA comprehensive design alternative, but may choose any design or mix of designs that will secure compliance with the rule's performance standard.

In addition, under section 4005(c)(1)(C), EPA must determine whether each State has developed an adequate program to meet the performance standard. As noted above, in making this determination, EPA will rely upon the specific criteria to be published in the State Implementation Rule. In order to ensure that States have the necessary guidance to prepare their submissions for EPA review, the Agency will not require these submissions until 12 months following the promulgation of the State Implementation Rule. Any State submission received before the expiration of this 12-month period will be reviewed pursuant to EPA's authority under section 4005(c)(1)(C), but will not be subject to section 4007(a). This 12-month provision will be included in EPA's proposed State Implementation Rule.

The Agency believes that some States may want to seek early EPA determination that their State programs comply with the performance standard announced today. For example, some States have chosen to adopt strict design standards similar to EPA's comprehensive design. EPA fully expects that these State programs will comply with today's performance standard irrespective of the specific criteria to be developed in the State Implementation Rule. Under these circumstances, EPA expects to make early determinations of State compliance in order to expedite State programs for which favorable EPA determinations appear to be a mere formality.

These early determinations, however, should not be interpreted as implicit guidelines, presumptions, or any other indication of the specific criteria that EPA will use to evaluate State programs. Nor will EPA, in developing the State Implementation Rule, rely upon the standards of the State programs represented in these early determinations. States that have chosen to adopt and implement programs that go beyond the requirements of section 4005(c)(1)(B) are likely to be candidates for early determinations, and do not necessarily provide an appropriate guide to the process that EPA will ultimately use for making compliance determinations under section 4005(c)(1)(C).

Unless and until EPA determines that a State program is not adequate to secure compliance with the performance standard announced today, the State will retain responsibility for administering this Subtitle of the Act.

Today's rule also establishes provisions that ensure effective and protective implementation of this rule in States without approved programs where State oversight will not be present. To address these situations, the Agency has amended each standard under the revised Criteria that required State interaction under the proposed rule to make that standard self-implementing. For example, the design standard (§ 258.40) contains in addition to the performance standard described above for approved States, a self-implementing requirement for landfill design in States without approved programs. This requirement specifies in these cases landfills must be designed with a composite liner meeting certain minimum specifications.

However, § 258.40(e) provides a backstop mechanism which will enable, under certain conditions, owners or operators to employ designs less stringent than EPA's comprehensive design in the unlikely event that the upcoming State Implementation Rule has not been promulgated on schedule. First, the owner or operator of such a facility would need to obtain concurrence from the State that the specific design meets the general performance standard set forth in § 258.40(a)(1). The State would then petition EPA to review its determination. EPA has 30 days to approve or disapprove the State's petition. Unless EPA determined within 30 days of such a petition that the State's determination was inadequate, the alternative design would be deemed to comply with the general performance standard. States are encouraged to work closely with the Regional Offices prior to formal submittal of petitions. This will allow the Agency to identify all information needs and to work with the State to resolve any difficult technical issues. This will also serve to avoid situations where the Agency would have

participation is an important element in the permitting of MSWLFs because it affords the permit writer the opportunity to solicit and consider the views of the public when writing permits. Therefore, the Agency intends to propose public participation requirements for permitting decisions in the State program approval rule. Public participation in the State regulation development process is already required by the public participation requirements contained in 40 CFR part 256.

3. Enforcement Considerations

States that adopt programs meeting the Federal minimum Criteria may enforce them in accordance with State authorities. The preamble to the proposed rule noted that EPA expected the States to assume primary responsibility for implementing and enforcing the revised Criteria, consistent with the solid waste management framework established by the statute in Subtitle D. One commenter expressed concern that by allowing States to enforce the revised Criteria there would be variation in interpretation and enforcement of the revised Criteria from State to State. This commenter suggested that EPA assure uniformity in the interpretation and enforcement of the revised Criteria.

EPA believes that variation in the control applied to landfills in different States is appropriate to account for site-specific factors (e.g., hydrology, precipitation). Therefore, today's rule sets performance standards that allow consideration of site-specific conditions. EPA agrees that while the Federal standards are flexible to allow different site-specific controls in different States, the Federal performance standards should be consistently interpreted from State to State. To ensure that these provisions are consistently interpreted, EPA plans to develop technical guidance for MSWLF owners and operators and State regulatory officials to enhance uniformity in interpretation of the revised Criteria.

Citizens may seek enforcement of the revised Criteria, independent of any State enforcement program, by means of citizen suits under section 7002 of RCRA. Section 7002 provides that any person may commence a civil action on his own behalf against any person who is alleged to be in violation of any permit, standard, regulation, condition, requirement, prohibition, or order that has become effective pursuant to RCRA. Once the self-implementing criteria in today's rule become effective, they constitute the basis for citizen enforcement actions brought in Federal court against facilities that fail to comply. It is important to note, however, that today's MSWLF Criteria offer alternative regulatory approaches in States with approved programs. For example, an approved State may use a performance standard in approving the design of a landfill rather than rely on the uniform liner standard in § 258.40(a)(2) of this rule. In approving State programs, EPA will review and explicitly approve the State's design or performance standard approach. In view of this approval, EPA expects that owners or operators in approved States who use the State's standard will be found by federal courts to have complied with the design requirements in part 258.

Under section 505 of the CWA, any person may commence a civil action against any person alleged to be in violation of an effluent standard or limitation under the CWA. "Effluent standard or limitation" is defined to include a regulation under section 405(d) of the CWA. (Section 505(f), 33 U.S.C. 1365(f).) Because the part 258 Criteria are also standards for sewage sludge use and disposal promulgated under section 405(d) of the CWA, citizen enforcement action in Federal court is authorized against non-complying facilities accepting sewage sludge.

EPA invited public comment on the overall role of EPA enforcement under subtitle D, the proper elements of an enforcement policy for ensuring compliance with the revised Criteria, and strategies for targeting MSWLFs that pose the greatest threat to human health and the environment. The Agency received one comment on the issue of Federal enforcement of the revised Criteria. This commenter noted that the legislative history of section 4005(c), the section authorizing EPA to enforce compliance with the revised Criteria, reflected Congressional concern with the poor record of State implementation of the original provisions of subtitle D. This commenter suggested that the continuing inadequacy of State solid waste program implementation and enforcement, as noted in EPA's own 1988 Report to Congress, argues for a vigorous Federal enforcement role. EPA agrees with the commenter that Congress intended EPA to enforce the revised Criteria in States that have an inadequate permit program. However, the statute is clear that EPA has no enforcement authority under section 4005 in approved States. EPA does, however, retain authority under section 7003 for imminent hazards.

Commenters also questioned whether EPA has authority to enforce the revised Criteria on Indian lands within a State without an approved permit program. This issue will be addressed in the State program approval rulemaking discussed earlier in this preamble.

D. Ground-Water Policy

Another issue EPA had to address in developing today's rule was its ground-water protection policy. This involves the role of ground-water resource evaluation in implementing the revised Criteria as well as additional controls imposed by State wellhead protection programs developed pursuant to the Safe Drinking Water Act.

1. Differential Protection of Ground-Water

Resource value refers to the current and future importance of ground water as a water supply and as an ecological resource. Highly saline ground water or ground water with very low yield may have a low resource value. Pristine ground water or ground water in high demand that cannot easily be replaced or restored similarly may have a high resource value. As EPA was developing the framework for the revised Criteria, the Agency considered at length the subject of differential protection of ground water based on its resource value. Specifically, EPA considered applying different federal engineering controls, monitoring, and corrective action requirements according to the resource value of the ground water.

In 1984 EPA issued the Ground-Water Protection Strategy, which established the concept of differential protection of ground water depending on its resource value. Accordingly, three classes of ground water were identified. Class I ground waters are defined as special ground waters that are highly vulnerable to contamination and that are either irreplaceable sources of drinking water or are ecologically vital. Class II ground waters are defined as current and potential sources of drinking water and those having other beneficial uses. Class III ground waters are defined as heavily saline ground water or ground water otherwise contaminated beyond the level allowing cleanup through methods commonly used by public water supply treatments. In 1991, EPA issued its Ground Water Task Force Report which confirms the role of States in devising ground-water protection strategies to meet State-specific needs. In devising their solid waste programs, States are expected to use ground-water classification and resource evaluations in making their State decisions.

The Agency's Ground-Water Protection Strategy and the concept of differential protection of ground water is

incorporated throughout today's rule. After the effective date and prior to State program approval, this rule requires the use of a specific design in all environmental settings. Following State approval, the rule provides States the flexibility to consider the resource value of ground water in determining appropriate landfill design, ground-water monitoring, and corrective action requirements. For example, today's rule allows States to approve less stringent landfill designs based on the quality of ground water, in addition to other factors. The performance standard for landfill design requires that landfills be designed to meet drinking water standards at a relevant point of compliance in ground water. Approved States may consider the quality of ground water, including whether the ground water is currently used or reasonably expected to be used as drinking water, in setting a relevant point of compliance. By establishing the relevent point of compliance further from the landfill in cases where the ground water is not reasonably expected to be used for drinking water, an approved State may allow less stringent landfill designs.

Subpart D of today's rule specifies that the relevant point of compliance may be up to 150 meters from the boundary of the landfill and must be on land owned by the owner of the landfill. However, the Agency is currently examining this issue as part of the Agency's subtitle C corrective action rule and if changes are made, they will be incorporated into this rule.

Differential protection also is built into today's corrective action requirements. Today's rule allows an approved State to determine that remediation of a release of an appendix II constituent is not necessary in situations where the MSWLF is located over an aquifer that is not currently or reasonably expected to be a source of drinking water, and that is not interconnected with waters to which the hazardous constituents are migrating or are likely to migrate in a concentration(s) that would exceed the ground-water protection standards established under § 258.55(h). Furthermore, today's rule allows the owner or operator to consider the value of ground-water in setting the schedule for initiating and completing corrective action. For example, a tighter schedule may be set for initiating and completing remedial activities for ground water of higher resource value than for ground water of lower resource value.

Today's rule also incorporates ground-water quality as a factor to be used by approved States in setting the phase-in schedule for ground-water monitoring. EPA also is requiring that the frequency of ground-water monitoring be specified by an approved State based on site-specific factors, including the resource value of the ground water. This approach, however, would not allow complete exemptions from ground-water monitoring for facilities located over low value ground water. Even though today's rule allows an approved State to waive the cleanup of a particular appendix II constituent in certain low value ground waters, the Agency believes that at least minimal ground-water monitoring is necessary at all MSWLFs (with the narrowly defined exception of small landfills discussed above) to evaluate the performance of facility design and operation and to identify potential threats to human health and the environment. Furthermore, HSWA specifically provides that the revised Criteria should require ground-water monitoring as necessary to detect contamination at facilities that may receive HHW or SQG waste.

Finally, EPA believes ground-water resource value already plays an important role in local and State decisions regarding the siting of MSWLFs. In this rule EPA has not established Federal siting Criteria specifically based on resource value because EPA believes that, due to the number and nature of MSWLFs regulated under Subtitle D of RCRA, resource value considerations in MSWLF siting are more appropriately made at the State and local levels.

2. Well Head Protection Programs

Section 1428 of the Safe Drinking Water Act (SDWA) contains requirements for the development and implementation of State wellhead protection (WHP) programs to protect wells and wellfields that are used, or may be used, to provide drinking water to public water systems. Under section 1428, each State is to adopt and submit to EPA for approval a WHP program that, at a minimum:

(1) Specifies the duties of State agencies, local governments, and public water systems in the development and implementation of the WHP program;

(2) For each wellhead, determines the wellhead protection area (WHPA), as defined in section 1428(e) of SDWA, based on all reasonably available hydrogeologic information on ground-water flow, recharge, and discharge and other information the State deems necessary to adequately determine the WHPA;

(3) Identifies within each WHPA all potential human sources of contaminants that may have any adverse health effects;

(4) Describes provisions for technical assistance, financial assistance, implementation of control measures, and education, training, and demonstration projects to protect the water supply within WHPAs from such contaminants;

(5) Includes contingency plans for the location and provision of alternate drinking water supplies for each public water system in the event of well or wellfield contamination by such contaminants;

(6) Requires that consideration be given to all potential sources of human contamination within the expected wellhead area of a new water well that serves a public water system; and

(7) Requires public participation in developing the WHP program.

EPA believes that today's rule complements the resource protection goals of State wellhead protection programs. The specific criteria for the location and monitoring of MSWLFs in this rule will help protect ground waters used by public water systems. Under an EPA-approved State WHP program, the State may impose more stringent or additional controls and requirements for MSWLFs than are included in today's rule. Any owner or operator of a MSWLF, in addition to meeting the requirements under today's rule, must also be in compliance with the State's WHP program. Therefore, meeting the requirements of this rule alone will not ensure that an owner or operator of an MSWLF is in compliance with a State's WHP program.

E. Issues Pertaining to Sewage Sludge

As noted above, today's rulemaking fulfills a portion of the CWA section 405(d) mandate that EPA promulgate regulations governing the use and disposal of sewage sludge. For this reason, the part 258 Criteria for MSWLFs are jointly promulgated under CWA and RCRA authorities and apply to all MSWLFs in which sewage sludge is co-disposed with household wastes. EPA believes today's rulemaking fully addresses this widely-used sewage sludge disposal practice.

The Agency received comments on two general issues pertaining to sewage sludge—pollutant limits for sewage sludge and removal credits. The preamble discussion below addresses these issues and presents the Agency's general rationale for using Part 258 to regulate sewage sludge disposal in MSWLFs.

1. Pollutant Limits for Sewage Sludge

In choosing to regulate sewage sludge disposal in MSWLFs by the part 258 Criteria, EPA decided not to establish pollutantspecific, numerical criteria for each toxic pollutant of concern in the sewage sludge for this sludge disposal practice. This decision is consistent with CWA section 405(d)(3), which permits EPA to promulgate alternative standards for protection of public health and the environment where EPA determines it is not feasible to prescribe numerical limits for pollutants of concern. Congress clearly recognized that circumstances would arise where it would not be technically feasible or scientifically justifiable for EPA to prescribe numerical limits for pollutants in sludge for certain sludge use and disposal practices.

EPA concluded it was not technically feasible to develop specific numeric limitations for pollutants in sewage sludge that are co-disposed with municipal solid waste for the following reasons. In developing numerical limitations for specific pollutants for the February 6, 1989 sewage sludge rule, EPA assessed risk to human health and the environment associated with individual pollutants when used or disposed in five different ways (incineration, land application, distribution and marketing, disposal in surface disposal units or disposal in sludge-only landfills). For its assessment, EPA relied on detailed mathematic models to simulate the movement of pollutants through the environment to environmental endpoints at potential risk from these use and disposal methods. A full discussion of this process is found in the proposal at 54 FR 5764–78. However, EPA cannot use its current models to describe the movement of sewage sludge pollutants from a co-disposal facility because of significant scientific uncertainties that confound any modelling effort.

The same mathematical processes used to model pollutant movement from a sludge-only facility cannot be used to establish numerical limitations for the pollutants in sewage sludge that is disposed of with municipal solid waste. The primary reason for this is chemical interaction between the pollutants in sewage sludge and those in municipal solid waste when disposed together in a landfill. The decomposition of garbage in the landfill results in the production of water-soluble, organic fatty acids (acetic, propionic and butyric) that promote the leaching of metals and other substances from the garbage. Sewage sludge, however, slows this process down, the sludge matrix acting to bind metals in insoluble form, significantly reducing their potential for leaching from the landfill. Understanding of this phenomenon is still preliminary and at this juncture, the Agency cannot measure the extent to which sewage sludge reduces the mobility of metals in landfills. Until it has some scientific basis for quantifying this process, the Agency cannot calculate appropriate limitations for the pollutants in the sludge that is disposed of in the landfill. Compounding the difficulty is the absence of data that would form the basis for conclusion about typical levels of organics and metals in garbage in order to select appropriate parameters for these components of any model. Sludge represents only about five percent of the volume of the total mass being disposed of in the landfill. Without knowledge about the character of the municipal solid waste component to potential leaching, it is impossible to calculate limitations for the sludge pollutants. Because of the interactive effect, it would not be scientifically defensible simply to apportion some percentage of the pollutants to the sludge contribution.

While EPA decided that numerical limitations for co-disposed sewage sludge were not feasible, the Agency determined that the design standards applicable to MSWLFs were adequate to protect human health and the environment. The design and engineering standards will prevent the migration of harmful pollutants from the waste leachate. Further, the rule prescribes corrective measures in the event of migration of pollutants. In these circumstances, EPA concluded that these requirements met the protection standard of section 405.

2. Removal Credits

Many industrial facilities discharge large quantities of pollutants to POTWs, where their wastes mix with wastewater from other industrial facilities, domestic wastes from private residences and run-off from various sources prior to treatment and discharge by the POTW. Industrial discharges frequently contain pollutants that are generally not removed as effectively by POTWs as by the industries themselves.

The introduction of pollutants to a POTW from industrial dischargers potentially poses several problems. The discharges may interfere with a POTW's operation, resulting in inadequate treatment of domestic wastes and sewage. Pollutants may pass through the POTW into navigable waters if they are inadequately treated. Finally, even if partially or fully treated by the POTW and removed from the POTW wastestream prior to discharge, these pollutants may settle in and contaminate the sludges produced by a POTW, causing a sludge disposal problem.

In order to prevent these potential problems, Congress has directed EPA in sections 307(b)–(d) of the CWA (33 U.S.C. 1317(b)–(d)) to establish pretreatment standards to "prevent the discharge of any pollutants through (POTWs), which pollutant interferes with, passes through, or otherwise is incompatible with such works." (33 U.S.C. 1317(b).) Pretreatment standards limit the amount of a pollutant that facilities in an industrial category may introduce into a POTW. (Section 307(d), 33 U.S.C. 1317(d).)

Congress recognized that in certain situations POTWs could provide some or all of the treatment of an industrial user's waste stream that would be required pursuant to the pretreatment standards. Consequently, Congress established a discretionary program for POTWs to grant "removal credits" to the indirect discharger. (33 U.S.C. 1317(b).) The credit, in the form of a less stringent pretreatment standard, allows an increased amount of pollutants to flow from the indirect discharger's plant to the POTW.

Section 307(b) of the CWA establishes a three-part test for obtaining removal credit authority. Removal credits may be awarded only if (1) the POTW "removes all or any part of such toxic pollutant," (2) the POTW's ultimate discharge would "not violate that effluent limitation or standard which would be applicable to such toxic pollutant if it were discharged by such source other than through a POTW, and does not prevent sludge use or disposal by such (POTW) in accordance with section (405) . . ." (Section 307(b), 33 U.S.C. 1317b.)

EPA has promulgated removal credit regulations in 40 CFR part 403. On April 30, 1986, the United States Court of Appeals for the Third Circuit invalidated certain portion of the then-effective removal credit regulations. *NRDC* v. *EPA*, 790 F.2d 289, 292 (3rd Cir. 1986), *cert. denied*, 107 S.Ct. 1285 (1987). Among other determinations, the Third Circuit held that, under section 307(b), EPA may not authorize any POTW to grant removal credits to any indirect discharger until EPA promulgates the comprehensive regulations addressing sewage sludge required by section 405 of the CWA. *NRDC* v. *EPA*, 790 F.2d 289, 292 (3rd Cir. 1986).

Congress made this prohibition explicit in the Water Quality Act of 1987 (WQA). While temporarily staying the

effect of the Third Circuit's decision until August 31, 1987, section 406(e) of the WQA provides that, after that date, EPA shall not authorize any other removal credits until EPA issues the sewage sludge use and disposal regulations required by CWA section 405(d)(2)(a)(ii).

EPA considers the part 258 regulations promulgated today to respond adequately to the Third Circuit's decision and section 406(e) of the WQA in the case of POTWs that dispose of all their sewage sludge through co-disposal in MSWLFs. These regulations comprehensively regulate this sludge disposal method. Consequently, the POTWs that dispose of all their sludge in co-disposal MSWLFs may apply to EPA for removal credits authority after the effective date of today's rule. EPA may grant such authority to any POTW that complies with the procedural and substantive requirements of the removal credits regulations.

Section 403.7(a)(3) of EPA's removal credits regulations provides that a POTW may be authorized to grant removal credits only if "the granting of removal credits will not cause the POTW to violate the local, State, and Federal sludge requirements which apply to the sludge management method chosen by the POTW." "Sludge requirements" are defined in 40 CFR 403.7(a)(1)(ii) to include regulatory requirements under section 405 of the CWA. In the case of sludge co-disposed with municipal solid waste, these requirements are spelled out in today's rule.

As previously stated, today's rule satisfies CWA section 405 requirements through a combination of design and operational criteria in association with monitoring wells and corrective action in the effect of failure. However, in consideration of the practicable capability of facilities to implement the requirements in the rule, the part 258 rule allows MSWLFs to phase in compliance with certain requirements. Thus, while the MSWLFs must comply with most of today's requirements within 24 months of publication, a MSWLF has 30 months to meet the financial responsibility requirements and up to five years after the publication date of today's rule to comply with the rule's groundwater monitoring provisions. Consequently, it is likely that some POTWs will, during the phase-in period, send sewage sludge to MSWLFs that have not yet implemented some of the substantive requirements of the rule. While such a phase-in is appropriate for MSWLFs, EPA has determined that POTWs should not be authorized to grant removal credits until the MSWLF to which the POTW sends its sludge is in compliance with all the part 258 requirements.

The statutory scheme of section 307(b) requires sludge use and disposal standards under section 405 before EPA may authorize removal credits. These standards are the predicate to a determination that an indirect discharge to a POTW is not preventing disposal in accordance with these standards as required by section 307(b). But the mere publication of standards does not entitle a POTW to removal credit authorization. EPA's conclusion that today's rule protects public health and the environment against reasonably anticipated adverse effects—the statutory standard of section 405 of the CWA—is based on the assumption that all the part 258 requirements are in place. Consequently, removal credits are not authorized before the statutory protective level is implemented. As Senator Stafford, one of the sponsors of the Water Quality Act of 1987 has pointed out (132 Cong. Rec. S 16427, daily ed. Oct. 16, 1986):

> * * * Congress intended the existence of sludge regulations, and compliance with those regulations, to be a precondition to the granting of removal credits.

Therefore, under today's rule, in order to obtain removal credits authority, the POTW must send its sludge to an MSWLF that has in place all of today's requirements.

Thus, any co-disposal POTW seeking to obtain removal credits authority must demonstrate that it is disposing of its sewage sludge in an MSWLF that meets all the substantive requirements specified today, including all financial responsibility, ground water monitoring, and corrective action requirements. During the period when an MSWLF is phasing into compliance with the substantive part 258 requirements, a POTW relying on such a facility could not obtain authorization to grant removal credits.

It should be noted that while it is the POTW's responsibility to demonstrate the MSWLF's compliance with part 258, such a demonstration may include a statement from the State or regulatory authority certifying that the MSWLF has implemented all part 258 requirements,[2] including remedial requirements where the need for remediation has been triggered. Removal credits regulations do not preclude an industrial user or other interested party from assisting in preparing and presenting the information required in the POTW's application for removal credits authorization. (40 CFR 403.7(e)(7)).

V. Summary of Amendments to Part 257

Today's final rule specifies amendments to 40 CFR part 257 that include conforming changes to part 257 that make it consistent with the proposed part 258, including an update to the maximum contaminant levels listed in appendix I of part 257. This section describes these amendments and the Agency's response to major comments received on the proposal.

A. Conforming Changes to Part 257

Today's action adds municipal solid waste landfills to the list of exceptions to the part 257 Criteria contained in § 257.1(c). Because MSWLFs will now be covered by the part 258 Criteria, they are no longer subject to the part 257 Criteria that are generally applicable to solid waste disposal facilities and practices. The part 257 Criteria are otherwise unchanged with respect to their applicability, and remain in effect for all other facilities and practices.

Today's rule also amends part 257 to include definitions of the types of solid waste disposal facilities regulated by the part 257 Criteria: Landfills, surface impoundments, land application units, and waste piles. These new definitions clarify that these types of solid waste disposal facilities are subject to part 257.

Finally, today's action makes certain conforming changes to § 257.3–4, which currently specifies that a facility or practice shall not contaminate underground drinking water sources beyond the solid waste boundary. For purposes of this requirement, contamination is defined as concentrations of substances exceeding maximum contaminant levels, contained in appendix I to part 257, developed by EPA under section 1412 of the Safe Drinking Water Act. Today's action revises appendix I to incorporate additional MCLs established by EPA. Pursuant to the 1986 amendments to the SDWA, EPA is in the process of promulgating more MCLs. Part 257 will be revised again in conjunction with promulgation of these new MCLs. This

[2] On February 6, 1989, EPA proposed standards (to be codified at 40 CFR part 503) for sewage sludge use and disposal under section 405 of the Clean Water Act, 33 U.S.C. 1365. 54 FR 5745. Specific standards were not proposed for sewage sludge disposed in MSWLFs. Rather, the proposal explained that co-disposed sludge would be regulated under the part 258 criteria that would include requirements for the disposal of sewage sludge in an MSWLF. In the part 503 standards, the Agency proposed and requested comment on a requirement that co-disposing POTWs send their sludge to State-permitted MSWLFs.

same approach will be used to update the MCLs used today in part 258.

Today's rule (both part 257 and part 258) uses the current Maximum Contaminant Level for lead of 50 ppb. The Agency recognizes that today's rule does not incorporate changes to the lead MCL established by EPA in a recently promulgated drinking water regulation (56 FR 26460; June 7, 1991). This regulation rescinds the current MCL of 50 ppb for lead as of November 9, 1992, and establishes a technology-based treatment standard. It does not establish a new MCL for lead. The Agency is currently evaluating how to incorporate this recent change in this and other Agency rules that use the current lead MCL of 50 ppb. EPA will propose necessary changes to today's rule once this evaluation is completed.

B. Notification and Exposure Information Requirements

The proposed amendments to part 257 (53 FR 33328; August 30, 1988) included a notification and exposure information requirement for certain solid waste disposal facilities. Under this proposed requirement, EPA intended to obtain notification and exposure information from a set of industrial solid waste disposal facilities that are of concern, including: Industrial landfills, surface impoundments, land application units, waste piles, and construction/demolition waste landfills. For reasons set forth below, EPA intends to proceed immediately with an alternative information gathering strategy that more clearly defines potential problems by seeking more useful information than was proposed in the notification requirement. The Agency is currently developing the components of that strategy. It may include, for example: An industry-wide statistical survey that will help set priorities for government action. EPA will pursue this information gathering strategy in lieu of the proposed notification requirement.

These facilities are of concern to the Agency because they represent a large and diverse set of solid waste disposal facilities that may receive quantities of small quantity generator and household hazardous waste, and some may pose a threat to human health and the environment. Evaluation of the potential threats at these facilities is further compounded because of limited facility design and monitoring criteria. The scope of the industrial nonhazardous waste problem is discussed in more detail in EPA's 1988 Report to Congress on Solid Waste Disposal in the United States.

The information that EPA proposed to require from these facilities in the notification consisted of two parts, including:

(1) A one-time notification that solicited information about facility owners, locations, amounts and types of wastes handled, and waste disposal practices applicable to existing facilities, and

(2) Exposure information indicating the number of households located within one mile of the facility and the number or ground-water monitoring wells at the facility.

The notification requirement was to be a preliminary step in assembling information that would enable EPA to identify the universe of facilities, and at the same time serve to remind the owners and operators of industrial solid waste disposal facilities that they are still subject to the existing part 257 criteria. The results of the notification requirements would also be used to design subsequent more specific information collection strategies for the development of any future program actions covering these facilities.

The notification and exposure information requirements were intended to update and supplement information that EPA had previously collected on the identity of facilities and their waste management practices. For example, in 1987 EPA conducted a stratified survey of 18,051 establishments from 17 different standard industrial categories (SICs), (see draft EPA report, Screening Survey of Industrial Subtitle D Establishments, available in the RCRA docket). This survey was based on information obtained from Dun's Marketing, Inc., which included establishment name, location, SIC codes, and other financial information. The result of this survey provided EPA with national and industry-specific estimates on:

- The number of establishments that manage industrial subtitle D waste on site;
- The number of establishments that manage subtitle D waste on site in landfills, surface impoundments, land application units, and waste piles;
- The number of landfills, surface impoundments, land application units, and waste piles used to manage industrial subtitle D waste; and
- The quantity of industrial Subtitle D waste managed on site in land-based waste management units.

EPA estimated that 72,400 establishments managed about 7 billion metric tons of industrial solid waste in 1985, and an estimated 20 percent of 12,000 establishments used at least one type of land-based waste disposal unit to manage waste. Further, about 99 percent of the industrial solid waste is generated and managed on site by facilities within the 17 SICs surveyed.

In its Report to Congress (Ref. 1), EPA stated its belief that, based on the information EPA collected to date, industrial hazardous waste facilities as a class may pose a threat to human health and the environment. However, additional information would be needed to evaluate the nature and extent of that threat. In the proposal, EPA proposed to begin the process of collecting additional information on these facilities by first establishing a baseline facility inventory through the proposed facility notification requirement. The notification was planned as a first step in an information collection process. EPA would use information received from the notification requirement to update and supplement facility inventory data that were already available to EPA to more accurately define the size of the nonhazardous waste management facility universe. The inventory would aid EPA in targeting categories of facilities for more detailed information collection that may be needed for the development of future waste management or other Agency program actions.

As a result of public comments on the proposed notification requirement, and additional information that has become available since the proposed rulemaking, EPA has changed its thinking on how best to collect needed information to characterize problems and set priorities for addressing this diverse universe of waste handlers. Some commenters argued that, because of the diverse nature of industrial solid waste, more detailed information about the physical and chemical characteristics of the waste would be needed to assess potential risks and support any development of waste management guidelines, than was present on the proposed notification form. More detailed information might include specific data on hazardous constituents contained in the waste, disposal facility size and location, ground-water monitoring information, and other detailed facility-specific information. The Agency agrees with the commenters arguments concerning the scope of data elements necessary.

In addition to this information, the General Accounting Office (GAO) completed a recent report [3] (Ref. 10) that

[3] GAO examined ground-water monitoring data from 112 industrial solid waste disposal facilities in California and New Jersey. State officials reported that 68 (61 percent) of the 112 facilities studied indicated ground-water contamination (i.e., constituents at levels above the State's standards or

Continued

confirmed the assessment of environmental threats made earlier by EPA in its Report to Congress (Ref. 1). This GAO report further emphasizes these findings using the results of an analysis of a study of 112 facilities in two states.

EPA believes the public comments received on the proposed notification, together with EPA's earlier findings concerning health threats and the findings in GAO's report, provide a compelling case to move forward more expeditiously than was previously proposed toward a more comprehensive information collection strategy to better understand the risks posed by these facilities and to assess the need for any future program actions by the Agency.

EPA believes that, while the notification requirement proposed in the 1988 proposal would provide EPA with better information than it currently has on the baseline inventory of facilities, it would not provide sufficient information needed to characterize potential problems and evaluate the need for future Agency action. Further, the time and resources required to complete this notification process would delay EPA's ability to accelerate a more detailed information collection effort for industrial nonhazardous waste management facilities. EPA would have to expand the notification requirements significantly to gather data that are believed to be needed.

Instead of expanding the data requirements of the notification, the Agency has, therefore, chosen to eliminate the notification and exposure information requirements in § 257.5 of today's final rule in order to move forward expeditiously on a more comprehensive information collection effort. As mentioned in the introduction to this section, the elements under consideration include:

—An industry-wide statistical survey that will help set priorities for government action

—Facility specific case studies to better understand facility operations, waste generation and waste management practices, and

—An understanding of State program requirements and accomplishments, since States will undoubtedly remain the front-line government agencies in day to day environmental management.

EPA anticipates that this approach will provide the Agency with the flexibility and capability to better understand the specific relative health and environmental risks posed by the broad range of facilities and wastes under study.

VI. Summary of Part 258

The following is a summary of each subpart of part 258. A detailed discussion of major comments received on each subpart of the proposal and the Agency's response to these comments is contained in Appendices B–H.

A. Subpart A—General

Subpart A contains the purpose, scope, applicability, and effective date of part 258 (§ 258.1). It provides definitions necessary for the proper interpretation of the rule (§ 258.2), and indicates that there are other Federal laws and regulations with which an owner or operator of a MSWLF must comply (§ 258.3).

The purpose of part 258 is to establish minimum national criteria for municipal solid waste landfills, including MSWLFs used for sludge disposal and disposal of nonhazardous municipal waste combustion (MWC) ash (whether the ash is co-disposed or disposed of in an ash monofill). Part 258 sets forth minimum national criteria for the location, design, operation, cleanup, and closure of MSWLF units. The rule provides that States will have flexibility in implementing these criteria, where States wish to run the program. A MSWLF unit that does not meet the part 258 Criteria will be considered to be engaged in the practice of "open dumping" in violation of section 4005 of RCRA. MSWLF units that receive sewage sludge and fail to satisfy these criteria will be deemed to be in violation of sections 309 and 405(e) of the Clean Water Act.

Figure 1 depicts the decisionmaking process that owners and operators of MSWLF units should use to determine the applicability of part 258 requirements to MSWLF units. As indicated in the figure, the Criteria do not apply to owners and operators of MSWLFs that have stopped receiving waste prior to October 9, 1991 (see § 258.1(c)). Owners and operators of MSWLFs that stop receiving waste between October 9, 1991 and October 9, 1993 are exempt from all of the requirements of part 258 except the final cover requirements cited in § 258.1(d). Finally, MSWLFs that receive waste on or after the effective date of today's rule October 9, 1993 must comply with all provisions of part 258 on the effective date with two exceptions. They are (1) the ground-water monitoring provisions of subpart E, which are phased in over a five-year period beginning on the date of publication of today's Rule, and (2) the financial responsibility provisions of subpart G, which are effective 30 months after the date of publication of today's Rule.

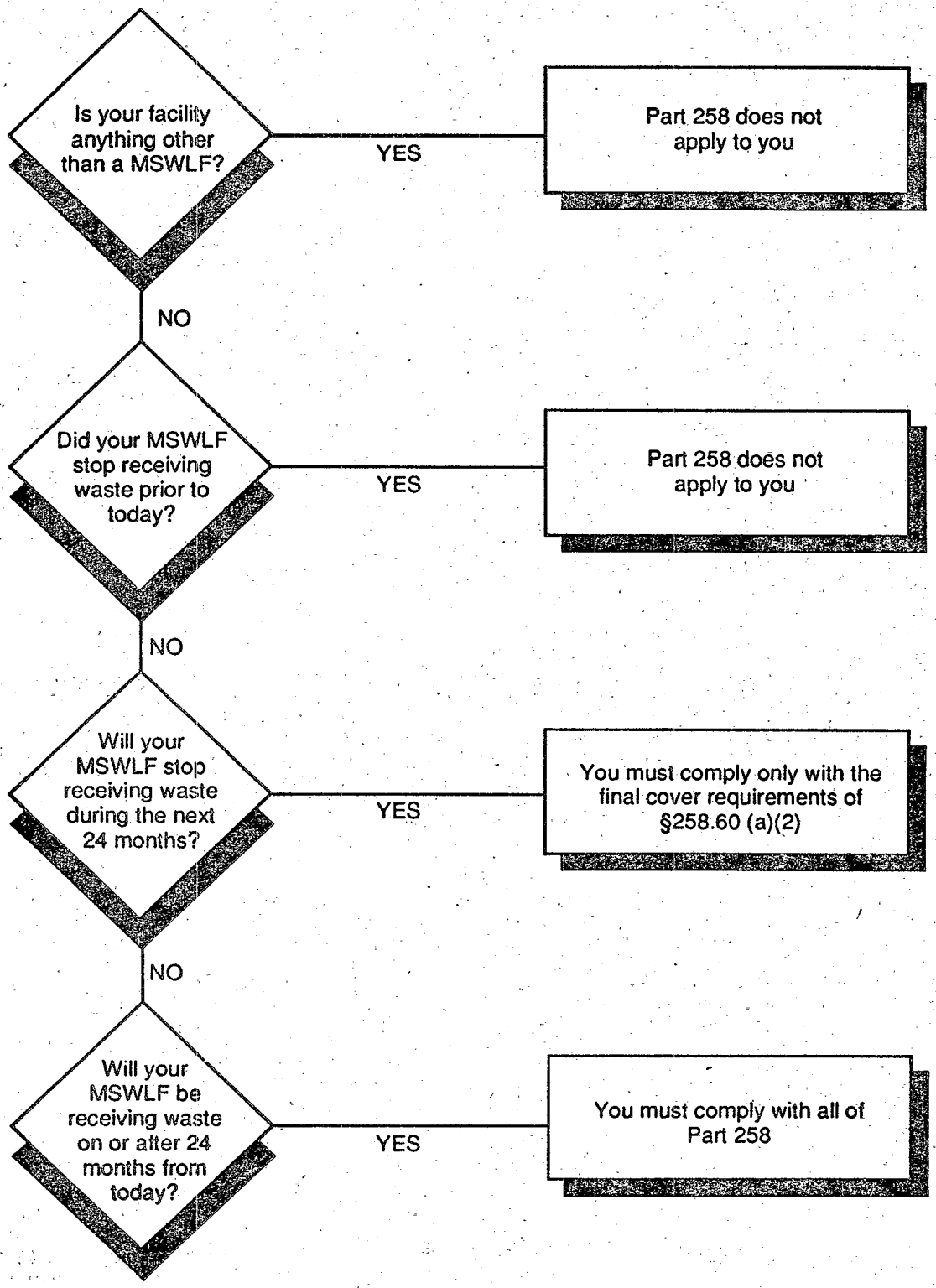
BILLING CODE 6560-50-M

---

prescribed limits.) At 32 (29 percent) of the 112 facilities, the known or suspected source of ground-water contamination was an industrial landfill, surface impoundment, or construction/demolition debris landfill.

Figure 1

What requirements apply to my MSWLF?



OTI10006L

BILLING CODE 6560-50-C

B. Subpart B—Location Restrictions

Subpart B of today's rule establishes six location restrictions applicable to MSWLF units. As shown in Figure 2, certain of these location restrictions are applicable to existing units. All of today's location restrictions require the owner or operator to demonstrate that the meet the specific criteria. The owner or operator must place these demonstrations in the operating record and notify the State Director.

BILLING CODE 6560-50-M

Figure 2

Which Location Restrictions Apply to my MSWLF?

Existing Units	New Units and Lateral Expansions
1. Airports	1. Airports
2. Floodplains	2. Floodplains
3. Unstable Areas	3. Unstable Areas
	4. Wetlands
	5. Seismic Impact Zones
	6. Fault Areas

BILLING CODE 6560-50-C

OTH0011L

1. Section 258.10 Airport Safety

Under today's rule, owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used only by piston-type aircraft must demonstrate that the unit does not pose a bird hazard to aircraft. The owner or operator must notify the State Director (as with all of today's demonstrations) that the demonstration has been placed in the operating record.

In addition, today's rule requires that owners or operators proposing new MSWLF units or lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the appropriate Federal Aviation Administration (FAA) office. This procedural requirement is consistent with existing FAA Order 5200.5A.

2. Section 258.11 Floodplains

The floodplain provision applies to new MSWLF units, lateral expansions, and existing MSWLF units located in 100-year floodplains. These MSWLF units may not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in the washout of solid waste so as to pose a hazard to human health or the environment.

3. Section 258.12 Wetlands

Today's wetland provisions apply only to new units and lateral expansions of existing units; they do not apply to existing units. New MSWLF units or lateral expansions of MSWLF units are barred from wetlands unless the owner or operator can make the following demonstrations to the Director of an approved State. First, the owner or operator must rebut the presumption that a practicable alternative to the proposed landfill is available that does not involve wetlands. Second, the owner or operator must show that the construction or operation of the landfill will not cause or contribute to violations of any applicable State water quality standard, violate any applicable toxic effluent standard or prohibition, jeopardize the continued existence of endangered or threatened species or critical habitats, or violate any requirement for the protection of a marine sanctuary. Third, the owner or operator must demonstrate that the MSWLF unit will not cause or contribute to significant degradation of wetlands. To this end, the owner or operator must ensure the integrity of the MSWLF unit, minimize impacts on fish, wildlife, and other aquatic resources and their habitat from release of the solid waste, and assure that the ecological resources in the wetland are sufficiently protected. Fourth, the owner or operator must demonstrate that steps have been taken to attempt to achieve no net loss of wetlands by first avoiding impacts to wetlands to the maximum extent practicable, then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions.

Because this demonstration must be approved by the Director of an approved State, this provision effectively bans the siting of new MSWLF units and lateral expansions in wetlands in States that do not have an EPA-approved permitting program.

On August 9, 1991, the Administrator announced a comprehensive plan for the protection of the Nation's wetlands. Included were a number of actions to improve the workability of the Clean Water Act section 404 regulatory program, which regulates the discharge of dredged or fill material into wetlands. Among these changes will be the development of wetlands categories by an interagency technical committee based on wetland value. After such a categorization scheme is developed, the mitigation sequence (i.e., avoidance, minimization, and then compensation) will be retained for the high value wetlands category, and projects in other wetland categories will be required to offset wetlands losses through compensatory mitigation. When such wetlands categories are identified, the above changes to the section 404 permitting program will be implemented through amendment of applicable legal authorities. Section 258.12 of today's rule is consistent with regulatory provisions currently governing the section 404 program. When the section 404 regulatory program is modified in accordance with the Administrator's wetlands protection program, relevant portions of this rule will be modified accordingly.

Furthermore, four agencies have recently published proposed revisions to a technical guidance document implementing the current regulatory definition of wetlands, and the agencies will shortly be proposing to codify portions of that document in the Code of Federal Regulations. See 56 FR 40446 (Aug. 14, 1991). The definition of wetlands contained in § 258.12 of today's rule reflects the Agency's current definition under the section 404 program. See 40 CFR 232.2(r). When the agency proposes amendments to the definition of wetlands under the section 404 program, such changes will also be proposed for the definition contained in § 258.12 of today's rule.

4. Section 258.13 Fault Areas

Today's rule bans the location of new MSWLF units and lateral expansions within 200 feet (60 meters) of faults that have experienced displacement during the Holocene Epoch. In States with approved programs, the owner or operator may site within the 200-foot zone if the owner or operator demonstrates to the Director of an approved State that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the MSWLF unit and will be protective of human health and the environment.

5. Section 258.14 Seismic Impact Zones

Today's rule bans the location of new MSWLF units and lateral expansions in seismic impact zones. In States with approved programs, owners or operators may locate new MSWLF units and lateral expansions in a seismic impact zone if they successfully demonstrate to the Director of an approved State that the unit is designed to resist the maximum horizontal acceleration in lithified material for the site. The design features to be protected include all containment structures (i.e., liners, leachate collection systems, and surface water control systems). For purposes of this requirement, seismic impact zones are defined as areas having a 10 percent or greater probability that the maximum expected horizontal acceleration in hard rock, expressed as a percentage of the earth's gravitation pull (g), will exceed 0.10g in 250 years.

6. Section 258.15 Unstable Areas

Owners or operators of new MSWLF units, lateral expansions, and existing MSWLF units located in unstable areas must demonstrate to the State Director's satisfaction that the integrity of the structural components of the unit will not be disrupted. The demonstration must show that the structural components of the MSWLF can withstand the impacts of establishing events, such as landslides. The structural components include liners, leachate collection systems, final cover systems, run-on and run-off control systems, and any other component used in the construction and operation of the MSWLF unit that is necessary for

protection of human health and the environment.

7. Section 258.16 Closure of Existing Units

Today's rule requires owners and operators of existing MSWLF units that cannot make the airport safety, floodplain, or unstable area demonstrations required under §§ 258.10(a), 258.11(a), or 258.15(a) to close the MSWLF unit within five years of the date of publication of this rule unless the Director of an approved State extends the deadline. The Director of an approved State may extend the deadline for up to two years, but only after considering the availability of alternative waste disposal capacity and the potential risk to human health and the environment.

C. Subpart C—Operating Criteria

Subpart C of today's rule establishes operating requirements for new MSWLF units, existing MSWLFs, and lateral expansions. Figure 3 lists these operating requirements, each of which is explained briefly below.

BILLING CODE 6560-50-M

Figure 3

OPERATIONAL REQUIREMENTS

All owners/operators must:

- Exclude the receipt of hazardous waste
- Provide daily cover
- Control on-site disease vectors
- Provide routine methane monitoring
- Eliminate most open burning
- Control public access
- Construct run-on and run-off controls
- Control discharges to surface water
- Cease disposal of most liquid wastes
- Keep records that demonstrate compliance

BILLING CODE 6560-50-C

1. Section 258.20 Procedures for Excluding the Receipt of Hazardous Waste

Today's rule requires owners or operators of all MSWLF units to implement a program at the facility for detecting and preventing the disposal of regulated quantities of hazardous wastes and polychlorinated biphenyl (PCB) wastes. This program must include random inspections of incoming loads, records of any inspections, and training of facility personnel to recognize regulated hazardous waste and PCB wastes, and notification to States with authorized RCRA subtitle C programs or the EPA Regional Administrator in an unauthorized State if a regulated hazardous waste or PCB wastes are discovered at the facility.

2. Section 258.21 Cover Material Requirements

Today's rule requires owners or operators of all MSWLF units to cover disposed solid waste with at least six inches of earthen materials at the end of each operating day. Daily cover is necessary to control disease vectors, fires, odors, blowing litter, and scavenging. The Director of an approved State can temporarily waive the daily cover requirement during extreme seasonal climate conditions and may allow alternative materials to be used as daily cover material.

3. Section 258.22 Disease Vector Control

Today's rule requires owners or operators of all MSWLF units to prevent or control on-site disease vector populations using appropriate techniques to protect human health and the environment.

4. Section 258.23 Explosive Gases Control

Today's rule requires the owners or operators of all MSWLF units to ensure that the concentration of methane generated by the MSWLF not exceed 25 percent of the lower explosive limit (LEL) in on-site structures, such as scale houses, or the LEL itself at the facility property boundary. The owner or operator must implement a routine methane monitoring program, with at least a quarterly monitoring frequency. If the methane concentration limits are exceeded, the owner or operator must notify the State Director within seven days that the problem exists and submit and implement a remediation plan within 60 days.

5. Section 258.24 Air Criteria

Section 258.24(a) requires owners or operators of all MSWLF units to comply with applicable requirements of State Implementation Plans (SIPs) developed under section 110 of the Clean Air Act (CAA). Open burning is prohibited except in limited circumstances, which include the infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

6. Section 258.25 Access Requirements

Section 258.25 requires owners or operators of all MSWLF units to control public access to MSWLF units and to prevent illegal dumping of wastes, public exposure to hazards at MSWLFs, and unauthorized vehicular traffic.

7. Section 258.26 Run-on/Run-off Control Systems

Section 258.26 requires owners or operators of all MSWLF units to design, construct, and maintain run-on and run-off control systems to prevent flow onto and control flow from the active portion of the MSWLF unit. Run-off from the active portion of the unit must be handled in accordance with the surface water requirements of today's rule.

8. Section 258.27 Surface Water Requirements

Under today's rule, all MSWLF units must be operated in compliance with National Pollutant Discharge Elimination System (NPDES) requirements, established pursuant to section 402 of the Clean Water Act. Any discharges of a nonpoint source of pollution from an MSWLF unit into waters of the United States must be in conformance with any established water quality management plan developed under the Clean Water Act.

9. Section 258.28 Liquids Restrictions

In today's rule, the disposal of bulk or noncontainerized liquid wastes in MSWLF units is prohibited, with two exceptions: (1) The waste is household waste (other than septic waste) and (2) the waste is leachate or gas condensate that is derived from the MSWLF unit, and the MSWLF unit is equipped with a composite liner and leachate collection system.

Containers of liquid waste can be placed in MSWLF units only when the containers (1) are small containers similar in size to that typically found n household waste; (2) are designed to hold liquids for use other than storage; or (3) hold household waste. "Liquid waste" is defined in today's rule as any waste material determined to contain free liquids as defined by Method 9095 "Paint Filter Liquids Test".

10. Section 258.29 Recordkeeping Requirements

Today's rule requires that the documents and records required under this Part be retained near the facility in an operating record by the owner or operator of each MSWLF unit. (An alternative location may be approved by the Director of an approved State.) These documents are listed in § 258.29(a) of today's rule. Upon completion of each document required in the operating record, the owner or operator must notify the State Director of its existence and its addition to the operating record. Furthermore, all information contained in the operating record must be furnished upon request or be made available at all reasonable times for inspection by the State Director.

Today's rule allows the Directo[illegible] approved State to set alternative schedules for the recordkeeping and notification requirements specified in the rule except the notification requirements in § 258.10(b) pertaining to the notification of the FAA by owner/operators planning to site a new or lateral expansion of a MSWLF within a 5-mile radius of an airport, and § 258.55(g)(1)(iii) pertaining to the notification of persons who own land or reside on land overlying a plume of ground-water contamination.

D. Subpart D—Design Criteria

Subpart D of today's rule establishes facility design requirements applicable to new MSWLF units and lateral expansions. These requirements do not apply to existing units.

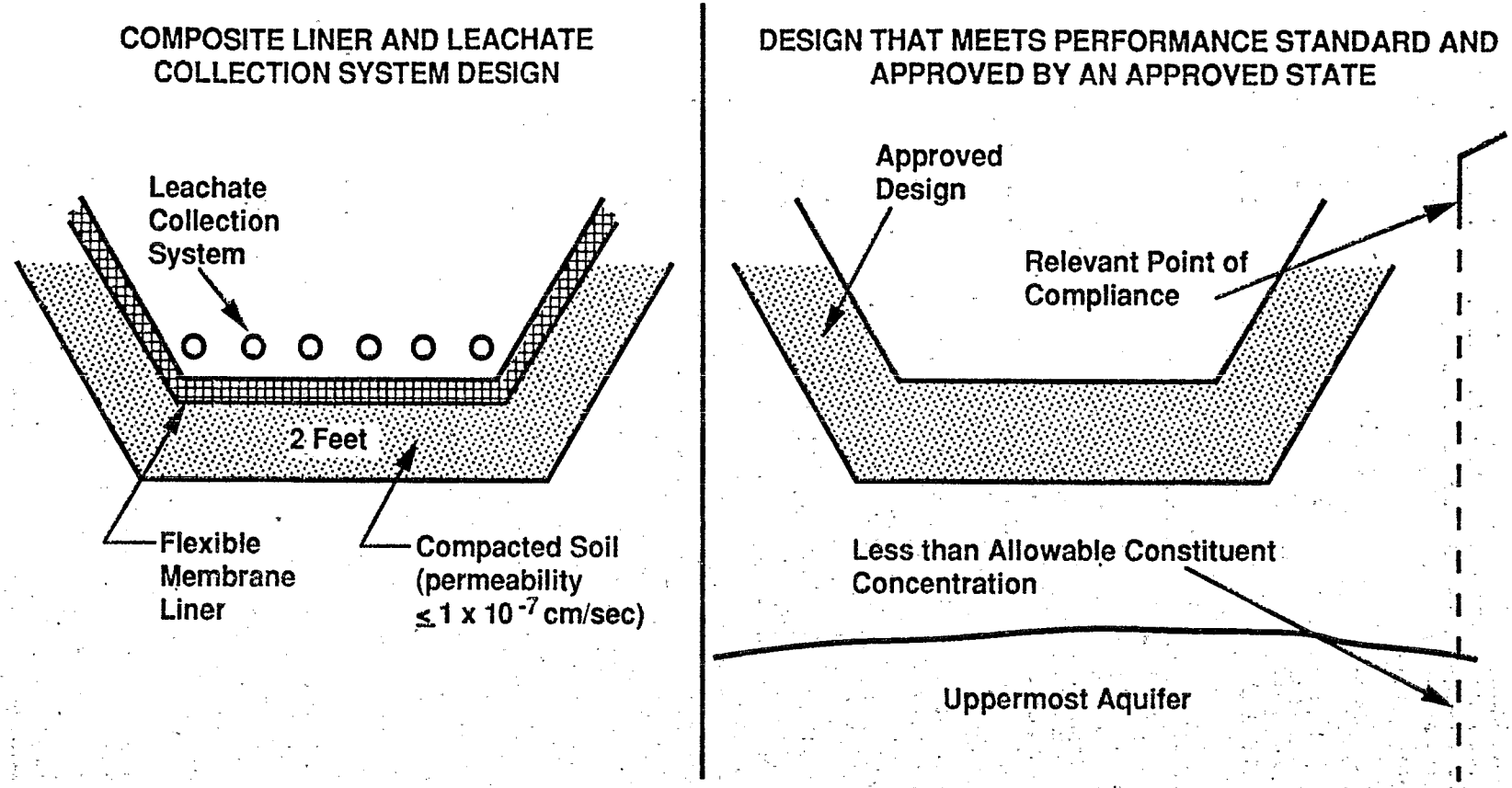
Today's final design criteria provide owners and operators with two basic design options: A site-specific design that meets the performance standard in today's rule and is approved by the Director of an approved State or a composite liner design. These two design options are depicted graphically in Figure 4.

BILLING CODE 6560-50-M

Figure 4

DESIGN CRITERIA

New MSWLF units and lateral expansions must have one of the following designs:



BILLING CODE 6560-50-C

The first option, which is available in approved States, allows owners or operators to consider site-specific conditions in developing a design that must be approved by the Director of an approved State. This design must meet the performance standard in § 258.40, which requires that the design ensure that the MCLs (Table 1 of today's rule) will not be exceeded at the relevant point of compliance.

When evaluating whether designs meet the performance standard, the approved States must consider a number of site-specific factors, such as the climate and hydrogeology of the site. For example, in areas where ground water is vulnerable, the State may require a composite liner system. In other areas where ground water is less vulnerable, the State may determine that a less comprehensive design meets the performance standard. State program approvals will be established in accordance with the "State Implementation Rule," expected to be proposed in early 1992.

The second option, the composite liner system, is required only for landfills located in States without EPA approved programs. The composite liner system is designed to be protective in all locations, including poor locations. It consists of a composite liner, including a flexible membrane liner and a compacted soil component, and a leachate collection and removal system.

EPA is concerned that certain owner/operators of new units or lateral expansions may be forced to use the design standard in § 258.40(a)(2) in situations where the composite liner specified in that section is not necessary to protect human health and the environment, and their state does not have program approval. In these cases the performance standard under § 258.40(a)(1) may be more appropriate since it would potentially avoid an unnecessarily stringent design. Therefore, the Agency has established a petition process in § 258.40(e). This process allows the owner/operator to use the performance standard in § 258.40(a)(1) if the State determines that the owner/operator's design meets the performance standard, and the State petitions EPA to review its determination, and EPA either approves the design or does not disapprove the design within 30 days of receipt.

Additional discussion regarding today's design criteria can be found in sections IV.B and IV.C and appendix D of this preamble.

E. Subpart E—Ground-Water Monitoring and Corrective Action

a. To Whom Does This Requirement Apply?

Today's rule requires a system of monitoring wells to be installed at new units, lateral expansions, and existing MSWLF units. Owners and operators of landfills that qualify for the small community exemption are not required to comply with the requirements of this subpart. In addition, today's rule provides for limited waivers for owners or operators who can demonstrate to the Director of an approved State that the MSWLF unit is located above a hydrogeologic setting that will prevent hazardous constituent migration to ground water during the active life of the unit, as well as during facility closure and throughout the post-closure period (§ 258.50(b)).

b. When Must Ground-Water Monitoring be in Place?

New MSWLF units must have ground-water monitoring systems in place prior to accepting waste. The schedule for installing the ground-water monitoring system at existing MSWLF units and lateral expansions is dependent upon the location of the landfill with respect to the nearest drinking water intake (§ 258.50(c)).

Today's rule allows the Director of an approved State to establish an alternative compliance schedule for phasing in the ground-water monitoring requirements at existing MSWLF units. This alternative schedule provides that all existing MSWLF units will be required to have ground-water monitoring systems by October 9, 1996 (§ 258.50(d)).

c. What Criteria Must the Ground-Water Monitoring System Meet?

The ground-water monitoring system must consist of a sufficient number of appropriately located wells able to yield ground-water samples from the uppermost aquifer that represent the quality of background ground water and the quality of ground water passing the relevant point of compliance as specified by the Director of an approved State (§ 258.51). Each MSWLF unit is required to have a separate ground-water monitoring system unless the Director of an approved State allows multi-unit ground-water monitoring systems based on consideration of several factors. Monitoring wells must be cased in a manner maintaining the integrity of the bore hole and must be maintained so as to meet design specifications. The number, spacing, and depths of monitoring wells may be based on site-specific characteristics, but each ground-water monitoring system must be certified as adequate by a qualified ground-water scientist or approved by the Director of an approved State.

d. What are the Procedures for Sampling and Analysis?

The rule provides procedures for sampling monitoring wells and methods for the statistical analysis of ground-water monitoring of hazardous constituents released from the MSWLF (§ 258.53). Requirements are included for determination of ground-water elevations, background ground-water quality, and the number of samples to be collected.

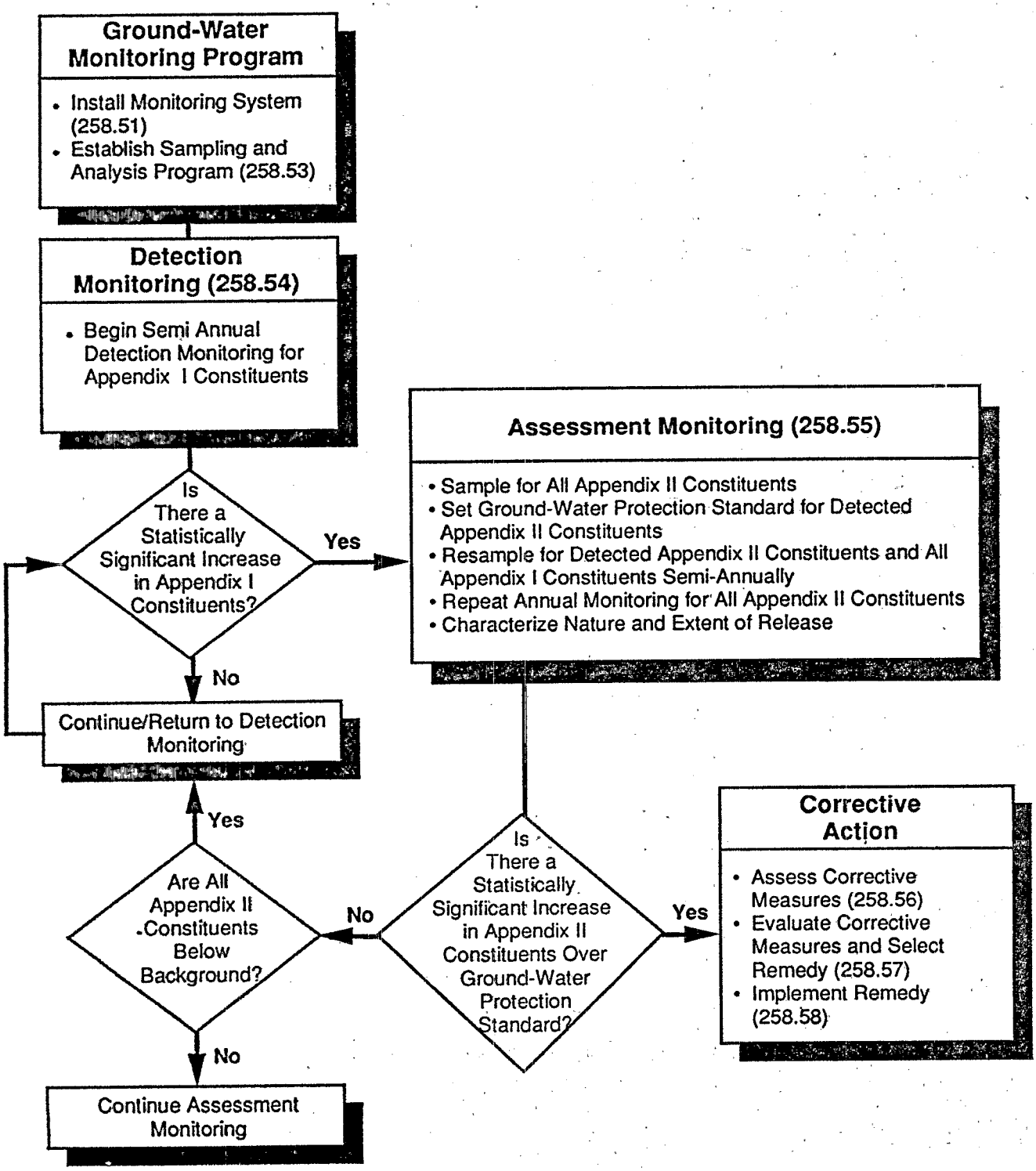
e. What are the Steps in the Ground-Water Monitoring and Corrective Action Programs?

Today's monitoring and corrective action provisions include three steps, which are depicted in Figure 5. In the first step, today's rule requires owners or operators of MSWLFs to establish background concentrations and sample at least semiannually during the active life of the facility, closure, and post-closure periods for a set of detection monitoring indicator parameters (§ 258.54). These indicator parameters include 47 volatile organic compounds and 15 metals (see Appendix I). The Director of an approved State may delete any of the constituents in Appendix I if it can be determined that a constituent is not reasonably expected to be contained in or derived from the waste contained in the unit. In addition, the Director of an approved State may establish an alternative list of inorganic indicator parameters for a MSWLF unit, in lieu of some or all of the heavy metals (constituents 1–15 in Appendix I), if the alternative parameters provide a reliable indication of inorganic releases from the MSWLF unit to the ground water. The Director of an approved State also may specify an alternate frequency for repeated sampling of Appendix I constituents during the active life of the MSWLF, and during post-closure. The alternative frequency during the active life must be no less than annual.

BILLING CODE 6560-50-M

Figure 5

Ground-Water Monitoring and Corrective Action



BILLING CODE 6560-50-C

If any of the detection monitoring parameters are detected at a statistically significant level over the established background concentrations, the owner or operator must move to the second step, assessment monitoring, and notify the State Director. After determining a statistically significant increase over background concentrations, the owner or operator must establish an assessment monitoring program unless he or she can demonstrate, based on certification by a qualified ground-water scientist (or approval of the Director of an approved State), that the contamination has resulted from a source other than the landfill or that the increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality.

Assessment monitoring (§ 258.55) requires annual analysis for the full list of hazardous constituents included in appendix II. However, the Director of an approved State may specify an alternative frequency for annual sampling and analysis of the full list of appendix II constituents, and may specify an appropriate subset of wells for the annual appendix II analysis. The Director of an approved State also may modify the list of constituents in appendix II if it can be determined that a constituent is not reasonably expected to be in or derived from the waste contained in the unit.

If any appendix II constituents are detected, in either the initial or repeated appendix II analyses, the owner or operator must notify the State Director and continue to monitor, at least semiannually, for those constituents in appendix II that were detected. The Director of an approved State may specify an alternative frequency other than semiannual. If the owner or operator demonstrates, at any time during assessment monitoring, that all of the detected appendix II constituents are at or below background values for two consecutive sampling events, he must notify the State and may return to detection monitoring.

For each appendix II constituent that is detected, background concentrations and a ground-water protection standard (GWPS) must be set. The GWPS must be the MCL or background concentration level for the detected constituent. However, the Director of an approved State may set an alternative GWPS based on criteria defined in today's rule. The owner or operator must compare the levels of those detected appendix II constituents to the appropriate GWPS. If subsequent monitoring indicates a statistically significant increase over the GWPS, the owner or operator is required to notify the State Director and local officials and characterize the nature and extent of contamination. The owner or operator must make a best effort to characterize the nature and extent of the plume, including the delineation of the plume off site. As part of characterizing the nature and extent of the release, the owner or operator must install additional wells, if necessary. At least one well, however, must be installed at the facility boundary in the direction of contaminant migration in order to ascertain whether or not the contaminants have migrated past the facility boundary. If contamination has migrated off-site, the owner or operator must notify individuals who own land or reside on land overlying the plume.

The owner or operator must then evaluate alternative corrective measures (§ 258.56) and select the appropriate remedy (§ 258.57). During this phase, the owner or operator is required to continue at least semiannual monitoring (or an alternative frequency no less than annual) for all appendix I constituents (or an alternative list approved by the Director of an approved State) and for those appendix II constituents exceeding the GWPS. As part of evaluating potential remedies, the owner or operator must hold a public meeting to discuss the remedies under consideration (prior to selecting a final remedy). Once the owner or operator has selected a remedy, he must place a description of the selected remedy in the operating record and notify the State Director.

The Director of an approved State may determine, however, that remediation of a release is not necessary if: (1) The ground water is contaminated by multiple sources and cleanup of the contamination resulting from the MSWLF will provide no significant reduction in risk; (2) the contaminated ground-water is not currently or reasonably expected to be a source of drinking water and is not hydraulically connected to other waters; (3) remediation is not technically feasible; or (4) unacceptable cross-media impacts would result from remediation.

After the remedy has been selected, the owner or operator is required to implement the corrective measure, establish a corrective action ground-water monitoring program, and take any necessary interim measures (§ 258.58). During implementation of the corrective measure, the owner or operator may determine that a requirement for the remedy cannot be met. In this situation, the owner or operator must obtain certification of a qualified ground-water scientist (or approval of the Director of an approved State) that the requirement cannot be met, notify the State Director, and implement an alternate measure.

Once implemented, corrective action must continue until the owner or operator achieves compliance with the GWPS for a period of three consecutive years or an alternate period of time determined by the Director of an approved State. Upon completion, the owner or operator must obtain certification that the remedy is complete from a qualified ground-water scientist (or approved by the Director of an approved State) and notify the State Director.

F. Subpart F—Closure and Post Closure-Care

Today's rule requires owners or operators of new MSWLF units, lateral expansions, and existing MSWLF units to close each unit in accordance with specified standards and to monitor and maintain the units after closure. In addition, the rule requires all owners or operators to prepare closure and post-closure plans describing these activities and to comply with a minimum set of procedural requirements.

1. Closure Requirements

All owners or operators of MSWLF units must install a final cover designed to minimize infiltration and erosion. The infiltration layer must be a minimum of 18 inches of earthen material that has a permeability less than or equal to the permeability of the bottom liner system or natural subsoils, or no greater than $1 \times 10-5$ cm/sec, whichever is less. The erosion layer must be a minimum of six inches of earthen material that can sustain native plant growth. The Director of an approved State may allow an alternative cover design if the cover layers achieve the same objectives as the specified design in the final rule.

2. Post-Closure Care Requirements

Today's rule requires all owners or operators to conduct post-closure care activities for a period of 30-years after the closure of each MSWLF unit. The Director of an approved State may either reduce the 30-year post-closure period if the Director determines a shorter period will be protective of human health and the environment or increase the post-closure care period if he/she determines that a lengthened period is necessary to protect human health and the environment. During the post-closure care period, all owners or operators of MSWLF units must

maintain the integrity and effectiveness of the final cover, and continue ground-water monitoring, gas monitoring, and leachate management.

3. Planning Requirements

Today's rule also requires owners or operators of MSWLF units to prepare closure and post-closure plans describing activities that will be undertaken to properly close each MSWLF unit and maintain them after closure. These plans must be prepared and placed in the facility operating record no later than the effective date of today's rule, or by the initial receipt of waste, whichever is later.

The closure and post-closure care standards also include certain procedural requirements. First, prior to closing each landfill unit, an owner or operator must notify the State Director and include the notification in the facility operating record. Second, the owner or operator must begin closure of a landfill unit within 30 days after the final receipt of waste and complete closure within 180 days. Extensions of both of these deadlines may be granted only by the Director of an approved State and only if certain criteria are met. Third, following closure of the last landfill unit, owners or operators of all MSWLF units must record a notation in the deed to the property, that indicates that the property has been used as an MSWLF unit and that its use is restricted. Finally, owners or operators of all MSWLFs must notify the State Director and place in the facility operating record a certification signed by an independent registered professional engineer (or approved by the Director of an approved State) that verifies that closure and post-closure care activities have been conducted in accordance with the closure and post-closure plans.

G. Subpart G—Financial Assurance Criteria

Today's rule requires owners or operators of all new MSWLFs, lateral expansions, and existing MSWLF units, except those owned or operated by State or Federal government entities, to demonstrate financial responsibility for the costs of closure, post-closure care, and corrective action for known releases.

Today's rule requires owners or operators of MSWLF units to demonstrate financial responsibility for closure, post-closure care, and corrective action for known releases in an amount equal to the cost of a third party conducting these activities. The cost estimates must be updated annually for inflation and whenever operation or design changes increase the costs at the MSWLF unit. An owner or operator may reduce his cost estimates and the amount of financial responsibility provided he places a justification for the reduction in the estimate in the operating record and notifies the State Director.

Today's rule includes a list of specific financial mechanisms that may be used to demonstrate financial responsibility, as well as criteria for judging whether other mechanisms are acceptable. The rule permits the use of a trust fund with a pay-in period, surety bond, letter of credit, insurance, State-approved mechanism, and State assumption of responsibility.

Today's rule releases an owner or operator from closure, post-closure care, or corrective action financial responsibility when he or she has notified the State Director that he has placed in the facility operating record a certification signed by an independent registered professional engineer (or approved by the Director of an approved State) that the specific activities (i.e., closure, 30 years of post-closure care, corrective action) have been completed in accordance with the appropriate plan. In addition, to be released from financial responsibility closure, an owner or operator must file the required notation to the deed that the land has been used as an MSWLF unit.

The financial responsibility requirements are effective 30 months after the publication of today's rule to allow time for rule development and implementation.

VII. Implementation of Today's Rule

States and owners and operators will need to undertake a number of steps to implement today's rule. As discussed below, many of these steps, such as State program upgrades and owner or operator compliance planning, need to be initiated well before the effective date of the rule.

A. State Activities

As indicated earlier, States will play a key role in implementing today's rule. RCRA requires States to adopt and implement, within 18 months of the promulgation of this rule, a permit program or other system of prior approval to ensure that MSWLFs are in compliance with the revised Criteria. EPA is required to determine whether States have developed adequate programs.

To implement the above statutory mandate, States need to move quickly to review their existing permitting program to determine where their program must be upgraded and to complete the necessary program changes, if any are needed. States should work closely with the appropriate EPA Regional Office during this process and in developing the appropriate program information for EPA review and approval. The process and criteria EPA will use in evaluating the adequacy of State programs will be set forth in a separate rule, the "State Implementation Rule," to be issued shortly. The Agency recognizes the traditional role of States in implementing landfill standards and fully intends that the States will maintain the lead role in implementing today's program. Therefore, EPA's goal is for all States to apply for and receive approval of their programs.

Once a State is approved by EPA, the State will implement its revised subtitle D program (or continue with their current program if no changes were needed). As part of this effort, States will need to review and modify existing permits as necessary and incorporate the revised Criteria into new permits. Approved States may establish alternative compliance schedules for ground-water monitoring at existing landfills and approve alternative methods of compliance for selected requirements. Finally, approved States will need to conduct inspection and enforcement activities.

B. Owner or Operator Activities

Owners or operators are responsible for compliance with today's rule by the effective date regardless of the status of the State's program. In fact, today's rule is structured to facilitate self-implementation by the owner or operator. However, if the facility is located in an approved State, the owner or operator has the opportunity for increased flexibility in complying with today's rule. As mentioned above, approved States may approve, under certain conditions, alternative compliance schedules and methods or procedures. The owner or operator should contact the State to determine the status of the State program.

Owners and operators should begin planning immediately for compliance with today's rule. A key first step is determining which requirements, if any, will apply. Figure 1 in Section VI of today's preamble provides a decision-making process to assist in this process. Figure 1 indicates, for example, that if your MSWLF will not receive waste after the effective date, only the final cover requirements of § 258.60(a)(2) will apply. If the community plans to phase out its existing MSWLF, it will need to identify an alternative waste

management arrangement for the community.

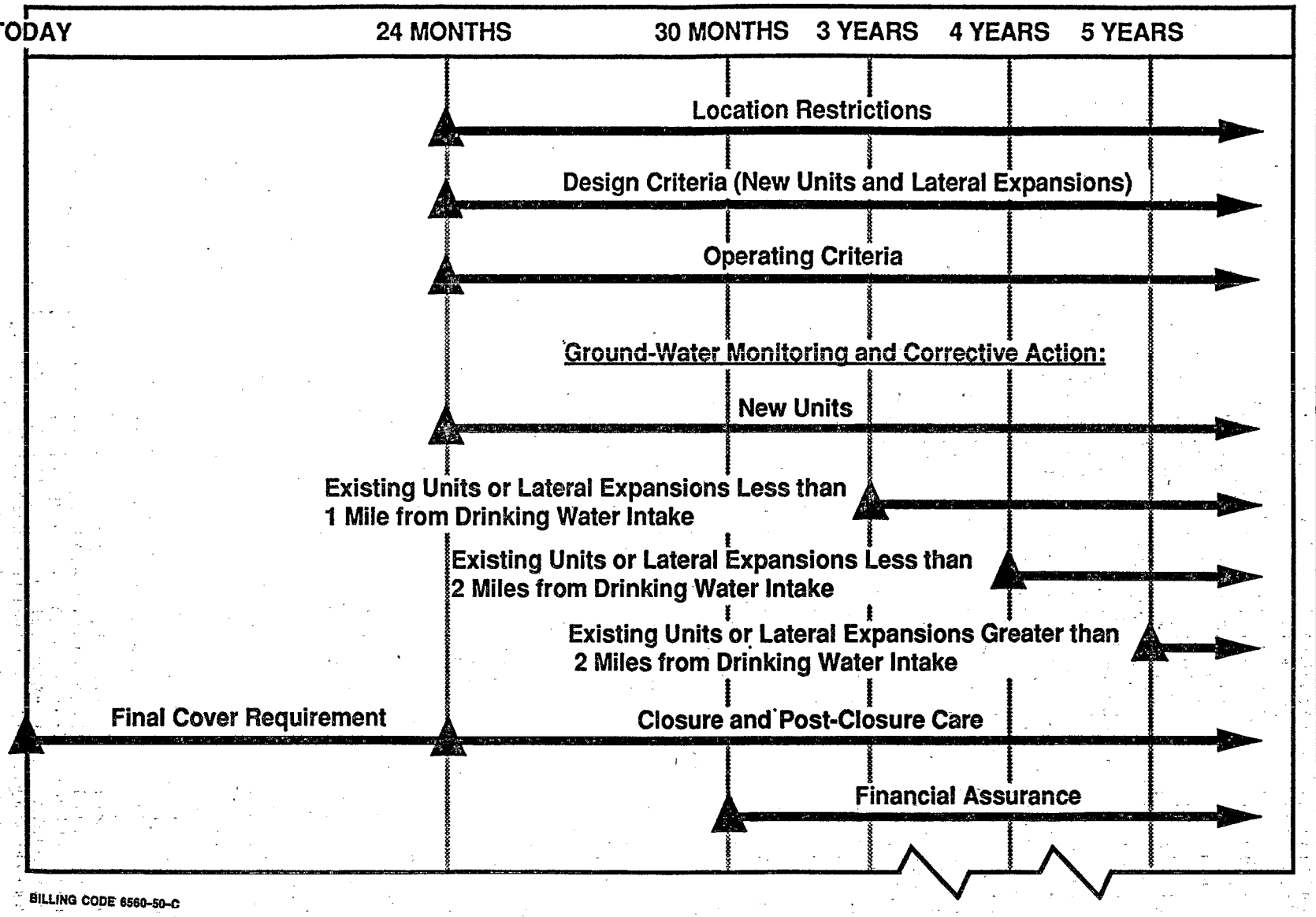
If the MSWLF will receive waste after the effective date of today's rule, all or some of the Part 258 requirements will apply. The specific requirements applicable to your MSWLF unit depend on whether your MSWLF unit is an existing unit, lateral expansion, or a new MSWLF unit. All requirements apply to new units and lateral expansions; all requirements, except certain location restrictions and the design criteria, apply to existing MSWLF units. Section VI of this preamble summarizes the major requirements in today's rule and their applicability to various types of MSWLF units.

Once an owner or operator has determined which requirements will apply to her/his MSWLF unit, the owner or operator should begin to take steps to ensure compliance by the effective date of the requirement. Figure 6 provides an overview of today's requirements and when they will become effective. All requirements are effective in 24 months, except ground-water monitoring (for existing units and lateral expansions) and financial responsibility. Ground-water monitoring is phased in over a five-year period for existing MSWLF units and lateral expansions, and owners and operators must comply with financial assurance in 30 months.

BILLING CODE 6560-50-M

Figure 6

EFFECTIVE DATE OF PART 258 REQUIREMENTS



BILLING CODE 6560-50-C

(7) U.S. EPA, OSWER, Report to Congress, Methods to Manage and Control Plastic Wastes. EPA/530-SW-89-051. February 1990.

(8) U.S. EPA, OSW, Summary of Data on Municipal Solid Waste Landfill Leachate Characteristics—Criteria for Municipal Solid Waste Landfills (40 CFR part 258)—Subtitle D of the Resource Conservation and Recovery Act (RCRA). July 1988. (draft). EPA/530-SW-88-038, PB88-242 441.

(9) U.S. EPA, OSWER, Characterization of Municipal Solid Waste in the United States: 1990 Update. EPA/530-SW-90-042. June 1990.

(10) U.S. GAO, Nonhazardous Waste: Environmental Safeguards for Industrial Facilities Need to be Developed. GAO/RCED-90-92. April 1990.

XI. List of Subjects

40 CFR Part 257

Reporting and recordkeeping requirements, Waste disposal.

40 CFR Part 258

Corrective action, Household hazardous waste, Liner requirements, Liquids in landfills, Reporting and recordkeeping requirements, Security measures, Small quantity generators, Waste disposal, Water pollution control.

Dated: September 11, 1991.

William K. Reilly,

Administrator.

For reasons set out in the preamble, title 40 of the Code of Federal Regulations is amended as set forth below:

PART 257—CRITERIA FOR CLASSIFICATION OF SOLID WASTE DISPOSAL FACILITIES AND PRACTICES

1. The authority citation for part 257 is revised to read as follows:

Authority: 42 U.S.C. 6907(a)(3), 6944(a) and 6949a(c), 33 U.S.C. 1345 (d) and (e).

2. Section 257.1 is amended by adding paragraph (c)(10) to read as follows:

§ 257.1 Scope and purpose.

* * * * *

(c) * * *

(10) The criteria of this part do not apply to municipal solid waste landfill units, which are subject to the revised criteria contained in part 258 of this chapter.

3. Section 257.2 is amended by revising the definition for "facility" and adding definitions in alphabetical order for "land application unit," "landfill," "municipal solid waste landfill unit," "surface impoundment," and "waste pile" to read as follows:

§ 257.2 Definitions.

* * * * *

Facility means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment and disposal.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and that is not a land application unit, surface impoundment, injection well, or waste pile.

* * * * *

Municipal solid waste landfill (MSWLF) unit means 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 this section. A MSWLF unit also may receive other types of RCRA Subtitle D wastes, such as commercial solid waste, nonhazardous sludge, and industrial solid waste. Such a landfill may be publicly or privately owned. An MSWLF unit may be a new MSWLF unit, an existing MSWLF unit or a lateral expansion.

* * * * *

Surface impoundment or *impoundment* means a facility or part of a facility that is a natural topographic depression, human-made excavation, or diked area formed primarily of earthern materials (although it may be lined with human-made materials), that is designed to hold an accumulation of liquid wastes or wastes containing free liquids and that is not an injection well. Examples of surface impoundments are holding storage, settling, and aeration pits, ponds, and lagoons.

* * * * *

Waste pile or *pile* means any noncontainerized accumulation of solid, nonflowing waste that is used for treatment or storage.

* * * * *

4. In 40 CFR part 257, Appendix I is revised to read as follows:

Appendix I to 40 CFR Part 257—Maximum Contaminant Levels (MCLs)

MAXIMUM CONTAMINANT LEVELS (MCLS) PROMULGATED UNDER THE SAFE DRINKING WATER ACT

Chemical	CAS No.	MCL (mg/l)
Arsenic	7440-38-2	0.05
Barium	7440-39-3	1.0
Benzene	71-343-2	0.005
Cadmium	7440-43-9	0.01
Carbon tetrachloride	56-23-5	0.005

MAXIMUM CONTAMINANT LEVELS (MCLS) PROMULGATED UNDER THE SAFE DRINKING WATER ACT—Continued

Chemical	CAS No.	MCL (mg/l)
Chromium (hexavalent)	7440-47-3	0.05
2,4-Dichlorophenoxy acetic acid	94-75-7	0.1
1,4-Dichlorobenzene	106-46-7	0.075
1,2-Dichloroethane	107-06-2	0.005
1,1-Dichloroethylene	75-35-4	0.007
Endrin	75-20-8	0.0002
Fluoride	7	4.0
Lindane	58-89-9	0.004
Lead	7439-92-1	0.05
Mercury	7439-97-6	0.002
Methoxychlor	72-43-5	0.1
Nitrate		10.0
Selenium	7782-49-2	0.01
Silver	7440-22-4	0.05
Toxaphene	8001-35-2	0.005
1,1,1-Trichloroethane	71-55-6	0.2
Trichloroethylene	79-01-6	0.005
2,4,5-Trichlorophenoxy acetic acid	93-76-5	0.01
Vinyl chloride	75-01-4	0.002

5. A new part 258 is added to read as follows:

PART 258—CRITERIA FOR MUNICIPAL SOLID WASTE LANDFILLS

Subpart A—General

Sec.
258.1 Purpose, scope, and applicability.
258.2 Definitions.
258.3 Consideration of other Federal laws.
258.4–258.9 [Reserved].

Subpart B—Location Restrictions

Sec.
258.10 Airport safety.
258.11 Floodplains.
258.12 Wetlands.
258.13 Fault areas.
258.14 Seismic impact zones.
258.15 Unstable areas.
258.16 Closure of existing municipal solid waste landfill units.
258.17–258.19 [Reserved].

Subpart C—Operating Criteria

Sec.
258.20 Procedures for excluding the receipt of hazardous waste.
258.21 Cover material requirements.
258.22 Disease vector control.
258.23 Explosive gases control.
258.24 Air criteria.
258.25 Access requirements.
258.26 Run-on/run-off control systems.
258.27 Surface water requirements.
258.28 Liquids restrictions.
258.29 Recordkeeping requirements.
258.30–258.39 [Reserved].

Subpart D—Design Criteria

Sec.
258.40 Design criteria.
258.41–258.49 [Reserved].

Owners or operators should examine each of the applicable requirements to identify steps necessary to ensure compliance. First, the owner or operator should evaluate the characteristics of the landfill site to determine if it complies with the location restrictions in today's rule. Certain restrictions apply for areas near airports, floodplains, unstable areas, wetlands, seismic impact zones, and fault areas. Some operational or design modifications may be needed at existing MSWLFs or for new MSWLFs that are planned.

Today's final design requirements do not apply to existing units. However, owners or operators of new MSWLF units or lateral expansions should review their design plans to ensure that they will meet the specifications of the final rule (i.e., a design that meets the performance criteria in subpart D of today's rule and is approved by the Director of an approved State or a composite liner design).

Owners or operators of MSWLFs should review the current operating procedures (or planned procedures if a new unit or a lateral expansion) of the landfill to determine if all required operational procedures are currently being carried out at the facility. For example, the owner or operator will need to have a routine methane monitoring program in place, control disposal of liquids, and establish a program for detecting and preventing disposal of regulated hazardous waste and PCB wastes. All of today's operating requirements are summarized in Section VI above.

As part of examining and upgrading the operation of the landfill, the owner or operator will need to begin steps to establish a ground-water monitoring program at the facility or upgrade the existing monitoring program. These steps include characterizing the hydrogeology of the site, installing wells, and establishing a sampling and analysis program. As indicated in Figure 6, the date monitoring must be in place depends on the location of the landfill with respect to drinking water intakes. Approved States may set an alternative schedule so owners and operators should contact their States for information on the status of the State program.

Owners and operators will also need to develop and have in place within 24 months closure and post-closure care plans for the landfill. These plans must describe the various activities and procedures the owner or operator will follow in closing and carrying out post-closure care at the landfill.

Finally, the owner or operator should begin early planning for implementation of the financial assurance requirements in today's rule. During the next 30 months, EPA plans to propose and finalize a special test for local governments. Therefore, owners and operators, particularly local governments, should track this effort and provide input to the Agency on the proposal.

VIII. EPA Training on Final Rule

As part of the implementation program for this rule, EPA is planning to conduct technical training for owners and operators, local government, and States. This training, which will be held at several locations throughout the country, will provide guidance on interpreting the technical provisions of today's rule. This training will be based on a comprehensive technical guidance document the Agency is currently developing for this rule. EPA expects that the guidance and the training programs will be available within the next six months. Specific information regarding the dates and locations of these programs will be announced in the Federal Register in the near future.

IX. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq*. The requirements are not effective until OMB approves them and a technical amendment to that effect is published in the Federal Register.

The total annual public reporting burden for this collection of information is estimated to be 204,400 hours with an average of 50 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223Y, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

X. References

A. Comment Response Documents

The following comment response documents have been prepared and placed in docket number F-91-CMLF-FFFFF.

- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Notification Requirements (40 CFR part 257) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—General Provisions (40 CFR part 258—subpart A) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Location Restrictions (40 CFR part 258—subpart B) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Operating Criteria (40 CFR part 258—subpart C) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Design Criteria (40 CFR part 258—subpart D) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Ground-water Monitoring and Corrective Action (40 CFR part 258—subpart E) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Closure and Post-Closure Care (40 CFR part 258—subpart F) August 1991.
- U.S. EPA, OSW. Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—Financial Assurance (40 CFR part 258—subpart G) August 1991.

B. Regulatory Impact Analysis

- U.S. EPA, OSW, Regulatory Impact Analysis (RIA) for the Final Criteria for Municipal Solid Waste Landfills—(40 CFR part 258)—Subtitle D of RCRA —December 1990.
- U.S. EPA, OSW, Addendum to RIA for the Final Criteria for Municipal Solid Waste Landfills—(40 CFR part 258)—Subtitle D of RCRA—August 1991.
- U.S. EPA, OSW, Comment Response Document on the Proposed Solid Waste Disposal Facility Criteria—RIA—August 1991.

C. Other References

(1) U.S. EPA, OSWER, Report to Congress, Solid Waste Disposal in the United States. EPA/530-SW-88-011B. October 1988.

(2) U.S. EPA, OSW, Survey of Solid Waste (Municipal) Landfill Facilities. August 1988.

(3) U.S. EPA, OSWER, The Solid Waste Dilemma: An Agenda for Action. EPA/530-SW-89-019. February 1989.

(4) U.S. EPA, OSWER, Decision-Makers Guide to Solid Waste Management. EPA/530-SW-89-072. November 1989.

(5) World Wildlife Fund & The Conservation Foundation, Getting at the Source: Strategies for Reducing Municipal Solid Waste. 1991.

(6) U.S. EPA, OSW, Characterization of Products Containing Lead and Cadmium in Municipal Solid Waste in the United States, 1970 to 2000. EPA/530-SW-89-015. January 1989.

Subpart E—Ground-Water Monitoring and Corrective Action

Sec.
258.50 Applicability.
258.51 Ground-water monitoring systems.
258.52 [Reserved].
258.53 Ground-water sampling and analysis requirements.
258.54 Detection monitoring program.
258.55 Assessment monitoring program.
258.56 Assessment of corrective measures.
258.57 Selection of remedy.
258.58 Implementation of the corrective action program.
258.59 [Reserved].

Subpart F—Closure and Post-closure Care

Sec.
258.60 Closure criteria.
258.61 Post-closure care requirements.
258.62–258.69 [Reserved].

Subpart G—Financial Assurance Criteria

258.70 Applicability and effective date.
258.71 Financial assurance for closure.
258.72 Financial assurance for post-closure care.
258.73 Financial assurance for corrective action.
258.74 Allowable mechanisms.
Appendix I to Part 258—Constituents for Detection Monitoring
Appendix II to Part 258—List of Hazardous and Organic Constituents

Authority: 42 U.S.C. 6907(a)(3), 6944(a) and 6949(c); 33 U.S.C. 1345 (d) and (e).

Subpart A—General

§ 258.1 Purpose, scope, and applicability.

(a) The purpose of this part is to establish minimum national criteria under the Resource Conservation and Recovery Act (RCRA or the Act), as amended, for all municipal solid waste landfill (MSWLF) units and under the Clean Water Act, as amended, for municipal solid waste landfills that are used to dispose of sewage sludge. These minimum national criteria ensure the protection of human health and the environment.

(b) These Criteria apply to owners and operators of new MSWLF units, existing MSWLF units, and lateral expansions, except as otherwise specifically provided in this part; all other solid waste disposal facilities and practices that are not regulated under Subtitle C of RCRA are subject to the criteria contained in part 257 of this chapter.

(c) These Criteria do not apply to municipal solid waste landfill units that do not receive waste after October 9, 1991.

(d) MSWLF units that receive waste after October 9, 1991 but stop receiving waste before October 9, 1993 are exempt from all the requirements of this part 258, except the final cover requirement specified in § 258.60(a). The final cover must be installed within six months of last receipt of wastes. Owners or operators of MSWLF units described in this paragraph that fail to complete cover installation within this six month period will be subject to all the requirements of this part 258, unless otherwise specified.

(e) All MSWLF units that receive waste on or after October 9, 1993 must comply with all requirements of this part 258 unless otherwise specified.

(f)(1) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that dispose of less than twenty (20) tons of municipal solid waste daily, based on an annual average are exempt from subparts D and E of this part, so long as there is no evidence of existing ground-water contamination from the MSWLF unit, and the MSWLF unit serves:

(i) A community that experiences an annual interruption of at least three consecutive months of surface transportation that prevents access to a regional waste management facility, or

(ii) A community that has no practicable waste management alternative and the landfill unit is located in an area that annually receives less than or equal to 25 inches of precipitation.

(2) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that meet the criteria in paragraph (f)(1)(i) or (f)(1)(ii) of this section must place in the operating record information demonstrating this.

(3) If the owner or operator of a new MSWLF unit, existing MSWLF unit, or lateral expansion has knowledge of ground-water contamination resulting from the unit that has asserted the exemption in paragraph (f)(1)(i) or (f)(1)(ii) of this section, the owner or operator must notify the State Director of such contamination and, thereafter, comply with subparts D and E of this part.

(g) Municipal solid waste landfill units failing to satisfy these criteria are considered open dumps for purposes of State solid waste management planning under RCRA.

(h) Municipal solid waste landfill units failing to satisfy these criteria constitute open dumps, which are prohibited under section 4005 of RCRA.

(i) Municipal solid waste landfill units containing sewage sludge and failing to satisfy these Criteria violate sections 309 and 405(e) of the Clean Water Act.

(j) The effective date of this part is October 9, 1993, except subpart G of this part 258 is effective April 9, 1994.

§ 258.2 Definitions.

Unless otherwise noted, all terms contained in this part are defined by their plain meaning. This section contains definitions for terms that appear throughout this part; additional definitions appear in the specific sections to which they apply.

Active life means the period of operation beginning with the initial receipt of solid waste and ending at completion of closure activities in accordance with § 258.60 of this part.

Active portion means that part of a facility or unit that has received or is receiving wastes and that has not been closed in accordance with § 258.60 of this part.

Aquifer means a geological formation, group of formations, or porton of a formation capable of yielding significant quantities of ground water to wells or springs.

Commercial solid waste means all types of solid waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding residential and industrial wastes.

Director of an approved State means the chief administrative officer of a State agency responsible for implementing the State municipal solid waste permit program or other system of prior approval that is deemed to be adequate by EPA under regulations published pursuant to sections 2002 and 4005 of RCRA.

Existing MSWLF unit means any municipal solid waste landfill unit that is receiving solid waste as of the effective date of this part (October 9, 1993). Waste placement in existing units must be consistent with past operating practices or modified practices to ensure good management.

Facility means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste.

Ground water means water below the land surface in a zone of saturation.

Household waste 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).

Industrial solid waste means solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: Electric power

generation; fertilizer/agricultural chemicals; food and related products/by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing/foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include mining waste or oil and gas waste.

Lateral expansion means a horizontal expansion of the waste boundaries of an existing MSWLF unit.

Leachate means a liquid that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from such waste.

Municipal solid waste landfill unit means 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 under § 257.2. A MSWLF unit also may receive other types of RCRA subtitle D wastes, such as commercial solid waste, nonhazardous sludge, small quantity generator waste and industrial solid waste. Such a landfill may be publicly or privately owned. A MSWLF unit may be a new MSWLF unit, an existing MSWLF unit or a lateral expansion.

New MSWLF unit means any municipal solid waste landfill unit that has not received waste prior to the effective date of this part (October 9, 1993).

Open burning means the combustion of solid waste without:

(1) Control of combustion air to maintain adequate temperature for efficient combustion,

(2) Containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and

(3) Control of the emission of the combustion products.

Operator means the person(s) responsible for the overall operation of a facility or part of a facility.

Owner means the person(s) who owns a facility or part of a facility.

Run-off means any rainwater, leachate, or other liquid that drains over land from any part of a facility.

Run-on means any rainwater, leachate, or other liquid that drains over land onto any part of a facility.

Saturated zone means that part of the earth's crust in which all voids are filled with water.

Sludge means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.

Solid waste means any garbage, or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U.S.C. 1342, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

State means any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

State Director means the chief administrative officer of the State agency responsible for implementing the State municipal solid waste permit program or other system of prior approval.

Uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as, lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

Waste management unit boundary means a vertical surface located at the hydraulically downgradient limit of the unit. This vertical surface extends down into the uppermost aquifer.

§ 258.3 Consideration of other Federal laws.

The owner or operator of a municipal solid waste landfill unit must comply with any other applicable Federal rules, laws, regulations, or other requirements.

§§ 258.4-258.9 [Reserved]

Subpart B—Location Restrictions

§ 258.10 Airport safety.

(a) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that are located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used by only piston-type aircraft must demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft.

(b) Owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the Federal Aviation Administration (FAA).

(c) The owner or operator must place the demonstration in paragraph (a) of this section in the operating record and notify the State Director that it has been placed in the operating record.

(d) For purposes of this section:

(1) *Airport* means public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities.

(2) *Bird hazard* means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.

§ 258.11 Floodplains.

(a) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions located in 100-year floodplains must demonstrate that the unit will not restrict the flow of the 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 human health and the environment. The owner or operator must place the demonstration in the operating record and notify the State Director that it has been placed in the operating record.

(b) For purposes of this section:

(1) *Floodplain* means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, that are inundated by the 100-year flood.

(2) *100-year flood* means a flood that has a 1-percent or greater chance of recurring in any given year or a flood of a magnitude equalled or exceeded once in 100 years on the average over a significantly long period.

(3) *Washout* means the carrying away of solid waste by waters of the base flood.

§ 258.12 Wetlands.

(a) New MSWLF units and lateral expansions shall not be located in wetlands, unless the owner or operator can make the following demonstrations to the Director of an approved State:

(1) Where applicable under section 404 of the Clean Water Act or applicable State wetlands laws, the presumption that practicable alternative to the

proposed landfill is available which does not involve wetlands is clearly rebutted;

(2) The construction and operation of the MSWLF unit will not:

(i) Cause or contribute to violations of any applicable State water quality standard,

(ii) Violate any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act,

(iii) 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

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

(3) The MSWLF unit will not cause or contribute to significant degradation of wetlands. The owner or operator must demonstrate the integrity of the MSWLF unit and its ability to protect ecological resources by addressing the following factors:

(i) Erosion, stability, and migration potential of native wetland soils, muds and deposits used to support the MSWLF unit;

(ii) Erosion, stability, and migration potential of dredged and fill materials used to support the MSWLF unit;

(iii) The volume and chemical nature of the waste managed in the MSWLF unit;

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

(v) The potential effects of catastrophic release of waste to the wetland and the resulting impacts on the environment; and

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

(4) To the extent required under section 404 of the Clean Water Act or applicable State wetlands laws, 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 paragraph (a)(1) of this section, then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands); and

(5) Sufficient information is available to make a reasonable determination with respect to these demonstrations.

(b) For purposes of this section, *wetlands* means those areas that are defined in 40 CFR 232.2(r).

§ 258.13 Fault areas.

(a) New MSWLF units and lateral expansions shall not be located within 200 feet (60 meters) of a fault that has had displacement in Holocene time unless the owner or operator demonstrates to the Director of an approved State that an alternative setback distance of less than 200 feet (60 meters) will prevent damage to the structural integrity of the MSWLF unit and will be protective of human health and the environment.

(b) For the purposes of this section:

(1) *Fault* means a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to that on the other side.

(2) *Displacement* means the relative movement of any two sides of a fault measured in any direction.

(3) *Holocene* means the most recent epoch of the Quaternary period, extending from the end of the Pleistocene Epoch to the present.

§ 258.14 Seismic impact zones.

(a) New MSWLF units and lateral expansions shall not be located in seismic impact zones, unless the owner or operator demonstrates to the Director of an approved State/Tribe that all containment structures, including liners, leachate collection systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site. The owner or operator must place the demonstration in the operating record and notify the State Director that it has been placed in the operating record.

(b) For the purposes of this section:

(1) *Seismic impact zone* means an area with a ten percent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull paragraph (g) of this section, will exceed 0.10g in 250 years.

(2) *Maximum horizontal acceleration in lithified earth material* means the maximum expected horizontal acceleration depicted on a seismic hazard map, with a 90 percent or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on a site-specific seismic risk assessment.

(3) *Lithified earth material* means all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. This term does not include man-made materials, such as fill, concrete, and asphalt, or unconsolidated earth materials, soil, or regolith lying at or near the earth surface.

§ 258.15 Unstable areas.

(a) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions located in an unstable area must demonstrate that engineering measures have been incorporated into the MSWLF unit's design to ensure that the integrity of the structural components of the MSWLF unit will not be disrupted. The owner or operator must place the demonstration in the operating record and notify the State Director that it has been placed in the operating record. The owner or operator must consider the following factors, at a minimum, when determining whether an area is unstable:

(1) On-site or local soil conditions that may result in significant differential settling;

(2) On-site or local geologic or geomorphologic features; and

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

(b) For purposes of this section:

(1) *Unstable area* means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for preventing releases from a landfill. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and Karst terranes.

(2) *Structural components* means liners, leachate collection systems, final covers, run-on/run-off systems, and any other component used in the construction and operation of the MSWLF that is necessary for protection of human health and the environment.

(3) *Poor foundation conditions* means those areas where features exist which indicate that a natural or man-induced event may result in inadequate foundation support for the structural components of an MSWLF unit.

(4) *Areas susceptible to mass movement* means those areas of influence (i.e., areas characterized as having an active or substantial possibility of mass movement) where the movement of earth material at, beneath, or adjacent to the MSWLF unit, because of natural or man-induced events, results in the downslope transport of soil and rock material by means of gravitational influence. Areas

of mass movement include, but are not limited to, landslides, avalanches, debris slides and flows, soil fluction, block sliding, and rock fall.

(5) *Karst terranes* means areas where karst topography, with its characteristic surface and subterranean features, is developed as the result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terranes include, but are not limited to, sinkholes, sinking streams, caves, large springs, and blind valleys.

§ 258.16 Closure of existing municipal solid waste landfill units.

(a) Existing MSWLF units that cannot make the demonstration specified in § 258.10(a), pertaining to airports, § 258.11(a), pertaining to floodplains, or § 258.15(a), pertaining to unstable areas, must close by October 9, 1996, in accordance with § 258.60 of this part and conduct post-closure activities in accordance with § 258.61 of this part.

(b) The deadline for closure required by paragraph (a) of this section may be extended up to two years if the owner or operator demonstrates to the Director of an approved State that:

(1) There is no available alternative disposal capacity;

(2) There is no immediate threat to human health and the environment.

Note to Subpart B: Owners or operators of MSWLFs should be aware that a State in which their landfill is located or is to be located, may have adopted a state wellhead protection program in accordance with section 1428 of the Safe Drinking Water Act. Such state wellhead protection programs may impose additional requirements on owners or operators of MSWLFs than those set forth in this part.

§ 258.17–258.19 [Reserved].

Subpart C—Operating Criteria

§ 258.20 Procedures for excluding the receipt of hazardous waste.

(a) Owners or operators of all MSWLF units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes as defined in part 261 of this chapter and polychlorinated biphenyls (PCB) wastes as defined in part 761 of this chapter. This program must include, at a minimum:

(1) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous wastes or PCB wastes;

(2) Records of any inspections;

(3) Training of facility personnel to recognize regulated hazardous waste and PCB wastes; and

(4) Notification of State Director of authorized States under Subtitle C of RCRA or the EPA Regional Administrator if in an unauthorized State if a regulated hazardous waste or PCB waste is discovered at the facility.

(b) For purposes of this section, *regulated hazardous waste* means a solid waste that is a hazardous waste, as defined in 40 CFR 261.3, that is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b) or was not generated by a conditionally exempt small quantity generator as defined in § 261.5 of this chapter.

§ 258.21 Cover material requirements.

(a) Except as provided in paragraph (b) of this section, the owners or operators of all MSWLF units must cover disposed solid waste with six inches of earthen material at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors, blowing litter, and scavenging.

(b) Alternative materials of an alternative thickness (other than at least six inches of earthen material) may be approved by the Director of an approved State if the owner or operator demonstrates that the alternative material and thickness control disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment.

(c) The Director of an approved State may grant a temporary waiver from the requirement of paragraph (a) and (b) of this section if the owner or operator demonstrates that there are extreme seasonal climatic conditions that make meeting such requirements impractical.

§ 258.22 Disease vector control.

(a) Owners or operators of all MSWLF units must prevent or control on-site populations of disease vectors using techniques appropriate for the protection of human health and the environment.

(b) For purposes of this section, *disease vectors* means any rodents, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.

§ 258.23 Explosive gases control.

(a) Owners or operators of all MSWLF units must ensure that:

(1) The concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane in facility structures (excluding gas control or recovery system components); and

(2) The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary.

(b) Owners or operators of all MSWLF units must implement a routine methane monitoring program to ensure that the standards of paragraph (a) of this section are met.

(1) The type and frequency of monitoring must be determined based on the following factors:

(i) Soil conditions;

(ii) The hydrogeologic conditions surrounding the facility;

(iii) The hydraulic conditions surrounding the facility; and

(iv) The location of facility structures and property boundaries.

(2) The minimum frequency of monitoring shall be quarterly.

(c) If methane gas levels exceeding the limits specified in paragraph (a) of this section are detected, the owner or operator must:

(1) Immediately take all necessary steps to ensure protection of human health and notify the State Director;

(2) Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

(3) Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the State Director that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

(4) The Director of an approved State may establish alternative schedules for demonstrating compliance with paragraphs (c) (2) and (3) of this section.

(d) For purposes of this section, *lower explosive limit* means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

§ 258.24 Air criteria.

(a) Owners or operators of all MSWLFs must ensure that the units not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the Administrator pursuant to section 110 of the Clean Air Act, as amended.

(b) Open burning of solid waste, except for the infrequent burning of agricultural wastes, silvicultural wastes, landclearing debris, diseased trees, or debris from emergency cleanup operations, is prohibited at all MSWLF units.

§ 258.25 Access requirements.

Owners or operators of all MSWLF units must control public access and prevent unauthorized vehicular traffic and illegal dumping of wastes by using artificial barriers, natural barriers, or both, as appropriate to protect human health and the environment.

§ 258.25 Run-on/run-off control systems.

(a) Owners or operators of all MSWLF units must design, construct, and maintain:

(1) A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 25-year storm;

(2) A run-off control system from the active portion of the landfill to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(b) Run-off from the active portion of the landfill unit must be handled in accordance with § 258.27(a) of this part.

§ 258.27 Surface water requirements.

MSWLF units shall not:

(a) Cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to section 402.

(b) Cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or State-wide water quality management plan that has been approved under section 208 or 319 of the Clean Water Act, as amended.

§ 258.28 Liquids restrictions.

(a) Bulk or noncontainerized liquid waste may not be placed in MSWLF units unless:

(1) The waste is household waste other than septic waste; or

(2) The waste is leachate or gas condensate derived from the MSWLF unit and the MSWLF unit, whether it is a new or existing MSWLF, or lateral expansion, is designed with a composite liner and leachate collection system as described in § 258.40(a)(2) of this part. The owner or operator must place the demonstration in the operating record and notify the State Director that it has been placed in the operating record.

(b) Containers holding liquid waste may not be placed in a MSWLF unit unless:

(1) The container is a small container similar in size to that normally found in household waste;

(2) The container is designed to hold liquids for use other than storage; or

(3) The waste is household waste.

(c) For purposes of this section:

(1) *Liquid waste* means any waste material that is determined to contain "free liquids" as defined by Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Pub. No. SW-846).

(2) *Gas condensate* means the liquid generated as a result of gas recovery process(es) at the MSWLF unit.

§ 258.29 Recordkeeping requirements.

(a) The owner or operator of a MSWLF unit must record and retain near the facility in an operating record or in an alternative location approved by the Director of an approved State the following information as it becomes available:

(1) Any location restriction demonstration required under subpart B of this part;

(2) Inspection records, training procedures, and notification procedures required in § 258.20 of this part;

(3) Gas monitoring results from monitoring and any remediation plans required by § 258.23 of this part;

(4) Any MSWLF unit design documentation for placement of leachate or gas condensate in a MSWLF unit as required under § 258.28(a)(2) of this part;

(5) Any demonstration, certification, finding, monitoring, testing, or analytical data required by subpart E of this part;

(6) Closure and post-closure care plans and any monitoring, testing, or analytical data as required by §§ 258.60 and 258.61 of this part; and

(7) Any cost estimates and financial assurance documentation required by subpart G of this part.

(8) Any information demonstrating compliance with small community exemption as required by § 258.1(f)(2).

(b) The owner/operator must notify the State Director when the documents from paragraph (a) of this section have been placed or added to the operating record, and all information contained in the operating record must be furnished upon request to the State Director or be made available at all reasonable times for inspection by the State Director.

(c) The Director of an approved State can set alternative schedules for recordkeeping and notification requirements as specified in paragraphs (a) and (b) of this section, except for the notification requirements in § 258.10(b) and § 258.55(g)(1)(iii).

§ 258.30–258.39 [Reserved].

Subpart D—Design Criteria

§ 258.40 Design criteria.

(a) New MSWLF units and lateral expansions shall be constructed:

(1) In accordance with a design approved by the Director of an approved State or as specified in § 258.40(e) for unapproved States. The design must ensure that the concentration values listed in Table 1 of this section will not be exceeded in the uppermost aquifer at the relevant point of compliance, as specified by the Director of an approved State under paragraph (d) of this section, or

(2) With a composite liner, as defined in paragraph (b) of this section and a leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner.

(b) For purposes of this section, *composite liner* means a system consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. FML components consisting of high density polyethylene (HDPE) shall be at least 60-mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component.

(c) When approving a design that complies with paragraph (a)(1) of this section, the Director of an approved State shall consider at least the following factors:

(1) The hydrogeologic characteristics of the facility and surrounding land;

(2) The climatic factors of the area; and

(3) The volume and physical and chemical characteristics of the leachate.

(d) The relevant point of compliance specified by the Director of an approved State shall be no more than 150 meters from the waste management unit boundary and shall be located on land owned by the owner of the MSWLF unit. In determining the relevant point of compliance State Director shall consider at least the following factors:

(1) The hydrogeologic characteristics of the facility and surrounding land;

(2) The volume and physical and chemical characteristics of the leachate;

(3) The quantity, quality, and direction, of flow of ground water;

(4) The proximity and withdrawal rate of the ground-water users;

(5) The availability of alternative drinking water supplies;

(6) The existing quality of the ground water, including other sources of contamination and their cumulative impacts on the ground water, and whether the ground water is currently used or reasonably expected to be used for drinking water;

(7) Public health, safety, and welfare effects; and

(8) Practicable capability of the owner or operator.

(e) If EPA does not promulgate a rule establishing the procedures and requirements for State compliance with RCRA section 4005(c)(1)(B) by October 9, 1993, owners and operators in unapproved States may utilize a design meeting the performance standard in § 258.40(a)(1) if the following conditions are met:

(1) The State determines the design meets the performance standard in § 258.40(a)(1);

(2) The State petitions EPA to review its determination; and

(3) EPA approves the State determination or does not disapprove the determination within 30 days.

Note to subpart D: 40 CFR part 239 is reserved to establish the procedures and requirements for State compliance with RCRA section 4005(c)(1)(B).

TABLE 1

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

Subpart E—Ground-Water Monitoring and Corrective Action

§ 258.50 Applicability.

(a) The requirements in this part apply to MSWLF units, except as provided in paragraph (b) of this section.

(b) Ground-water monitoring requirements under § 258.51 through § 258.55 of this part may be suspended by the Director of an approved State for a MSWLF unit if the owner or operator can demonstrate that there is no potential for migration of hazardous constituents from that MSWLF unit to the uppermost aquifer (as defined in § 258.2) during the active life of the unit and the post-closure care period. This demonstration must be certified by a qualified ground-water scientist and approved by the Director of an approved State, and must be based upon:

(1) Site-specific field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport, and

(2) Contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and environment.

(c) Owners and operators of MSWLF units must comply with the ground-water monitoring requirements of this part according to the following schedule unless an alternative schedule is specified under paragraph (d) of this section:

(1) Existing MSWLF units and lateral expansions less than one mile from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51–258.55 by October 9, 1996;

(2) Existing MSWLF units and lateral expansions greater than one mile but less than two miles from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51–258.55 by October 9, 1995;

(3) Existing MSWLF units and lateral expansions greater than two miles from a drinking water intake (surface or subsurface) must be in compliance with the ground-water monitoring requirements specified in §§ 258.51–258.55 by October 9, 1996.

(4) New MSWLF units must be in compliance with the ground-water monitoring requirements specified in §§ 258.51–258.55 before waste can be placed in the unit.

(d) The Director of an approved State may specify an alternative schedule for the owners or operators of existing MSWLF units and lateral expansions to comply with the ground-water monitoring requirements specified in §§ 258.51–258.55. This schedule must ensure that 50 percent of all existing MSWLF units are in compliance by October 9, 1994 and all existing MSWLF units are in compliance by October 9, 1996. In setting the compliance schedule, the Director of an approved State must consider potential risks posed by the unit to human health and the environment. The following factors should be considered in determining potential risk:

(1) Proximity of human and environmental receptors;

(2) Design of the MSWLF unit;

(3) Age of the MSWLF unit;

(4) The size of the MSWLF unit; and

(5) Types and quantities of wastes disposed including sewage sludge; and

(6) Resource value of the underlying aquifer, including:

(i) Current and future uses;

(ii) Proximity and withdrawal rate of users; and

(iii) Ground-water quality and quantity.

(e) Once established at a MSWLF unit, ground-water monitoring shall be conducted throughout the active life and post-closure care period of that MSWLF unit as specified in § 258.61.

(f) For the purposes of this subpart, a *qualified ground-water scientist* is a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields as may be demonstrated by State registration, professional Certifications, or completion of accredited university programs that enable that individual to make sound professional judgements regarding ground-water monitoring, contaminant fate and transport, and corrective-action.

(g) The Director of an approved State may establish alternative schedules for demonstrating compliance with § 258.51(d)(2), pertaining to notification of placement of certification in operating record; § 258.54(c)(1), pertaining to notification that statistically significant increase (SSI) notice is in operating record; § 258.54(c) (2) and (3), pertaining to an assessment monitoring program; § 258.55(b), pertaining to sampling and analyzing Appendix II constituents; § 258.55(d)(1), pertaining to placement of notice (Appendix II constituents detected) in record and notification of notice in record; § 258.55(d)(2), pertaining to sampling for appendix I and II to this part; § 258.55(g), pertaining to notification (and placement of notice in record) of SSI above ground-water protection standard; §§ 258.55(g)(1)(iv) and 258.56(a), pertaining to assessment of corrective measures; § 258.57(a), pertaining to selection of remedy and notification of placement in record; § 258.58(c)(4), pertaining to notification of placement in record (alternative

corrective action measures); and § 258.58(f), pertaining to notification of placement in record (certification of remedy completed).

§ 258.51 Ground-water monitoring systems.

(a) A ground-water monitoring system must be installed that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield ground-water samples from the uppermost aquifer (as defined in § 258.2) that:

(1) Represent the quality of background ground water that has not been affected by leakage from a unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the waste management area where:

(i) Hydrogeologic conditions do not allow the owner or operator to determine what wells are hydraulically upgradient; or

(ii) Sampling at other wells will provide an indication of background ground-water quality that is as representative or more representative than that provided by the upgradient wells; and

(2) Represent the quality of ground water passing the relevant point of compliance specified by Director of an approved State under § 258.40(d) or at the waste management unit boundary in unapproved States. The downgradient monitoring system must be installed at the relevant point of compliance specified by the Director of an approved State under § 258.40(d) or at the waste management unit boundary in unapproved States that ensures detection of ground-water contamination in the uppermost aquifer. When physical obstacles preclude installation of ground-water monitoring wells at the relevant point of compliance at existing units, the down-gradient monitoring system may be installed at the closest practicable distance hydraulically down-gradient from the relevant point of compliance specified by the Director of an approved State under § 258.40 that ensure detection of groundwater contamination in the uppermost aquifer.

(b) The Director of an approved State may approve a multiunit ground-water monitoring system instead of separate ground-water monitoring systems for each MSWLF unit when the facility has several units, provided the multi-unit ground-water monitoring system meets the requirement of § 258.51(a) and will be as protective of human health and the environment as individual monitoring systems for each MSWLF unit, based on the following factors:

(1) Number, spacing, and orientation of the MSWLF units;

(2) Hydrogeologic setting;

(3) Site history;

(4) Engineering design of the MSWLF units, and

(5) Type of waste accepted at the MSWLF units.

(c) Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of ground-water samples. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the ground water.

(1) The owner or operator must notify the State Director that the design, installation, development, and decommission of any monitoring wells, piezometers and other measurement, sampling, and analytical devices documentation has been placed in the operating record; and

(2) The monitoring wells, piezometers, and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to design specifications throughout the life of the monitoring program.

(d) The number, spacing, and depths of monitoring systems shall be:

(1) Determined based upon site-specific technical information that must include thorough characterization of:

(i) Aquifer thickness, ground-water flow rate, ground-water flow direction including seasonal and temporal fluctuations in ground-water 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, porosities and effective porosities.

(2) Certified by a qualified ground-water scientist or approved by the Director of an approved State. Within 14 days of this certification, the owner or operator must notify the State Director that the certification has been placed in the operating record.

§ 258.52 [Reserved].

§ 258.53 Ground-water sampling and analysis requirements.

(a) The ground-water monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of ground-water quality at the background and downgradient wells installed in compliance with § 258.51(a) of this part. The owner or operator must notify the State Director that the sampling and analysis program documentation has been placed in the operating record and the program must include procedures and techniques for:

(1) Sample collection;

(2) Sample preservation and shipment;

(3) Analytical procedures;

(4) Chain of custody control; and

(5) Quality assurance and quality control.

(b) The ground-water monitoring program must include sampling and analytical methods that are appropriate for ground-water sampling and that accurately measure hazardous constituents and other monitoring parameters in ground-water samples. Ground-water samples shall not be field-filtered prior to laboratory analysis.

(c) The sampling procedures and frequency must be protective of human health and the environment.

(d) Ground-water elevations must be measured in each well immediately prior to purging, each time ground water is sampled. The owner or operator must determine the rate and direction of ground-water flow each time ground water is sampled. Ground-water elevations in wells which monitor the same waste management area must be measured within a period of time short enough to avoid temporal variations in ground-water flow which could preclude accurate determination of ground-water flow rate and direction.

(e) The owner or operator must establish background ground-water quality in a hydraulically upgradient or background well(s) for each of the monitoring parameters or constituents required in the particular ground-water monitoring program that applies to the MSWLF unit, as determined under § 258.54(a) or § 258.55(a) of this part. Background ground-water quality may be established at wells that are not located hydraulically upgradient from the MSWLF unit if it meets the requirements of § 258.51(a)(1).

(f) The number of samples collected to establish ground-water quality data must be consistent with the appropriate statistical procedures determined pursuant to paragraph (g) of this section. The sampling procedures shall be those specified under § 258.54(b) for detection monitoring, § 258.55 (b) and (d) for assessment monitoring, and § 258.56(b) of corrective action.

(g) The owner or operator must specify in the operating record one of the following statistical methods to be used in evaluating ground-water monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well.

(1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(2) An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(3) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

(4) A control chart approach that gives control limits for each constituent.

(5) Another statistical test method that meets the performance standards of § 258.53(h). The owner or operator must place a justification for this alternative in the operating record and notify the State Director of the use of this alternative test. The justification must demonstrate that the alternative method meets the performance standards of § 258.53(h).

(h) Any statistical method chosen under § 258.53(g) shall comply with the following performance standards, as appropriate:

(1) The statistical method used to evaluate ground-water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data should be transformed or a distribution-free theory test should be used. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground-water 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 wise 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 must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(3) If a control chart approach is used to evaluate ground-water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The parameters 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.

(4) If a tolerance interval or a predictional interval is used to evaluate ground-water monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be protective of human health and the environment. These parameters 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.

(5) The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (pql) 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.

(6) 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.

(i) The owner or operator must determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the particular ground-water monitoring program that applies to the MSWLF unit, as determined under §§ 258.54(a) or 258.55(a) of this part.

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the ground-water quality of each parameter or constituent at each monitoring well designated pursuant to § 258.51(a)(2) to the background value of that constituent, according to the statistical procedures and performance standards specified under paragraphs (g) and (h) of this section.

(2) Within a reasonable period of time after completing sampling and analysis, the owner or operator must determine whether there has been a statistically significant increase over background at each monitoring well.

§ 258.54 Detection monitoring program.

(a) Detection monitoring is required at MSWLF units at all ground-water monitoring wells defined under §§ 258.51 (a)(1) and (a)(2) of this part. At a minimum, a detection monitoring program must include the monitoring for the constituents listed in appendix I to this part.

(1) The Director of an approved State may delete any of the appendix I monitoring parameters for a MSWLF unit if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

(2) The Director of an approved State may establish an alternative list of inorganic indicator parameters for a MSWLF unit, in lieu of some or all of the heavy metals (constituents 1–15 in appendix I to this part), if the alternative parameters provide a reliable indication of inorganic releases from the MSWLF unit to the ground water. In determining alternative parameters, the Director shall consider the following factors:

(i) The types, quantities, and concentrations of constituents in wastes managed at the MSWLF unit;

(ii) The mobility, stability, and persistence of waste constituents or their reaction products in the unsaturated zone beneath the MSWLF unit;

(iii) The detectability of indicator parameters, waste constituents, and reaction products in the ground water; and

(iv) The concentration or values and coefficients of variation of monitoring parameters or constituents in the groundwater background.

(b) The monitoring frequency for all constituents listed in appendix I to this part, or in the alternative list approved in accordance with paragraph (a)(2) of this section, shall be at least semiannual during the active life of the facility (including closure) and the post-closure period. A minimum of four independent samples from each well (background and downgradient) must be collected and analyzed for the appendix I constituents, or the alternative list approved in accordance with paragraph (a)(2) of this section, during the first

semiannual sampling event. At least one sample from each well (background and downgradient) must be collected and analyzed during subsequent semiannual sampling events. The Director of an approved State may specify an appropriate alternative frequency for repeated sampling and analysis for appendix I constituents, or the alternative list approved in accordance with paragraph (a)(2) of this section, during the active life (including closure) and the post-closure care period. The alternative frequency during the active life (including closure) shall be no less than annual. The alternative frequency shall be based on consideration of the following factors:

(1) Lithology of the aquifer and unsaturated zone;

(2) Hydraulic conductivity of the aquifer and unsaturated zone;

(3) Ground-water flow rates;

(4) Minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen (minimum distance of travel); and

(5) Resource value of the aquifer.

(c) If the owner or operator determines, pursuant to § 258.53(g) of this part, that there is a statistically significant increase over background for one or more of the constituents listed in appendix I to this part or in the alternative list approved in accordance with paragraph (a)(2) of this section, at any monitoring well at the boundary specified under § 258.51(a)(2), the owner or operator:

(1) Must, within 14 days of this finding, place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels, and notify the State director that this notice was placed in the operating record; and

(2) Must establish an assessment monitoring program meeting the requirements of § 258.55 of this part within 90 days except as provided for in paragraph (c)(3) of this section.

(3) The owner/operator may demonstrate that a source other than a MSWLF unit caused the contamination or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. A report documenting this demonstration must be certified by a qualified ground-water scientist or approved by the Director of an approved State and be placed in the operating record. If a successful demonstration is made and documented, the owner or operator may continue detection monitoring as specified in this section. If, after 90 days, a successful demonstration is not made, the owner or operator must initiate an assessment monitoring program as required in § 258.55.

§ 258.55 Assessment monitoring program.

(a) Assessment monitoring is required whenever a statistically significant increase over background has been detected for one or more of the constituents listed in the appendix I to this part or in the alternative list approved in accordance with § 258.54(a)(2).

(b) Within 90 days of triggering an assessment monitoring program, and annually thereafter, the owner or operator must sample and analyze the ground water for all constituents identified in appendix II to this part. A minimum of one sample from each downgradient well must be collected and analyzed during each sampling event. For any constituent detected in the downgradient wells as a result of the complete appendix II analysis, a minimum of four independent samples from each well (background and downgradient) must be collected and analyzed to establish background for the constituents. The Director of an approved State may specify an appropriate subset of wells to be sampled and analyzed for appendix II constituents during assessment monitoring. The Director of an approved State may delete any of the appendix II monitoring parameters for a MSWLF unit if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

(c) The Director of an approved State may specify an appropriate alternate frequency for repeated sampling and analysis for the full set of appendix II constituents required by § 258.55(b) of this part, during the active life (including closure) and post-closure care of the unit considering the following factors:

(1) Lithology of the aquifer and unsaturated zone;

(2) Hydraulic conductivity of the aquifer and unsaturated zone;

(3) Ground-water flow rates;

(4) Minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen (minimum distance of travel);

(5) Resource value of the aquifer; and

(6) Nature (fate and transport) of any constituents detected in response to this section.

(d) After obtaining the results from the initial or subsequent sampling events required in paragraph (b) of this section, the owner or operator must:

(1) Within 14 days, place a notice in the operating record identifying the appendix II constituents that have been detected and notify the State Director that this notice has been placed in the operating record;

(2) Within 90 days, and on at least a semiannual basis thereafter, resample all wells specified by § 258.51(a), conduct analyses for all constituents in appendix I to this part or in the alternative list approved in accordance with § 258.54(a)(2), and for those constituents in appendix II to this part that are detected in response to paragraph (b) of this section, and record their concentrations in the facility operating record. At least one sample from each well (background and downgradient) must be collected and analyzed during these sampling events. The Director of an approved State may specify an alternative monitoring frequency during the active life (including closure) and the post-closure period for the constituents referred to in this paragraph. The alternative frequency for appendix I constituents, or the alternative list approved in accordance with § 258.54(a)(2), during the active life (including closure) shall be no less than annual. The alternative frequency shall be based on consideration of the factors specified in paragraph (c) of this section;

(3) Establish background concentrations for any constituents detected pursuant to paragraph (b) or (d)(2) of this section; and

(4) Establish ground-water protection standards for all constituents detected pursuant to paragraph (b) or (d) of this section. The ground-water protection standards shall be established in accordance with paragraphs (h) or (i) of this section.

(e) If the concentrations of all appendix II constituents are shown to be at or below background values, using the statistical procedures in § 258.53(g), for two consecutive sampling events, the owner or operator must notify the State Director of this finding and may return to detection monitoring.

(f) If the concentrations of any appendix II constituents are above background values, but all concentrations are below the ground-water protection standard established under paragraphs (h) or (i) of this section, using the statistical procedures in § 258.53(g), the owner or operator must continue assessment monitoring in accordance with this section.

(g) If one or more appendix II constituents are detected at statistically significant levels above the ground-water protection standard established under paragraphs (h) or (i) of this section in any sampling event, the owner or operator must, within 14 days

of this finding, place a notice in the operating record identifying the appendix II constituents that have exceeded the ground-water protection standard and notify the State Director and all appropriate local government officials that the notice has been placed in the operating record. The owner or operator also:

(1)(i) Must characterize the nature and extent of the release by installing additional monitoring wells as necessary;

(ii) Must install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with § 258.55(d)(2);

(iii) Must 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 if indicated by sampling of wells in accordance with § 258.55 (g)(1); and

(iv) Must initiate an assessment of corrective measures as required by § 255.56 of this part within 90 days; or

(2) May demonstrate that a source other than a MSWLF unit caused the contamination, or that the SSI increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. A report documenting this demonstration must be certified by a qualified ground-water scientist or approved by the Director of an approved State and placed in the operating record. If a successful demonstration is made the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to § 258.55, and may return to detection monitoring if the appendix II constituents are at or below background as specified in § 258.55(e). Until a successful demonstration is made, the owner or operator must comply with § 258.55(g) including initiating an assessment of corrective measures.

(h) The owner or operator must establish a ground-water protection standard for each appendix II constituent detected in the ground-water. The ground-water protection standard shall be:

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

(2) For constituents for which MCLs have not been promulgated, the background concentration for the constituent established from wells in accordance with § 258.51(a)(1); or

(3) For constituents for which the background level is higher than the MCL identified under paragraph (h)(1) of this section or health based levels identified under § 258.55(i)(1), the background concentration.

(i) The Director of an approved State may establish an alternative ground-water protection standard for constituents for which MCLs have not been established. These ground-water protection standards shall be appropriate health based levels that satisfy the following criteria:

(1) The level is derived in a manner consistent with Agency guidelines for assessing the health risks of environmental pollutants (51 FR 33992, 34006, 34014, 34028, Sept. 24, 1986);

(2) The level is based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act Good Laboratory Practice Standards (40 CFR part 792) or equivalent;

(3) For carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level (due to continuous lifetime exposure) with the 1×10^{-4} to 1×10^{-6} range; and

(4) For systemic toxicants, the level represents a concentration to which the human population (including sensitive subgroups) could be exposed to on a daily basis that is likely to be without appreciable risk of deleterious effects during a lifetime. For purposes of this subpart, systemic toxicants include toxic chemicals that cause effects other than cancer or mutation.

(j) In establishing ground-water protection standards under paragraph (i) of this section, the Director of an approved State may consider the following:

(1) Multiple contaminants in the ground water;

(2) Exposure threats to sensitive environmental receptors; and

(3) Other site-specific exposure or potential exposure to ground water.

§ 258.56 Assessment of corrective measures.

(a) Within 90 days of finding that any of the constituents listed in appendix II to this part have been detected at a statistically significant level exceeding the ground-water protection standards defined under § 258.55 (h) or (i) of this part, the owner or operator must initiate an assessment of corrective measures. Such an assessment must be completed within a reasonable period of time.

(b) The owner or operator must continue to monitor in accordance with the assessment monitoring program as specified in § 258.55.

(c) 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 § 258.57, addressing at least the following:

(1) 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;

(2) The time required to begin and complete the remedy;

(3) The costs of remedy implementation; and

(4) 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(s).

(d) The owner or operator must discuss the results of the corrective measures assessment, prior to the selection of remedy, in a public meeting with interested and affected parties.

§ 258.57 Selection of remedy.

(a) Based on the results of the corrective measures assessment conducted under § 258.56, the owner or operator must select a remedy that, at a minimum, meets the standards listed in paragraph (b) of this section. The owner or operator must notify the State Director, within 14 days of selecting a remedy, a report describing the selected remedy has been placed in the operating record and how it meets the standards in paragraph (b) of this section.

(b) Remedies must:

(1) Be protective of human health and the environment;

(2) Attain the ground-water protection standard as specified pursuant to §§ 258.55 (h) or (i);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of appendix II constituents into the environment that may pose a threat to human health or the environment; and

(4) Comply with standards for management of wastes as specified in § 258.58(d).

(c) In selecting a remedy that meets the standards of § 258.57(b), the owner or operator shall consider the following evaluation factors:

(1) The long- and short-term effectiveness and protectiveness of the potential remedy(s), 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 a 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 such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal of 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.

(2) 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;

(ii) The extent to which treatment technologies may be used.

(3) The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors:

(i) Degree of difficulty associated with constructing the technology;

(ii) Expected operational reliability of the 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.

(4) Practicable capability of the owner or operator, including a consideration of the technical and economic capability.

(5) The degree to which community concerns are addressed by a potential remedy(s).

(d) The owner or operator shall specify as part of the selected remedy a schedule(s) for initiating and completing remedial activities. Such a schedule must require the initiation of remedial activities within a reasonable period of time taking into consideration the factors set forth in paragraphs (d) (1)–(8) of this section. The owner or operator must consider the following factors in determining the schedule of remedial activities:

(1) Extent and nature of contamination;

(2) Practical capabilities of remedial technologies in achieving compliance with ground-water protection standards established under § 258.55 (g) or (h) and other objectives of the remedy;

(3) Availability of treatment or disposal capacity for wastes managed during implementation of the remedy;

(4) 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;

(5) Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;

(6) Resource value of the aquifer including:

(i) Current and future uses;

(ii) Proximity and withdrawal rate of users;

(iii) Ground-water quantity and quality;

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

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

(vi) Ground-water removal and treatment costs; and

(vii) The cost and availability of alternative water supplies.

(7) Practicable capability of the owner or operator.

(8) Other relevant factors.

(e) The Director of an approved State may determine that remediation of a release of an appendix II constituent from a MSWLF unit is not necessary if the owner or operator demonstrates to the satisfaction of the Director of the approved State that:

(1) The ground-water is additionally contaminated by substances that have originated from a source other than a MSWLF unit and those substances are present in concentrations such that cleanup of the release from the MSWLF unit would provide no significant reduction in risk to actual or potential receptors; or

(2) The constituent(s) is present in ground water that:

(i) Is not currently or reasonably expected to be a 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 would exceed the ground-water protection standards established under § 258.55 (h) or (i); or

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

(4) Remediation results in unacceptable cross-media impacts.

(f) A determination by the Director of an approved State pursuant to paragraph (e) of this section shall not affect the authority of the State to require the owner or operator to undertake source control measures or other measures that may be necessary to eliminate or minimize further releases to the ground-water, to prevent exposure to the ground-water, or to remediate the ground-water to concentrations that are technically practicable and significantly reduce threats to human health or the environment.

§ 258.58 Implementation of the corrective action program.

(a) Based on the schedule established under § 258.57(d) for initiation and completion of remedial activities the owner/operator must:

(1) Establish and implement a corrective action ground-water monitoring program that:

(i) At a minimum, meet the requirements of an assessment monitoring program under § 258.55;

(ii) Indicate the effectiveness of the corrective action remedy; and

(iii) Demonstrate compliance with ground-water protection standard pursuant to paragraph (e) of this section.

(2) Implement the corrective action remedy selected under § 258.57; and

(3) Take any interim measures necessary to ensure the protection of human health and the environment. Interim measures should, 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 § 258.57. The following factors must be considered by an owner or operator 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 ground-water 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.

(b) An owner or operator may determine, based on information developed after implementation of the remedy has begun or other information, that compliance with requirements of § 258.57(b) are not being achieved through the remedy selected. In such cases, the owner or operator must implement other methods or techniques that could practicably achieve compliance with the requirements, unless the owner or operator makes the determination under § 258.58(c).

(c) If the owner or operator determines that compliance with requirements under § 258.57(b) cannot be practically achieved with any currently available methods, the owner or operator must:

(1) Obtain certification of a qualified ground-water scientist or approval by the Director of an approved State that compliance with requirements under § 258.57(b) cannot be practically achieved with any currently available methods;

(2) Implement alternate measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment; and

(3) Implement alternate 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.

(4) Notify the State Director within 14 days that a report justifying the alternative measures prior to implementing the alternative measures has been placed in the operating record.

(d) All solid wastes that are managed pursuant to a remedy required under § 258.57, or an interim measure required under § 258.58(a)(3), shall be managed in a manner:

(1) That is protective of human health and the environment; and

(2) That complies with applicable RCRA requirements.

(e) Remedies selected pursuant to § 258.57 shall be considered complete when:

(1) The owner or operator complies with the ground-water protection standards established under §§ 258.55(h) or (i) at all points within the plume of contamination that lie beyond the ground-water monitoring well system established under § 258.51(a).

(2) Compliance with the ground-water protection standards established under §§ 258.55(h) or (i) has been achieved by demonstrating that concentrations of appendix II constituents have not exceeded the ground-water protection standard(s) for a period of three consecutive years using the statistical procedures and performance standards in § 258.53(g) and (h). The Director of an approved State may specify an alternative length of time during which the owner or operator must demonstrate that concentrations of appendix II constituents have not exceeded the ground-water protection standard(s) taking into consideration:

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

(ii) Behavior characteristics of the hazardous constituents in the ground-water;

(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 ground-water.

(3) All actions required to complete the remedy have been satisfied.

(f) Upon completion of the remedy, the owner or operator must notify the State Director within 14 days that a certification that the remedy has been completed in compliance with the requirements of § 258.58(e) has been placed in the operating record. The certification must be signed by the owner or operator and by a qualified ground-water scientist or approved by the Director of an approved State.

(g) When, upon completion of the certification, the owner or operator determines that the corrective action remedy has been completed in accordance with the requirements under paragraph (e) of this section, the owner or operator shall be released from the requirements for financial assurance for corrective action under § 258.73.

§ 258.59 [Reserved]

Subpart F—Closure And Post-Closure Care

§ 258.60 Closure criteria.

(a) Owner or operator of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be comprised of an erosion layer underlain by an infiltration layer as follows:

(1) The infiltration layer must be comprised of a minimum of 18 inches of earthen material that has a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less, and

(2) The erosion layer must consist of a minimum of 6 inches of earthen material that is capable of sustaining native plant growth.

(b) The Director of an approved State may approve an alternative final cover design that includes:

(1) An infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraph (a)(1) of this section, and

(2) An erosion layer that provides equivalent protection from wind and water erosion as the erosion layer specified in paragraph (a)(2) of this section.

(c) The owner or operator must prepare a written closure plan that describes the steps necessary to close all MSWLF units at any point during its active life in accordance with the cover design requirements in § 258.60(a) or (b), as applicable. The closure plan, at a minimum, must include the following information:

(1) A description of the final cover, designed in accordance with § 258.60(a) and the methods and procedures to be used to install the cover;

(2) An estimate of the largest area of the MSWLF unit ever requiring a final cover as required under § 258.60(a) at any time during the active life;

(3) An estimate of the maximum inventory of wastes ever on-site over the active life of the landfill facility; and

(4) A schedule for completing all activities necessary to satisfy the closure criteria in § 258.60.

(d) The owner or operator must notify the State Director that a closure plan has been prepared and placed in the operating record no later than the effective date of this part, or by the initial receipt of waste, whichever is later.

(e) Prior to beginning closure of each MSWLF unit as specified in § 258.60(f), an owner or operator must notify the State Director that a notice of the intent to close the unit has been placed in the operating record.

(f) The owner or operator must begin closure activities of each MSWLF unit no later than 30 days after the date on which the MSWLF unit receives the known final receipt of wastes or, if the MSWLF unit has remaining capacity and there is a reasonable likelihood that the MSWLF unit will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be

granted by the Director of an approved State if the owner or operator demonstrates that the MSWLF unit has the capacity to receive additional wastes and the owner or operator has taken and will continue to take all steps necessary to prevent threats to human health and the environmental from the unclosed MSWLF unit.

(g) The owner or operator of all MSWLF units must complete closure activities of each MSWLF unit in accordance with the closure plan within 180 days following the beginning of closure as specified in paragraph (f) of this section. Extensions of the closure period may be granted by the Director of an approved State if the owner or operator demonstrates that closure will, of necessity, take longer than 180 days and he has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed MSWLF unit.

(h) Following closure of each MSWLF unit, the owner or operator must notify the State Director that a certification, signed by an independent registered professional engineer or approved by Director of an approved State, verifying that closure has been completed in accordance with the closure plan, has been placed in the operating record.

(i) (1) Following closure of all MSWLF units, the owner or operator must record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search, and notify the State Director that the notation has been recorded and a copy has been placed in the operating record.

(2) The notation on the deed must in perpetuity notify any potential purchaser of the property that:

(i) The land has been used as a landfill facility; and

(ii) Its use is restricted under § 258.61(c)(3).

(j) The owner or operator may request permission from the Director of an approved State to remove the notation from the deed if all wastes are removed from the facility.

§ 258.61 Post-closure care requirements.

(a) Following closure of each MSWLF unit, the owner or operator must conduct post-closure care. Post-closure care must be conducted for 30 years, except as provided under paragraph (b) of this section, and consist of at least the following:

(1) Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(2) Maintaining and operating the leachate collection system in accordance with the requirements in § 258.40. The Director of an approved State may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;

(3) Monitoring the ground water in accordance with the requirements of subpart E of this part and maintaining the ground-water monitoring system, if applicable; and

(4) Maintaining and operating the gas monitoring system in accordance with the requirements of § 258.23.

(b) The length of the post-closure care period may be:

(1) Decreased by the Director of an approved State if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment and this demonstration is approved by the Director of an approved State; or

(2) Increased by the Director of an approved State if the Director of an approved State determines that the lengthened period is necessary to protect human health and the environment.

(c) The owner or operator of all MSWLF units must prepare a written post-closure plan that includes, at a minimum, the following information:

(1) A description of the monitoring and maintenance activities required in § 258.61(a) for each MSWLF unit, and the frequency at which these activities will be performed;

(2) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and

(3) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this Part 258. The Director of an approved State may approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

(d) The owner or operator must notify the State Director that a post-closure plan has been prepared and placed in the operating record no later than the effective date of this part, October 9, 1991, or by the initial receipt of waste, whichever is later.

(e) Following completion of the post-closure care period for each MSWLF unit, the owner or operator must notify the State Director that a certification, signed by an independent registered professional engineer or approved by the Director of an approved State, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

§§ 258.62—258.69 [Reserved]

Subpart G—Financial Assurance Criteria

§ 258.70 Applicability and effective date.

(a) The requirements of this section apply to owners and operators of all MSWLF units, except owners or operators who are State or Federal government entities whose debts and liabilities are the debts and liabilities of a State or the United States.

(b) The requirements of this section are effective April 9, 1994.

§ 258.71 Financial assurance for closure.

(a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to close the largest area of all MSWLF unit ever requiring a final cover as required under § 258.60 at any time during the active life in accordance with the closure plan. The owner or operator must notify the State Director that the estimate has been placed in the operating record.

(1) The cost estimate must equal the cost of closing the largest area of all MSWLF unit ever requiring a final cover at any time during the active life when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan (see § 258.60(c)(2) of this part).

(2) During the active life of the MSWLF unit, the owner or operator must annually adjust the closure cost estimate for inflation.

(3) The owner or operator must increase the closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes to the closure plan or MSWLF unit conditions increase the maximum cost of closure at any time during the remaining active life.

(4) The owner or operator may reduce the closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum cost of closure at any time during the remaining life of the MSWLF unit. The

owner or operator must notify the State Director that the justification for the reduction of the closure cost estimate and the amount of financial assurance has been placed in the operating record.

(b) The owner or operator of each MSWLF unit must establish financial assurance for closure of the MSWLF unit in compliance with § 258.74. The owner or operator must provide continuous coverage for closure until released from financial assurance requirements by demonstrating compliance with § 258.60(h) and (i).

§ 258.72 Financial assurance for post-closure care.

(a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to conduct post-closure care for the MSWLF unit in compliance with the post-closure plan developed under § 258.61 of this part. The post-closure cost estimate used to demonstrate financial assurance in paragraph (b) of this section must account for the total costs of conducting post-closure care, including annual and periodic costs as described in the post-closure plan over the entire post-closure care period. The owner or operator must notify the State Director that the estimate has been placed in the operating record.

(1) The cost estimate for post-closure care must be based on the most expensive costs of post-closure care during the post-closure care period.

(2) During the active life of the MSWLF unit and during the post-closure care period, the owner or operator must annually adjust the post-closure cost estimate for inflation.

(3) The owner or operator must increase the post-closure care cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes in the post-closure plan or MSWLF unit conditions increase the maximum costs of post-closure care.

(4) The owner or operator may reduce the post-closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum costs of post-closure care remaining over the post-closure care period. The owner or operator must notify the State Director that the justification for the reduction of the post-closure cost estimate and the amount of financial assurance has been placed in the operating record.

(b) The owner or operator of each MSWLF unit must establish, in a manner in accordance with § 258.74, financial assurance for the costs of post-closure care as required under § 258.61 of this part. The owner or operator must provide continuous coverage for post-closure care until released from financial assurance requirements for post-closure care by demonstrating compliance with § 258.61(e).

§ 258.73 Financial assurance for corrective action.

(a) An owner or operator of a MSWLF unit required to undertake a corrective action program under § 258.58 of this part must have a detailed written estimate, in current dollars, of the cost of hiring a third party to perform the corrective action in accordance with the program required under § 258.58 of this part. The corrective action cost estimate must account for the total costs of corrective action activities as described in the corrective action plan for the entire corrective action period. The owner or operator must notify the State Director that the estimate has been placed in the operating record.

(1) The owner or operator must annually adjust the estimate for inflation until the corrective action program is completed in accordance with § 258.58(f) of this part.

(2) The owner or operator must increase the corrective action cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes in the corrective action program or MSWLF unit conditions increase the maximum costs of corrective action.

(3) The owner or operator may reduce the amount of the corrective action cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum remaining costs of corrective action. The owner or operator must notify the State Director that the justification for the reduction of the corrective action cost estimate and the amount of financial assurance has been placed in the operating record.

(b) The owner or operator of each MSWLF unit required to undertake a corrective action program under § 258.58 of this part must establish, in a manner in accordance with § 258.74, financial assurance for the most recent corrective action program. The owner or operator must provide continuous coverage for corrective action until released from financial assurance requirements for corrective action by demonstrating compliance with § 258.58 (f) and (g).

§ 258.74 Allowable mechanisms.

The mechanisms used to demonstrate financial assurance under this section must ensure that the funds necessary to meet the costs of closure, post-closure care, and corrective action for known releases will be available whenever they are needed. Owners and operators must choose from the options specified in paragraphs (a) through (j) of this section.

(a) *Trust Fund.* (1) An owner or operator may satisfy the requirements of this section by establishing a trust fund which conforms to the requirements of this paragraph. The trustee must be an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency. A copy of the trust agreement must be placed in the facility's operating record.

(2) Payments into the trust fund must be made annually by the owner or operator over the term of the initial permit or over the remaining life of the MSWLF unit, whichever is shorter, in the case of a trust fund for closure or post-closure care, or over one-half of the estimated length of the corrective action program in the case of corrective action for known releases. This period is referred to as the pay-in period.

(3) For a trust fund used to demonstrate financial assurance for closure and post-closure care, the first payment into the fund must be at least equal to the current cost estimate for closure or post-closure care, except as provided in paragraph (j) of this section, divided by the number of years in the pay-in period as defined in paragraph (a)(2) of this section. The amount of subsequent payments must be determined by the following formula:

$$\text{Next Payment} = \frac{CE - CV}{Y}$$

where CE is the current cost estimate for closure or post-closure care (updated for inflation or other changes), CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.

(4) For a trust fund used to demonstrate financial assurance for corrective action, the first payment into the trust fund must be at least equal to one-half of the current cost estimate for corrective action, except as provided in paragraph (j) of this section, divided by the number of years in the corrective action pay-in period as defined in paragraph (a)(2) of this section. The amount of subsequent payments must be determined by the following formula:

$$\text{Next Payment} = \frac{RB - CV}{Y}$$

where RB is the most recent estimate of the required trust fund balance for corrective action (i.e., the total costs that will be incurred during the second half of the corrective action period), CV is the current value of the trust fund, and Y is the number of years remaining on the pay-in period.

(5) The initial payment into the trust fund must be made before the initial receipt of waste or before the effective date of this section (April 9, 1994), whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of § 258.58.

(6) If the owner or operator establishes a trust fund after having used one or more alternate mechanisms specified in this section, the initial payment into the trust fund must be at least the amount that the fund would contain if the trust fund were established initially and annual payments made according to the specifications of this paragraph and § 270.74(a) of this section, as applicable.

(7) The owner or operator, or other person authorized to conduct closure, post-closure care, or corrective action activities may request reimbursement from the trustee for these expenditures. Requests for reimbursement will be granted by the trustee only if sufficient funds are remaining in the trust fund to cover the remaining costs of closure, post-closure care, or corrective action, and if justification and documentation of the cost is placed in the operating record. The owner or operator must notify the State Director that the documentation of the justification for reimbursement has been placed in the operating record and that reimbursement has been received.

(8) The trust fund may be terminated by the owner or operator only if the owner or operator substitutes alternate financial assurance as specified in this section or if he is no longer required to demonstrate financial responsibility in accordance with the requirements of §§ 258.71(b), 258.72(b), or 258.73(b).

(b) *Surety Bond Guaranteeing Payment or Performance.* (1) An owner or operator may demonstrate financial assurance for closure or post-closure care by obtaining a payment or performance surety bond which conforms to the requirements of this paragraph. An owner or operator may demonstrate financial assurance for corrective action by obtaining a performance bond which conforms to the requirements of this paragraph. The bond must be effective before the initial receipt of waste or before the effective date of this section (April 9, 1994), whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of § 258.58. The owner or operator must notify the State Director that a copy of the bond has been placed in the operating record. The surety company issuing the bond must, at a minimum, be among those listed as acceptable sureties on Federal bonds in Circular 570 of the U.S. Department of the Treasury.

(2) The penal sum of the bond must be in an amount at least equal to the current closure, post-closure care or corrective action cost estimate, whichever is applicable, except as provided in § 258.74(k).

(3) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond.

(4) The owner or operator must establish a standby trust fund. The standby trust fund must meet the requirements of § 258.74(a) except the requirements for initial payment and subsequent annual payments specified in § 258.74 (a)(2), (3), (4) and (5).

(5) Payments made under the terms of the bond will be deposited by the surety directly into the standby trust fund. Payments from the trust fund must be approved by the trustee.

(6) Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the owner and operator and to the State Director 120 days in advance of cancellation. If the surety cancels the bond, the owner or operator must obtain alternate financial assurance as specified in this section.

(7) The owner or operator may cancel the bond only if alternate financial assurance is substituted as specified in this section or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with § 258.71(b), 258.72(b) or 258.73(b).

(c) *Letter of Credit.* (1) An owner or operator may satisfy the requirements of this section by obtaining an irrevocable standby letter of credit which conforms to the requirements of this paragraph. The letter of credit must be effective before the initial receipt of waste or before the effective date of this section (April 9, 1994), whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of § 258.58. The owner or operator must notify the State Director that a copy of the letter of credit has been placed in the operating record. The issuing institution must be an entity which has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a Federal or State agency.

(2) A letter from the owner or operator referring to the letter of credit by number, issuing institution, and date, and providing the following information: Name, and address of the facility, and the amount of funds assured, must be included with the letter of credit in the operating record.

(3) The letter of credit must be irrevocable and issued for a period of at least one year in an amount at least equal to the current cost estimate for closure, post-closure care or corrective action, whichever is applicable, except as provided in § 258.74(a). The letter of credit must provide that the expiration date will be automatically extended for a period of at least one year unless the issuing institution has cancelled the letter of credit by sending notice of cancellation by certified mail to the owner and operator and to the State Director 120 days in advance of cancellation. If the letter of credit is cancelled by the issuing institution, the owner or operator must obtain alternate financial assurance.

(4) The owner or operator may cancel the letter of credit only if alternate financial assurance is substituted as specified in this section or if the owner or operator is released from the requirements of this section in accordance with § 258.71(b), 258.72(b) or 258.73(b).

(d) *Insurance.* (1) An owner or operator may demonstrate financial assurance for closure and post-closure care by obtaining insurance which conforms to the requirements of this paragraph. The insurance must be effective before the initial receipt of waste or before the effective date of this section (April 9, 1994), whichever is later. At a minimum, the insurer must be licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States. The owner or operator must notify the State Director that a copy of the insurance policy has been placed in the operating record.

(2) The closure or post-closure care insurance policy must guarantee that funds will be available to close the MSWLF unit whenever final closure occurs or to provide post-closure care for the MSWLF unit whenever the post-closure care period begins, whichever is applicable. The policy must also guarantee that once closure or post-closure care begins, the insurer will be

esponsible for the paying out of funds to the owner or operator or other person authorized to conduct closure or post-closure care, up to an amount equal to the face amount of the policy.

(3) The insurance policy must be issued for a face amount at least equal to the current cost estimate for closure or post-closure care, whichever is applicable, except as provided in § 258.74(a). The term *face amount* means the total amount the insurer is obligated to pay under the policy. Actual payments by the insurer will not change the face amount, although the insurer's future liability will be lowered by the amount of the payments.

(4) An owner or operator, or any other person authorized to conduct closure or post-closure care, may receive reimbursements for closure or post-closure expenditures, whichever is applicable. Requests for reimbursement will be granted by the insurer only if the remaining value of the policy is sufficient to cover the remaining costs of closure or post-closure care, and if justification and documentation of the cost is placed in the operating record. The owner or operator must notify the State Director that the documentation of the justification for reimbursement has been placed in the operating record and that reimbursement has been received.

(5) Each policy must contain a provision allowing assignment of the policy to a successor owner or operator. Such assignment may be conditional upon consent of the insurer, provided that such consent is not unreasonably refused.

(6) The insurance policy must provide that the insurer may not cancel, terminate or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the insured with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the insurer may cancel the policy by sending notice of cancellation by certified mail to the owner and operator and to the State Director 120 days in advance of cancellation. If the insurer cancels the policy, the owner or operator must obtain alternate financial assurance as specified in this section.

(7) For insurance policies providing coverage for post-closure care, commencing on the date that liability to make payments pursuant to the policy accrues, the insurer will thereafter annually increase the face amount of the policy. Such increase must be equivalent to the face amount of the policy, less any payments made, multiplied by an amount equivalent to 85 percent of the most recent investment rate or of the equivalent coupon-issue yield announced by the U.S. Treasury for 26-week Treasury securities.

(8) The owner or operator may cancel the insurance policy only if alternate financial assurance is substituted as specified in this section or if the owner or operator, is no longer required to demonstrate financial responsibility in accordance with the requirements of § 258.71(b), 258.72(b) or 258.73(b).

(e) *Corporate Financial Test.* [Reserved]

(f) *Local Government Financial Test.* [Reserved]

(g) *Corporate Guarantee.* [Reserved]

(h) *Local Government Guarantee.* [Reserved]

(i) *State-Approved Mechanism.* An owner or operator may satisfy the requirements of this section by obtaining any other mechanism that meets the criteria specified in § 258.74(1), and that is approved by the Director of an approved State.

(j) *State Assumption of Responsibility.* If the State Director either assumes legal responsibility for an owner or operator's compliance with the closure, post-closure care and/or corrective action requirements of this part, or assures that the funds will be available from State sources to cover the requirements, the owner or operator will be in compliance with the requirements of this section. Any State assumption of responsibility must meet the criteria specified in § 258.74(l).

(k) *Use of Multiple Financial Mechanisms.* An owner or operator may satisfy the requirements of this section by establishing more than one financial mechanism per facility. The mechanisms must be as specified in paragraphs (a), (b), (c), (d), (e), (f), (g), (h), (i), and (j) of this section, except that it is the combination of mechanisms, rather than the single mechanism, which must provide financial assurance for an amount at least equal to the current cost estimate for closure, post-closure care or corrective action, whichever is applicable. The financial test and a guarantee provided by a corporate parent, sibling, or grandparent may not be combined if the financial statements of the two firms are consolidated.

(l) The language of the mechanisms listed in paragraphs (a), (b), (c), (d), (e), (f), (g), (h), (i), and (j) of this section must ensure that the instruments satisfy the following criteria:

(1) The financial assurance mechanisms must ensure that the amount of funds assured is sufficient to cover the costs of closure, post-closure care, and corrective action for known releases when needed;

(2) The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed;

(3) The financial assurance mechanisms must be obtained by the owner or operator by the effective date of these requirements or prior to the initial receipt of solid waste, whichever is later, in the case of closure and post-closure care, and no later that 120 days after the corrective action remedy has been selected in accordance with the requirements of § 258.58, until the owner or operator is released from the financial assurance requirements under §§ 258.71, 258.72 and 258.73.

(4) The financial assurance mechanisms must be legally valid, binding, and enforceable under State and Federal law.

Appendix I to this Part 258—Constituents for Detection Monitoring [1]

Common name [2]	CAS RN [3]
Inorganic Constituents:	
(1) Antimony	(Total)
(2) Arsenic	(Total)
(3) Barium	(Total)
(4) Beryllium	(Total)
(5) Cadmium	(Total)
(6) Chromium	(Total)
(7) Cobalt	(Total)
(8) Copper	(Total)
(9) Lead	(Total)
(10) Nickel	(Total)
(11) Selenium	(Total)
(12) Silver	(Total)
(13) Thallium	(Total)
(14) Vanadium	(Total)
(15) Zinc	(Total)
Organic Constituents:	
(16) Acetone	67-64-1
(17) Acrylonitrile	107-13-1
(18) Benzene	71-43-2
(19) Bromochloromethane	74-97-5
(20) Bromodichloromethane	75-27-4
(21) Bromoform; Tribromomethane	75-25-2
(22) Carbon disulfide	75-15-0
(23) Carbon tetrachloride	56-23-5
(24) Chlorobenzene	108-90-7
(25) Chloroethane; Ethyl chloride	75-00-3
(26) Chloroform; Trichloromethane	67-66-3
(27) Dibromochloromethane; Chlorodibromomethane	124-48-1
(28) 1,2-Dibromo-3-chloropropane; DBCP	96-12-8
(29) 1,2-Dibromoethane; Ethylene dibromide; EDB	106-93-4
(30) o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1
(31) p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7
(32) trans-1,4-Dichloro-2-butene	110-57-6
(33) 1,1-Dichloroethane; Ethylidene chloride	75-34-3
(34) 1,2-Dichloroethane; Ethylene dichloride	107-06-2
(35) 1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4
(36) cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2

Common name [2]	CAS RN [3]
(37) trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	156-60-5
(38) 1,2-Dichloropropane; Propylene dichloride	78-87-5
(39) cis-1,3-Dichloropropene	10061-01-5
(40) trans-1,3-Dichloropropene	10061-02-6
(41) Ethylbenzene	100-41-4
(42) 2-Hexanone; Methyl butyl ketone	591-78-6
(43) Methyl bromide; Bromomethane	74-83-9
(44) Methyl chloride; Chloromethane	74-87-3
(45) Methylene bromide; Dibromomethane	74-95-3
(46) Methylene chloride; Dichloromethane	75-09-2
(47) Methyl ethyl ketone; MEK; 2-Butanone	78-93-3
(48) Methyl iodide; Iodomethane	74-88-4
(49) 4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1
(50) Styrene	100-42-5
(51) 1,1,1,2-Tetrachloroethane	630-20-6
(52) 1,1,2,2-Tetrachloroethane	79-34-5
(53) Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4
(54) Toluene	108-88-3
(55) 1,1,1-Trichloroethane; Methylchloroform	71-55-6
(56) 1,1,2-Trichloroethane	79-00-5
(57) Trichloroethylene; Trichloroethene	79-01-6
(58) Trichlorofluoromethane; CFC-11	75-69-4
(59) 1,2,3-Trichloropropane	96-18-4
(60) Vinyl acetate	108-05-4
(61) Vinyl chloride	75-01-4
(62) Xylenes	1330-20-7

[1] This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846 "Test Methods for Evaluating Solid Waste," third edition, November 1986, as revised December 1987, includes Method 8260; and 15 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

Appendix II to this Part 258—List of Hazardous Inorganic and Organic Constituents [1]

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µg/L) [6]
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100	200
			8270	10
Acenaphthylene	208-96-8	Acenaphthylene	8100	200
			8270	10
Acetone	67-64-1	2-Propanone	8260	100
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015	100
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270	10
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270	20
Acrolein	107-02-8	2-Propenal	8030	5
			8260	100
Acrylonitrile	107-13-1	2-Propenenitrile	8030	5
			8260	200
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro- (1α,4α,4aβ,5α,8α,8aβ)-	8080	0.05
			8270	10
Allyl chloride	107-05-1	1-Propene, 3-chloro-	8010	5
			8260	10
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine	8270	20
Anthracene	120-12-7	Anthracene	8100	200
			8270	10
Antimony	(Total)	Antimony	6010	300
			7040	2000
			7041	30
Arsenic	(Total)	Arsenic	6010	500
			7060	10
			7061	20
Barium	(Total)	Barium	6010	20
			7080	1000
Benzene	71-43-2	Benzene	8020	2
			8021	0.1
			8260	5
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8100	200
			8270	10
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8100	200
			8270	10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100	200
			8270	10
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100	200
			8270	10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100	200
			8270	10
Benzyl alcohol	100-51-6	Benzenemethanol	8270	20
Beryllium	(Total)	Beryllium	6010	3
			7090	50
			7091	2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-	8080	0.05
			8270	10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4β,5α,6β)-	8080	0.05
			8270	20
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-	8080	0.1
			8270	20

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (μg/L) [6]
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-	8080	0.05
			8270	20
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1[1]-[methylenebis(oxy)]bis[2-chloro-	8110	5
			8270	10
Bis(2-chloroethyl) ether; Dichloroethyl ether	111-44-4	Ethane, 1,1[1]-oxybis[2-chloro-	8110	3
			8270	10
Bis-(2-chloro-1-methylethyl) ether; 2,2[1]-Dichlorodiisopropyl ether; DCIP, See note 7	108-60-1	Propane, 2,2[1]-oxybis[1-chloro-	8110	10
			8270	10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	8060	20
Bromochloromethane; Chlorobromomethane	74-97-5	Methane, bromochloro-	8021	0.1
			8260	5
Bromodichloromethane; Dibromochloromethane	75-27-4	Methane, bromodichloro-	8010	1
			8021	0.2
			8260	5
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-	8010	2
			8021	15
			8260	5
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8110	25
			8270	10
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	8060	5
			8270	10
Cadmium	(Total)	Cadmium	6010	40
			7130	50
			7131	1
Carbon disulfide	75-15-0	Carbon disulfide	8260	100
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8010	1
			8021	0.1
			8260	10
Chlordane	See Note 8	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	8080	0.1
			8270	50
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108-90-7	Benzene, chloro-	8010	2
			8020	2
			8021	0.1
			8260	5
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	8270	10
p-Chloro-m-cresol; 4-Chloro-3-methylphenol	59-50-7	Phenol, 4-chloro-3-methyl-	8040	5
			8270	20
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8010	5
			8021	1
			8260	10
Chloroform; Trichloromethane	67-66-3	Methane, trichloro-	8010	0.5
			8021	0.2
			8260	5
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8120	10
			8270	10
2-Chlorophenol	95-57-8	Phenol, 2-chloro-	8040	5
			8270	10
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8110	40
			8270	10
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-	8010	50
			8260	20
Chromium	(Total)	Chromium	6010	70
			7190	500
			7191	10
Chrysene	218-01-9	Chrysene	8100	200
			8270	10
Cobalt	(Total)	Cobalt	6010	70
			7200	500
			7201	10
Copper	(Total)	Copper	6010	60
			7210	200
			7211	10
m-Cresol; 3-methylphenol	108-39-4	Phenol, 3-methyl-	8270	10
o-Cresol; 2-methylphenol	95-48-7	Phenol, 2-methyl-	8270	10
p-Cresol; 4-methylphenol	106-44-5	Phenol, 4-methyl-	8270	10
Cyanide	57-12-5	Cyanide	9010	200
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4[1]-DDD	72-54-8	Benzene 1,1[1]-(2,2-dichloroethylidene)bis[4-chloro-	8080	0.1
			8270	10
4,4[1]-DDE	72-55-9	Benzene, 1,1[1]-(dichloroethyenylidene)bis[4-chloro-	8080	0.05
			8270	10
4,4[1]-DDT	50-29-3	Benzene, 1,1[1]-(2,2,2-trichloroethylidene)bis[4-chloro-	8080	0.1
			8270	10
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester.	8270	10

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µg/L) [6]
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8100	200
Dibenzofuran	132-64-9	Dibenzofuran	8270	10
Dibromochloromethane; Chlorodibromomethane	124-48-1	Methane, dibromochloro-	8270	10
			8010	1
			8021	0.3
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibrome-3-chloro-	8260	5
			8011	0.1
			8021	30
1,2-Dibromoethane; Ethylene dribromide; EDB	106-93-4	Ethane, 1,2-dibromo-	8260	25
			8011	0.1
			8021	10
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester	8260	5
			8060	5
o-Dichlorobenzene; 1,2-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8270	10
			8010	2
			8020	5
			8021	0.5
			8120	10
			8260	5
m-Dichlorobenzene; 1,3-Dichlorobenzene	541-73-1	Benzene, 1,3-Dichloro-	8270	10
			8010	5
			8020	5
			8021	0.2
			8120	10
			8260	5
p-Dichlorobenzene; 1,4-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8270	10
			8010	2
			8020	5
			8021	0.1
			8120	15
			8260	5
3,3¹-Dichlorobenzidine	91-94-1	[1,1¹-Biphenyl]-4,4¹-diamine, 3,3¹-dichloro-	8270	10
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8270	20
Dichlorodifluoromethane; CFC 12;	75-71-8	Methane, dichlorodifluoro-	8260	100
			8021	0.5
1,1-Dichloroethane; Ethyldidene chloride	75-34-3	Ethane, 1,1-dichloro-	8260	5
			8010	1
			8021	0.5
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,1-dichloro-	8260	5
			8010	0.5
			8021	0.3
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	75-35-4	Ethene, 1,1-dichloro-	8260	5
			8010	1
			8021	0.5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	Ethene, 1,2-dichloro-, (Z)-	8260	5
			8021	0.2
trans-1,2-Dichloroethylene trans-1,2-Dichloroethene	156-60-5	Ethene, 1,2-dichloro-, (E)-	8260	5
			8010	1
			8021	0.5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8260	5
			8040	5
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane; Propylene dichloride	78-87-5	Propane, 1,2-dichloro-	8270	10
			8010	0.5
			8021	0.05
1,3-Dichloropropane; Trimethylene dichloride	142-28-9	Propane, 1,3-dichloro-	8260	5
			8021	0.3
2,2-Dichloropropane; Isopropylidene chloride	594-20-7	Propane, 2,2-dichloro-	8260	5
			8021	0.5
1,1-Dichloropropene	563-58-6	1-Propene, 1,1-dichloro-	8260	15
			8021	0.2
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8260	5
			8010	20
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8260	10
			8010	5
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β,7aα)-.	8260	10
			8080	0.05
			8270	10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	8060	5
			8270	10
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester	8141	5
			8270	20
Dimethoate	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S-[2-(methylamino)-2-oxoethyl] ester.	8141	3
			8270	20
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-	8270	10
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270	10

—Continued

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µg/L) [6]
3,3¹-Dimethylbenzidine	119-93-7	[1,1¹-Biphenyl]-4,4¹-diamine, 3,3¹-dimethyl-	8270	10
2,4-Dimethylphenol; m-Xylenol	105-67-9	Phenol, 2,4-dimethyl-	8040	5
			8270	10
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester	8060	5
			8270	10
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-	8270	20
4,6-Dinitro-o-cresol 4,6-Dinitro-2-methylphenol	534-52-1	Phenol, 2-methyl-4,6-dinitro	8040	150
			8270	50
2,4-Dinitrophenol;	51-28-5	Phenol, 2,4-dinitro-	8040	150
			8270	50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090	0.2
			8270	10
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090	0.1
			8270	10
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150	1
			8270	20
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester	8060	30
			8270	10
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298-04-4	Phosphorodithioic acid, 0,0-diethyl S-[2-(ethylthio)ethyl] ester	8140	2
			8141	0.5
			8270	10
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,	8080	0.1
			8270	20
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3 oxide, (3α,5aα,6β,9β,9aα)-.	8080	0.05
			8270	20
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-,3-3-dioxide.	8080	0.5
			8270	10
Endrin	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα, 2β,2aβ,3α,6α, 6aβ,7β,7aα)-.	8080	0.1
			8270	20
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4β, 4aβ,5β,6aβ,6bβ,7R*)-.	8080	0.2
			8270	10
Ethylbenzene	100-41-4	Benzene, ethyl-	8020	2
			8221	0.05
			8260	5
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester	8015	5
			8260	10
			8270	10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270	20
Famphur	52-85-7	Phosphorothioic acid, 0-[4-[(dimethylamino)sulfonyl]phenyl] 0,0-dimethyl ester.	8270	20
Fluoranthene	206-44-0	Fluoranthene	8100	200
			8270	10
Fluorene	86-73-7	9H-Fluorene	8100	200
			8270	10
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	8080	0.05
			8270	10
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1aα, 1bβ, 2α, 5α, 5aβ, 6β, 6aα).	8080	1
			8270	10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120	0.5
			8270	10
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	8021	0.5
			8120	5
			8260	10
			8270	10
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	8120	5
			8270	10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120	0.5
			8260	10
			8270	10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270	10
2-Hexanone; Methyl butyl ketone	591-78-6	2-Hexanone	8260	50
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno(1,2,3-cd)pyrene	8100	200
			8270	10
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-	8015	50
			8240	100
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10- hexachloro-1,4,4a,5,8,8a hexahydro- (1α,4α,4aβ,5β,8β,8aβ)-.	8270	20
			8260	10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-	8090	60
			8270	10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	8270	20

—Continued

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µg/L) [6]
Lead	(Total)	Lead	6010	400
			7420	1000
Mercury	(Total)	Mercury	7421	10
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	7470	2
			8015	5
Methapyrilene	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N[1]-2-pyridinyl-N1/2-thienylmethyl)-.	8260	100
			8270	100
Methoxychlor	72-43-5	Benzene,1,1[1]-(2,2,2,trichloroethylidene)bis[4-methoxy-	8080	2
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-	8270	10
			8010	20
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8021	10
			8010	1
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	8021	0.3
Methyl ethyl ketone; MEK; 2-Butanone	78-93-3	2-Butanone	8270	10
			8015	10
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-	8260	100
			8010	40
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester	8260	10
			8015	2
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8260	30
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270	10
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, 0,0-dimethyl 0-(4-nitrophenyl) ester	8270	10
			8140	0.5
			8141	1
4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1	2-Pentanone, 4-methyl-	8270	10
			8015	5
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-	8260	100
			8010	15
			8021	20
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	8260	10
			8010	5
			8021	0.2
Naphthalene	91-20-3	Naphthalene	8260	10
			8021	0.5
			8100	200
			8260	5
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	8270	10
			6010	150
			7520	400
o-Nitroaniline; 2-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline; 3-Nitroanile	99-09-2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline; 4-Nitroaniline	100-01-6	Benzenamine, 4-nitro	8270	20
Nitrobenzene	98-95-3	Benzene, nitro-	8090	40
			8270	10
o-Nitrophenol; 2-Nitrophenol	88-75-5	Phenol, 2-nitro-	8040	5
			8270	10
p-Nitrophenol; 4-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040	10
			8270	50
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	20
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8070	2
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8070	5
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-propyl-	8070	10
N-Nitrosomethylethalamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	20
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	40
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester	8141	0.5
			8270	10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270	20
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040	5
			8270	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenl)	8270	20
Phenanthrene	85-01-8	Phenanthrene	8100	200
			8270	10
Phenol	108-95-2	Phenol	8040	1
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10
Phorate	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl] ester	8140	2
			8141	0.5
			8270	1[illegible]

—Continued

Common Name [2]	CAS RN [3]	Chemical abstracts service index name [4]	Suggested methods [5]	PQL (µg/L) [6]
Polychlorinated biphenyls; PCBs; Aroclors	See Note 9	1,1'-Biphenyl, chloro derivatives	8080	50
			8270	200
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	8270	10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015	60
			8260	150
Pyrene	129-00-0	Pyrene	8100	200
			8270	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-	8270	10
Selenium	(Total)	Selenium	6010	750
			7740	20
			7741	20
Silver	(Total)	Silver	6010	70
			7760	100
			7761	10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020	1
			8021	0.1
			8260	10
Sulfide	18496-25-8	Sulfide	9030	4000
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-	8150	2
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010	5
			8021	0.05
			8260	5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8010	0.5
			8021	0.1
			8260	5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	127-18-4	Ethene, tetrachloro-	8010	0.5
			8021	0.5
			8260	5
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10
Thallium	(Total)	Thallium	6010	400
			7840	1000
			7841	10
Tin	(Total)	Tin	6010	40
Toluene	108-88-3	Benzene, methyl-	8020	2
			8021	0.1
			8260	5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	See Note 10	Toxaphene	8080	2
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	8021	0.3
			8120	0.5
			8260	10
			8270	10
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8010	0.3
			8021	0.3
			8260	5
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8010	0.2
			8260	5
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	8010	1
			8021	0.2
			8260	5
Trichlorofluoromethane; CFC-11	75-69-4	Methane, trichlorofluoro-	8010	10
			8021	0.3
			8260	5
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	8270	10
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	8040	5
			8270	10
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8010	10
			8021	5
			8260	15
0,0,0-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, 0,0,0-triethylester	8270	10
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	8270	10
Vanadium	(Total)	Vanadium	6010	8[illegible]
			7910	2000
			7911	40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8260	50
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-	8010	2
			8021	0.4
			8260	10
Xylene (total)	See Note 11	Benzene, dimethyl-	8020	5
			8021	0.2
			8260	5
Zinc	(Total)	Zinc	6010	20
			7950	50
			7951	0.5

Notes

[1] The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.

[2] Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3] Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

[4] CAS index are those used in the 9th Collective Index.

[5] Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste", third edition, November 1986, as revised, December 1987. Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW-846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.

[6] Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be realiably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[7] This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2"-oxybis[2-chloro- (CAS RN 39638-32-9).

[8] Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 μg/L by method 8270.

[9] Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

[10] Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.

[11] Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 μg/L by method 8020 or 8260.

Appendices to the Preamble

Appendix A—[Reserved]

Appendix B—Supplemental Information for Subpart A—General

Subpart A discusses the purpose, scope, and applicability of part 258 (§ 258.1). It provides definitions necessary for the proper interpretation of the rule (§ 258.2), and indicates that there are other Federal laws and rules with which owners and operators of MSWLFs must comply.

1. Section 258.1 Purpose, Scope, and Applicability

Part 258 sets forth minimum national Criteria for the location, design, operation, cleanup, and closure of municipal solid waste landfills. An MSWLF that does not meet these Criteria will be considered to be engaged in the practice of "open dumping" in violation of section 4005 of RCRA. Moreover, MSWLFs failing to satisfy these Criteria will be deemed to be in violation of sections 309 and 405(e) of the Clean Water Act if they are receiving sewage sludge. The purpose of part 258 is to establish minimum national Criteria for municipal solid waste landfills, including MSWLFs used for sludge disposal. The Criteria do not apply to owners and operators of MSWLFs that have stopped receiving waste as of October 9, 1991 (see § 258.1(c)). Owners and operators of MSWLFs that stop receiving waste between October 9, 1991 and October 9, 1993 are exempt from all of the requirements of part 258 except the final cover requirements cited in § 258.1(d). Finally, MSWLFs that receive waste on or after October 9, 1991 must comply with all of part 258 unless otherwise specifically exempted, e.g., the small communities exemption contained in § 285.1(f).

The effective date of part 258 is October 9, 1993, except for two provisions: (1) The ground-water monitoring provisions of §§ 258.51–258.55, which are phased in for existing MSWLFs and lateral expansions over a five-year period beginning on October 9, 1991, in accordance with § 258.50, and (2) the financial responsibility provisions of subpart G, which are effective April 4, 1994.

The proposed § 258.1 was the subject of extensive and substantive comments. These comments, and EPA's response to the comments, are addressed below.

a. Closed Facilities

The proposal excluded "closed units," from the revised Criteria. "Closed units" were defined as "* * * any solid waste disposal unit that no longer receives solid waste as of the effective date of this part and has received a final layer of cover material." The Agency proposed this approach for several reasons. First, as discussed in the preamble to the proposal, identification of "closed units" would be difficult, time consuming, and complicated by such issues as changes in ownership. Second, the inclusion of inactive facilities would dilute the already scarce technical and financial resources available to the States. Moreover, other authorities and resources are available to address inactive facilities that are creating environmental hazards. For example, abandoned MSWLFs releasing hazardous substances that pose a threat to human health and the environment can be addressed using authorities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Several commenters argued that EPA should distinguish between those facilities that have closed as of promulgation of the revised Criteria and those that continue to receive waste after today's date, but stop doing so prior to the date the rules take effect. These commenters were concerned that some MSWLF owners or operators would take advantage of this window, perpetuating problems that could compromise human health and the environment. Specifically, several commenters urged that liquid restrictions, ground-water monitoring, and final cover requirements should be applicable to facilities that cease receiving waste in the window between the date of promulgation and the effective date. Commenters argued that this approach was more protective of human health and the environment than allowing MSWLFs that close during the window to be exempt from all the revised Criteria.

To address these concerns, EPA is today distinguishing between (1) those facilities that stopped receiving waste prior to the date that the rule is published in the **Federal Register**, and (2) those MSWLFs that stop receiving waste in the window between the date of publication and the rule's effective date. MSWLFs in the first category will remain outside the scope of the revised Criteria. However, EPA is today requiring the second category of MSWLFs to install a final cover as specified under § 258.60(a). The cover must be completely installed within six months of the last receipt of wastes. Owners and operators of MSWLFs that stop receiving waste during the window but that fail to finish cover installation within six months of the last receipt of waste will be subject to all of the requirements of part 258. EPA also eliminated the proposed definition of "closed unit" from the final rule, because the definition was unnecessary given the revised rule language added to respond to comments described. The

Agency believes the regulatory language in today's final rule clearly spells out both the exclusion and the regulatory requirements for facilities that stop receiving waste between the promulgation and effective dates.

EPA decided to distinguish between the two categories of closed facilities for several reasons. EPA never intended to include within the scope of the revised Criteria inactive MSWLFs that stopped receiving waste prior to the date of promulgation of today's rule for the reasons cited previously, and most commenters agreed. On the other hand, the Agency agreed with comments that some regulatory requirements for facilities that stop receiving waste between the date of promulgation and the rule effective date would curtail continued problems. In particular, EPA agreed that, if closed without the benefit of final cover, facilities would continue to be exposed to precipitation, which would result in increased generation of leachate. The cover requirement in today's rule will restrict the introduction of liquids into the landfill, thereby limiting the production of leachate. Today's final cover requirement is consistent with many State programs and, therefore, EPA does not believe that it will cause significant impacts on owners and operators of MSWLFs.

EPA rejected the idea of subjecting these facilities to additional requirements for several reasons. MSWLF owners or operators budget for facility upgrades or closure requirements by setting aside funds during the operating life of the facility. The 18-month time period between the date of publication and the rule effective date is not a sufficient period for many owners or operators to raise the capital necessary to install a ground-water monitoring system. Thus, the "practicable capability" of these owners or operators to install such a system is severely limited. Liquids restrictions requirements would not be necessary after the cover was installed, since there would no longer be any containerized or bulk liquids disposal and the cover would minimize the introduction of precipitation into the landfill.

b. Controls on Municipal Waste Combustion

The proposal extended the applicability of the Part 258 Criteria to landfills that receive municipal waste combustion (MWC) ash regulated under subtitle D (i.e., not otherwise regulated under subtitle C as a hazardous waste). This would include monofills that receive only such MWC ash as well as landfills that co-dispose such MWC ash with regular municipal solid waste. EPA noted, however, that action was pending in Congress on legislation dealing specifically with the management of MWC ash. In addition, EPA asked for comments on the adequacy and appropriateness of the proposed requirements to MWC ash disposal.

On November 15, 1990, the President signed the Clean Air Act Amendments of 1990. Section 306 of the act exempts MWC ash from being regulated as a hazardous waste under subtitle C of RCRA until November 15, 1992. The intent of this provision was to provide time for Congress to clarify the regulatory status of MWC ash during the reauthorization of RCRA. Previously, Congress had considered legislation that, if enacted, would have required special management standards for MWC ash under subtitle D of RCRA. Because this rule is not effective until after November 1992, the applicability of this rule to MWC ash will be affected by Congressional action on this issue and a pending decision on a federal district court appeal regarding the regulatory status of ash.[1] Until November 1992, MWC ash disposal is subject to the existing solid waste disposal criteria under 40 CFR part 257. In addition, some States have regulations governing the disposal of MWC ash.

c. Rule Effective Date

The Agency proposed a uniform 18-month effective date for the revised Criteria, with the exception of the ground-water monitoring requirements, which were to be phased in over a five-year period following a schedule developed by the State and financial assurance. EPA proposed to make all requirements (except ground-water monitoring) effective at the same time to avoid confusion and to simplify implementation. However, EPA specifically solicited comment in the proposal on the merits of phasing in the requirements over time, rather than uniformly. Under that approach, "self-implementing" provisions (e.g., liquids restrictions, hazardous waste screening) could be effective in less than eighteen months, perhaps within six or twelve months, but the remaining requirements would be effective at 18 months.

Many commenters were in agreement with the Agency on the usefulness of the uniform effective date. However, several commenters were concerned that 18 months would be insufficient time for owners or operators to acquire capital necessary to fund changes in facility operation or design, or for States to revise their solid waste management laws and to promulgate their own regulations. In particular, many States commented that EPA should lengthen the uniform effective date of 18 months by a significant time period to reflect the time needed to change State laws, revise State regulations, and have their programs approved by EPA. These commenters suggested alternative dates ranging from 24 to 48 months. However, other commenters supported phasing in some self-implementing Criteria prior to the 18-month date, because it would be more protective of human health and the environment.

EPA still believes that a uniform effective date, except for ground-water monitoring and financial responsibility requirements, is an important aspect of the rule's implementation. However, after closely evaluating the comments received which questioned the wisdom of imposing an 18 month effective date for most provisions of the rule, EPA had decided to extend the effective date by six additional months. As a result, other than for ground-water monitoring and financial assurance requirements, all provisions of the rule will become effective 24 months after the rule is published in the **Federal Register**.

The Agency is adopting a 24 month effective date instead of the 18 month period contained in the proposed rule for two reasons. First, owners and operators and other commenters stated that the 18 month period did not provide sufficient time for facilities to have sufficient capital and resources to comply with the rule requirements. To deal with these concerns, commenters suggested that the rule become effective in anywhere from 24 to 48 months from the date of publication. EPA has decided to provide an additional six months before the rule becomes effective to assure that owners and operators have sufficient time to comply with the extensive requirements contained in the final rule. As explained elsewhere, EPA has also decided that the ground-water monitoring requirements will be phased in over a five year period and that the financial responsibility requirements will become effective in 30 months.

Secondly, while RCRA section 4005(c) requires States to adopt and implement a permit program or other system of prior approval within 18 months after the revised landfill criteria are promulgated, EPA recognizes that even if States are able to meet that statutory deadline the Agency will still need time to evaluate and make a determination

[1] *Environmental Defense Fund, Inc.* v. *City of Chicago* (H.D.Ill. 1989) concluded that MWC ash is exempt from regulation under subtitle C as a hazardous waste if the combustor satisfies the criteria of RCRA section 3001(i). This decision has been appealed.

as to the adequacy of the State permit program in accordance with RCRA section 4005(c)(1)(C). Obtaining EPA's approval of a State permit program is an important element in the implementation of the revised criteria because many of the rule's provisions are tied to whether a State has a permit program which has been approved by the Agency. Six additional months will provide EPA with time that may be necessary to review the adequacy of State permit programs.

EPA next considered whether certain requirements should be effective prior to 24 months or, for ground-water monitoring, on a different schedule from the five year phase-in period. EPA was not persuaded to change the ground-water monitoring effective date because the Agency believes the five-year period is needed to ensure there are sufficient trained personnel and installation equipment available to complete monitoring system installation. EPA's rationale for the five-year phase-in period is described in more detail in appendix F. As a general matter, EPA concluded that applying a significant number of requirements before 24 months would give owners and operators insufficient time to incorporate the requirements into their operations. However, EPA was persuaded by commenters who indicated that facilities that close in the window between the promulgation date and the effective date (i.e., 24 months) should comply with minimum final cover requirements. Therefore, as described earlier in this section, today's rule applies this one requirement to facilities before 24 months.

EPA also evaluated whether other requirements besides ground-water monitoring should be effective later than 24 months. The Agency determined that a later effective date was necessary for the financial responsibility requirements because, as discussed in appendix H, EPA has decided to develop a special financial test for local governments. Therefore, to allow time for this rulemaking, EPA has set an effective date of 30 months for this section of the rule.

2. Section 258.2 Definitions

Major comments on the proposed definitions centered on three terms. The comments, and EPA's response, are highlighted below.

Aquifer. According to the proposed rule, "aquifer" is a geologic formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs. Several commenters suggested that the proposed definition was ambiguous and that "aquifer" should be redefined. Other commenters suggested specific values for the aquifer "yield capability."

After reviewing and evaluating the comments, the Agency has decided to retain the definition of "aquifer" as proposed. EPA believes that the quality and value of the aquifer should be a site-specific determination. The Agency is opposed to judging the resource value of an aquifer based on a generic scale of significance, both in terms of quantity and quality, because of the variability of aquifers on a site-by-site basis. The Agency believes it is more appropriate that such judgments be made on a site-specific basis.

Closed unit. The proposed rule defined "closed unit" as any solid waste disposal unit that no longer receives solid waste as of the effective date of this Part and has received a final layer of cover material. This definition was dropped from the final rule because it was confusing and, as discussed in the section on closed facilities above, because it is now unnecessary given the rule changes to § 258.1.

Existing Unit/Lateral Expansion. The proposal defined "existing unit" as any solid waste disposal unit that is receiving solid waste as of the effective date of part 258 and has not received a final layer of cover material, and "lateral expansion" as a horizontal expansion of the waste boundaries of an existing landfill unit.

Several commenters requested that the Agency clarify the definitions of "existing unit" and/or "lateral expansion," because as proposed, a clear distinction was not made on the definitive limits or extent of an "existing unit," and how lateral expansions of existing units after the effective date would be regulated. Commenters recommended that the Agency consider the entire permitted landfill area (including those areas currently without waste) to be an "existing unit." Lateral expansion of such units would be only those outside the original permitted area. Alternatively, other commenters supported designating the "existing unit" as the area of landfill space actively receiving waste as of the effective date. Any enlargement of this area would be considered a "lateral expansion" and regulated as a "new unit."

EPA agreed with commenters that as proposed, the definitions were not clear. The Agency considered defining "existing unit" as the entire, originally permitted landfill area (inclusive of areas not yet receiving waste on the effective date). An extension of this "existing unit" beyond the original permitted area would be a "lateral expansion." EPA rejected this approach because of the high degree of variability of permitted landfill areas throughout the country. Some State agencies permit landfills only on a unit-by-unit basis, whereas others permit the entire area expected to receive waste during the landfill life. EPA believed some landfills would have large areas not subject to the revised Criteria, thus significantly reducing the protection of human health and the environment.

The Agency also considered the alternative proposed by commenters, i.e., defining "existing unit" as the landfill area that is receiving waste as of the effective date. This definition is the same as proposed with the exception that the reference to a final cover requirement is deleted. While this alternative was preferable to the proposed definition, the Agency was concerned that owners and operators would spread wastes over large portions of their facility prior to the effective date so that such portions would be deemed "existing units" and not be subject to certain requirements of today's rule. To address this concern, EPA added language specifying that expansions to an "existing unit" would have to be consistent with past operating practices or operating practices modified to ensure good management. The Agency believes this added provision ensures that owners or operators will not prematurely enlarge their facilities to avoid compliance with portions of the revised Criteria, but at the same time, accounts for legitimate landfill enlargements or changes in facility operations resulting from additional waste volumes.

Therefore, in today's rule, the Agency elected to revise the definition of "existing unit" to "* * * mean any solid waste disposal unit that is receiving solid waste as of the effective date of this part. Waste placement in existing units must be consistent with past operating practices or operating practices modified to ensure good management." This approach to revising the definition of "existing unit" did not require that the definition of "lateral expansion" be changed from that contained in the proposal.

3. Section 258.3 Consideration of Other Federal Laws

The Agency received two comments on the proposed § 258.3, which provided that the owner/operator of an MSWLF comply with any other applicable Federal laws, regulations, or requirements. This section recognizes that there are other Federal statutes and

programs that must be considered in siting, designing, and operating MSWLFs and serves as a reminder to the MSWLF owner/operator that such requirements must be met. The preamble to the proposed rule noted a number of applicable Federal statutes, including the Clean Water Act and Clean Air Act.

One commenter suggested that EPA should maintain consistency among the MSWLF requirements and other requirements established under Federal statutes like the Clean Water and Clean Air Acts. This commenter proposed that EPA provide guidance to permit writers and regulators of other Federal programs on the unique nature of MSWLFs. Another commenter expressed concern that § 258.3 implied that the State solid waste agency would be responsible for ensuring compliance of the MSWLF with other Federal requirements. This commenter wanted to make it clear that the MSWLF owner/operator is responsible for compliance with any other Federal requirements and that the State solid waste agency is not the clearinghouse for all these other requirements.

The Agency agrees with the points made by both commenters. EPA has attempted and will continue to attempt to ensure consistency among the requirements in the revised Criteria and other requirements under Federal law to the extent authorized by statute. EPA intends to include information on the applicable requirements under other Federal statutes in the technical guidance that EPA is preparing for this rule. Finally, the owner or operator, not the State, is responsible for ensuring compliance with these other Federal requirements. The State, however, may be involved to the extent these Federal requirements are incorporated and implemented through State regulatory programs.

Appendix C—Supplemental Information for Subpart B—Location Restrictions

The proposed Criteria specified restrictions on siting MSWLF units for six types of locations that the Agency believed warranted control, in order to protect human health and the environment. These six location restrictions have been retained in the final Criteria with some modifications. The six are: MSWLFs in the vicinity of airports and in 100-year floodplains, wetlands, fault areas, seismic impact zones, and unstable areas. Two of these locations, sites near airports and floodplains, are included in the existing part 257 Criteria.

This Appendix summarizes the proposed location restrictions, provides a review of the public comments received, and explains the Agency's approach and rationale for today's final location criteria. The first subsection below discusses and provides the rationale for the differences in the location restrictions for new MSWLF units, existing MSWLF units, and lateral expansions.

Differences in Location Restrictions for Existing Units, New Units, and Lateral Expansions

Several commenters raised concerns as to why the Agency applied certain location restrictions to new MSWLF units and lateral expansions, but not to existing MSWLF units. Specifically, commenters stated that they believed that the proposed location restrictions for wetlands and fault areas should be applicable not only to new units and lateral expansions but also to existing MSWLF units.

Consistent with the proposal, the Agency is subjecting existing units to only three of the location restrictions—airport safety, floodplains, and unstable areas—in today's final rule. Existing units are subject to both the airport safety and floodplains location restrictions because these two criteria are essentially the same as the existing part 257 Criteria, which have been in effect since 1979. Because owners and operators of existing units already should be in compliance with these Criteria, EPA believes that applying these location restrictions should not cause a significant impact on the regulated community or result in a detrimental impact to solid waste disposal capacity, while continuing to provide protection of human health and the environment.

The Agency decided to apply today's final unstable area location restriction to existing units, because the Agency believes that the impacts to human health and the environment that would result from the rapid and catastrophic destruction of these units outweighs any disposal capacity concerns resulting from the closure of existing MSWLF units.

On the other hand, EPA did not impose requirements on existing MSWLF units in wetlands, fault areas, or seismic impact areas. The Agency believes that disposal capacity shortfalls, which could result if existing landfills in these locations were required to close, raise greater environmental and public health concerns than the potential risks caused by existing units in these locations. If existing MSWLF units located in wetlands were required to close, there would be a significant decrease in disposal capacity, as approximately six percent of all existing MSWLF units are located in wetlands. (This estimate was developed by correlating maps of wetland areas with MSWLF locations.) In addition, wetlands are more prevalent in some parts of the country (e.g., Florida and Louisiana). In these States, the closure of all existing units located in wetlands would likely significantly disrupt statewide solid waste management, leading to possible increases in open dumping and open burning. Therefore, the Agency believes that it is impracticable to require closure of existing units located in wetlands.

Concern about impacts on solid waste disposal capacity was also the primary reason the Agency did not subject existing units to today's final fault area location restrictions. The closure of a significant number of existing units located in fault areas would result in the serious reduction of landfill capacity in certain regions of the U.S. where movement along Holocene faults is common, such as along the Gulf Coast and in much of California and the Pacific Northwest. EPA estimates that 35 percent of all existing MSWLF units are in counties that contain faults that have been active in the Holocene Epoch. The Agency, however, does not have specific data showing the distance between these landfills and the active faults, and therefore, is unable to precisely estimate the number of these existing MSWLF units that would not meet today's fault area restrictions. However, given the potential for impacts on solid waste capacity, EPA believes it is appropriate not to subject existing units to the final fault area requirements.

Finally, the Agency today is not imposing the seismic impact zone restrictions of § 258.14 on existing units located in these areas. The Agency anticipated that there would be a significant number of existing MSWLFs in these areas that would be unable to meet the requirements of § 258.14, because retrofitting would be prohibitively expensive and technically very difficult in most cases. As a result, many existing MSWLFs would be forced to close leading to potentially significant impacts on solid waste disposal capacity in these areas.

While the wetlands, fault areas, and seismic impact zone provisions of today's location restrictions do not apply to existing units, all of these restrictions apply to lateral expansions of existing units (as well as new units). Therefore, owners and operators of existing units may vertically expand

their existing units in these locations, but must comply with the provisions governing new units if they wish to laterally expand. EPA recognizes that applying these provisions to lateral expansions (and new units) will somewhat limit the ability of owners and operators to address capacity needs. However, the Agency believes that the flexibility provided owners and operators to vertically expand existing units will adequately address short-term capacity needs. In addition, the 24-month window prior to the effective date of today's rule provides owners and operators time to plan for future capacity needs.

Section 258.29(a) requires the MSWLF owner/operator to record and retain in an operating record any location restriction demonstrations. The final rule allows the Director of an approved State to specify an alternative location for maintaining the operating record and alternative schedules for recordkeeping and notification requirements.

1. Section 258.10 Airport Safety

The proposed criteria specified that new MSWLF units, lateral expansions, and existing MSWLF units located within 10,000 feet (3,048 meters) of any airport runway used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway used by only piston-type aircraft shall not pose a bird hazard to aircraft. These distance limits were derived from the Federal Aviation Administration (FAA) Order 5200.5, "FAA Guidance Concerning Sanitary Landfills on or Near Airports" (October 16, 1974). The proposal was identical to existing § 257.3-8, applicable to solid waste disposal facilities.

In general, commenters supported the proposed airport safety criteria; however, some commenters suggested that the Agency consult with the FAA to establish a coordinated national policy for siting of new MSWLF units near airports. Specifically, commenters were concerned that the FAA had placed additional restrictions on siting near airports that were not reflected in EPA's revised criteria.

In response to these comments, the Agency consulted with the FAA on the latest policies for siting near airports. In January 1990, the FAA revised FAA Order 5200.5, which was the basis for the Agency's existing part 257 criteria and proposed part 258 airport safety provision. Under this revision (FAA order 5200.5A) any waste disposal site located within a five-mile radius of a runway end and that attracts or sustains hazardous bird movements from feeding, water, or roosting areas into, or across the runways and/or approach and departure patterns of aircraft will be considered "incompatible" with airports. Additionally, any operator proposing a new or expanded waste disposal facility within five miles of a runway end should notify the airport and the appropriate FAA airport office so as to provide an opportunity to review and comment on the site in accordance with FAA guidance. If the disposal facility is determined by the FAA to be incompatible with the airport then under the terms of the order, it should not be sited at that location.

To respond to commenters concerns about the need for a coordinated national policy for siting near airports, the Agency carefully considered modifying § 258.10 so as to make it consistent with the FAA Order 5200.5A. However, the Agency recognizes the public has not had full opportunity to review and comment on these potential additional part 258 requirements for airport safety, particularly substantive new performance criteria and restrictions for new MSWLFs and lateral expansions within five miles of airport runways. Therefore, EPA has decided not to include new performance criteria for MSWLFs within five miles of airport runways, in today's rule. Instead EPA expects to propose additional performance criteria or restrictions for new and expanded MSWLFs near airports when the Agency revises these criteria in the future.

However, EPA believes it is appropriate to include in today's rule one minor procedural element of the revised FAA order—that owners and operators proposing new MSWLF or (lateral) expansions within five miles of a runway notify the affected airport and the appropriate FAA office. EPA believes that this requirement will ensure communication between the owner or operator and the FAA, and facilitate implementation of the revised FAA order by the FAA. EPA believes this requirement partially addresses commenters' concerns about a coordinated national policy on siting near airports. More importantly, today's notification requirement imposes little burden on the owner or operator. EPA believes this burden is particularly small when weighed against the FAA concern that landfills and other waste disposal sites erode the safety of the airport environment. Owners and operators can comply with today's notification requirement simply by submitting letters to the affected airport and the appropriate FAA airports office stating their intent to site a new MSWLF or lateral expansions within five miles of an airport runway. And finally, this notification requirement is a type of other applicable Federal requirement with which an owner or operator must comply with under § 258.3 of today's rule.

Today's final airport safety criteria applicable to new MSWLFs, existing MSWLFs, and lateral expansions remain unchanged from the proposal, except for minor clarifying language changes. The Agency also wishes to clarify that today's airport safety criteria do not prohibit the disposal of solid waste within the specified distances, unless the owner or operator is unable to make the required demonstration showing that the landfill is designed and operated so as not to pose a bird hazard. Today's regulation simply defines a "danger zone" within which particular care must be taken to ensure that no bird hazard arises. Also, today's requirement applies only to MSWLFs and does not affect the location of airports or airport runways within the specified distance.

Finally, commenters suggested that the terms "bird hazard" and "airport" be defined in the rule language. In today's final rule, the Agency defines those terms by using the definitions currently found in 40 CFR 257.3-8. The rationale for these definitions, which remains valid for purposes of this rule, can be found at 44 FR 53458, September 13, 1979. The definitions are as follows: "*Airport*" is a public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities." "*Bird hazard*" is "an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants."

2. Section 258.11 Floodplains

The proposed criteria specified that new MSWLF units, lateral expansions, and existing MSWLF units located in 100-year floodplains shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in the washout of solid waste so as to pose a hazard to human health and the environment. The proposed requirement was identical to the existing part 257 Criteria, which are applicable to all solid waste disposal facilities, including MSWLFs.

The intent of this requirement is to ensure that MSWLFs located in a 100-year floodplains are designed and operated to prevent significant impacts on the 100-year flood flow and water storage capacity. Specifically, disposal of solid waste in floodplains may have the following kinds of significant adverse impacts: (1) If not adequately protected from washout, wastes may be carried by flood waters and flow from

the site, affecting downstream water quality; (2) filling in the floodplains may restrict the flow of flood waters, causing greater flooding upstream; and (3) filling in the floodplain may reduce the size and effectiveness of the temporary water storage capacity of the floodplain, which may cause a more rapid movement of flood waters downstream, resulting in higher flood levels and greater flood damage downstream.

Several commenters noted that the proposed rule and preamble were inconsistent. Specifically, the rule language specified that the MSWLF must not restrict the flow of the 100-year flood or reduce the temporary water storage capacity of the floodplain or result in washout of solid waste so as to pose a hazard to human health and the environment. However, the preamble stated that locating a MSWLF in a floodplain will always have some impact on the flow of the 100-year flood and water storage capacity. The Agency agrees that an MSWLF will always have some impact upon the flow and water storage capacity of the 100-year flood and a requirement that an MSWLF not do so is impracticable. As proposed, the Agency is requiring that the flow restriction or impact upon water storage capacity that does occur, as the result of the MSWLF, not pose a hazard to human health and the environment.

Several other commenters disagreed with the proposed requirement and strongly urged EPA to ban all MSWLF units from the 100-year floodplain. These commenters argued that it is difficult to predict in advance the adverse impacts of a flood and asserted that, in the event of a flood, remediation would likely involve further environmental threats and would be extremely costly, if even possible. Those commenters also suggested that if the Agency still decides not to ban MSWLFs from the 100-year floodplain, EPA should at least ban MSWLFs in areas subject to frequent flooding (e.g., five- or ten-year floodplains).

The Agency decided not to ban the siting of new MSWLF units, lateral expansions, or existing MSWLF units in the 100-year floodplain for two reasons. First, EPA believes that such an across-the-board ban is not necessary for MSWLFs to protect human health and the environment. EPA believes that the demonstration requirement in today's final rule fully addresses the human health and environmental concerns (i.e., restricting flow, reducing temporary water storage capacity, and washout of waste) posed by the siting of MSWLFs in floodplain areas. If such a demonstration cannot be made, the landfill cannot be sited in that location or must be closed in accordance with § 258.16 of this part. Although EPA agrees with commenters that it is somewhat difficult to predict in advance the adverse impacts of a flood, the Agency believes such predictions can be made. In fact, such demonstrations have been made in the past by facility owners and operators to comply with identical floodplain restrictions for solid waste disposal facilities under part 257, which have been in existence since 1979.

Second, as stated previously in the preamble to the proposed rule, the outright banning of all MSWLFs from the 100-year floodplain could affect large portions of the nation, including large areas of some States (e.g., Louisiana, Mississippi, Missouri, and Arkansas) and, thus, could strain the regulated community's ability to provide adequate disposal capacity for municipal solid waste in those areas.

Owners or operators of MSWLFs can determine if their facilities are located in a 100-year floodplain by using the Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRMs). These maps cover over 99 percent of the flood-prone communities in the United States and can be obtained at no cost from the FEMA Flood Map Distribution Center, 6930 (A–F) San Tomas Road, Baltimore, Maryland, 21227–6227. For the small number of areas that are not covered by FIRMs, owners or operators could obtain 100-year floodplain maps from: The U.S. Army Corps of Engineers, the Soil Conservation Service, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, the Bureau of Land Management, the Bureau of Reclamation, the Tennessee Valley Authority, and State and local flood control agencies and other departments. Additional guidance on procedures for delineating floodplains where no maps exist will be included in the technical guidance for this rule, which is discussed in section V of today's preamble.

The Agency also decided not to ban the siting of all MSWLF units in areas of more frequent flooding (e.g., five- or ten-year floodplains). Under the 100-year floodplain criterion, an MSWLF unit cannot be located in the 100-year floodplain unless the MSWLF unit is designed, constructed, and maintained so as not to restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste. The main difference between the five- or ten-year floods and the 100-year flood is the magnitude of the flood and, therefore, any structures built for a 100-year flood should be able to withstand the five- or ten-year flood. Furthermore, the 100-year floodplain encompasses, geographically, all five- and ten-year floodplains. Thus, the Agency believes that today's requirement adequately protects human health and the environment in 100-year floodplains as well as in five- and ten-year floodplains.

Finally, the Agency believes that a ban on MSWLF units in areas of frequent flooding would be more difficult to implement because maps depicting the five- or ten-year floodplains (frequent flooding areas) are not readily available and in most areas are not available at all. A requirement banning the location of MSWLFs from areas of frequent flooding areas would require owners or operators to develop floodplain maps for frequent-flooding areas. On the other hand, maps depicting the 100-year floodplain are generally readily available.

3. Section 258.12 Wetlands

The proposed criteria specified that no new MSWLF unit or lateral expansion could be located in a wetland unless the owner or operator made specific demonstrations to the State that the new unit (1) would not result in "significant degradation" of the wetland as defined in the Clean Water Act section 404(b)(1) guidelines, published at 40 CFR part 230, and (2) would meet other requirements derived from the section 404(b)(1) guidelines. Under the proposal, existing MSWLF units located in wetlands could continue to operate; however, as indicated above, any lateral expansions of existing units would have to be in compliance with the proposed wetland restrictions.

To be consistent with the Clean Water Act, the proposed criteria adopted the definition of wetlands contained in the Army Corps of Engineers section 404 implementing regulations (33 CFR parts 320 through 330) and the EPA section 404(b)(1) guidelines (40 CFR part 230). As defined by the Corps and EPA, wetlands are those "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include, but are not limited to, swamps, marshes, bogs, and similar areas."

Several commenters requested that new MSWLF units be banned completely from wetlands. A few commenters suggested that when a new

MSWLF unit is located in a wetland, the owner or operator of the MSWLF should be required to restore an equivalent amount of land as a wetland "offset." On the other hand, several commenters supported the proposed approach or one with more flexibility to allow siting of critically-needed landfills in wetlands under certain conditions.

In response to these comments, the Agency considered whether to establish an outright ban on new MSWLF units and lateral expansions in wetlands. The Agency fully agrees with the commenters that wetlands are a very important, fragile ecosystem that must be protected. In fact, the Agency has identified wetlands protection as a top priority. In evaluating this issue for today's final rule, however, EPA also seriously considered commenters' request for flexibility to allow limited siting of landfills in wetlands to address potential impacts on current and future solid waste disposal capacity. As discussed earlier in this section, wetlands comprise large areas of the country, particularly in certain regions of the U.S. Because large volumes of municipal waste are generated in every community throughout the U.S., there is a critical need for regional or local waste management capacity. EPA was concerned that an outright ban of new MSWLFs or lateral expansions in wetlands would severely restrict the available sites or expansion possibilities. Such capacity shortfalls very likely could lead to other health and environmental impacts, such as open dumping or open burning. Because of the potential for serious disruption of municipal solid waste capacity, the Agency concluded that some flexibility must be provided for communities to site or laterally expand MSWLFs in wetlands. Therefore, the Agency decided against an outright ban on new MSWLFs or lateral expansions in wetlands.

However, EPA continues to believe that siting new MSWLFs or lateral expansions in wetlands should be done only under very limited conditions. The Agency is retaining in today's rule the comprehensive set of demonstration requirements included in the proposed rule. In addition, the Agency agrees with commenters that when a new MSWLF is located or a lateral expansion is created in a wetland, that the owner or operator should offset any impacts through appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands). This approach is consistent with the Agency's recent adoption of the goal of achieving no overall net loss of the nation's remaining wetland base, as defined by acreage and function. Therefore, the Agency has incorporated this additional demonstration element into the final rule. Specifically, § 258.12(a)(4) has been modified to require owners or operators of new MSWLF units or lateral expansions to demonstrate that 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 and then minimizing such impacts to the maximum extent practicable, and finally, offsetting any remaining wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands).

The Agency has also made additional changes to ensure that the demonstrations required today for new MSWLFs and lateral expansions are comprehensive and ensure protection of human health and the environment. First, EPA has added language to § 258.12(a)(2) clarifying that the owner or operator must demonstrate that both the construction and operation of the MSWLF will not result in violations of the standards specified in § 258.12(a)(2)(i)-(iv).

Second, as requested by commenters, the Agency has revised § 258.12(a)(3) to identify the factors the owner or operator must address in demonstrating that the landfill will not cause or contribute to significant degradation of wetlands. These factors, which were partially derived from the section 404(b)(1) guidelines, address the integrity of the MSWLF and its ability to protect the ecological resources of the wetland.

Finally, because of the unique characteristics of wetlands, EPA believes that the review and approval of the Director of an approved State is necessary for ensuring that the demonstration is comprehensive and adequate to protect human health and the environment. Therefore, today's rule specifies that all of the demonstrations must be made to the Director of an approved State and placed in the operating record of the facility. This provision effectively bans the siting of new MSWLFs or lateral expansions in wetlands in unapproved States (i.e., States that do not have EPA-approved RCRA subtitle D permitting programs). EPA believes this approach, is warranted given the commenters' concerns regarding wetlands and the Agency's commitment to protecting this valuable resource.

As indicated earlier in today's preamble, the Administration announced on August 9, 1991 a comprehensive plan for the protection of the Nation's wetlands. Included were a number of actions to improve the workability of the Clean Water Act section 404 regulatory program, which regulates the discharge of dredged or fill material into wetlands. Among these changes will be the development of wetlands categories by an interagency technical committee based on wetlands value. After such a categorization scheme is developed, the mitigation sequence (i.e., avoidance, minimization, and then compensation) will be retained for the high value wetlands category, and projects in other wetland categories will be required to offset wetlands losses through compensatory mitigation. When such wetlands categories are identified, the above changes to the section 404 permitting program will be implemented through amendment of applicable legal authorities. Section 258.12 of today's rule is consistent with regulatory provisions currently governing the section 404 program. When the section 404 regulatory program is modified in accordance with the Administration's wetlands protection program, relevant portions of this rule will be modified accordingly.

Furthermore, four agencies have recently published proposed revisions to a technical guidance document implementing the current regulatory definition of wetlands, and the agencies will shortly be proposing to codify portions of that document in the Code of Federal Regulations. See 56 FR 40446 (Aug. 14, 1991). The definition of wetlands contained in § 258.12 of today's rule reflects the Agency's current definition under the section 404 program. *See* 40 CFR 232.2(r). When the agency proposes amendments to the definition of wetlands under the section 404 program, such changes will also be proposed for the definition contained in § 258.12 of today's rule.

4. Section 258.13 Fault Areas

EPA proposed to ban new MSWLF units and lateral expansions within 200 feet (60 meters) of faults that have experienced displacement during the Holocene Epoch. The Holocene is a unit of geologic time, extending from the end of the Pleistocene Epoch to the present and includes the past 11,000 years of the Earth's history. The technical justification for the 200-foot (60-meter) setback is discuss' in the preamble for

the proposed rule and the Draft Location Restriction Background Document.

In the proposed rule, a "fault" was defined as a fracture along which strata on one side have been displaced with respect to that on the other side. In response to comments, EPA revised the definition of fault in today's rule to include a zone or zones of rock fracturing in any geologic material along which there has been an observable amount of displacement of the sides relative to each other. This addition is necessary because faulting does not always occur along a single plane of movement (a "fault"), but rather along a zone of movement (a "fault zone"). Therefore, "zone of fracturing," which means a fault zone in the context of the definition, is included as part of the definition of fault, and thus the 200-foot setback distance will apply to the outermost boundary of a fault or fault zone.

Several commenters suggested alternatives to the proposed 200-foot setback distance. Although no commenters suggested actual values for these changes or provided any data, two favored an increased distance, one favored a decreased distance, and two favored a distance based on site-specific studies.

Seismologists generally believe that the structural integrity of MSWLFs cannot be unconditionally guaranteed when they are built within 200-feet of a fault along which movement is highly likely to occur. Moreover, EPA relied on a study that showed that damage to engineered structures from earthquakes is most severe when the structures were located within 200-feet of the fault along which displacement occurred. In general, EPA believes that the 200-foot buffer zone is necessary to protect engineered structures from seismic damages.

However, the Agency also agrees with commenters who argued that the 200-foot setback may be overly protective in some geologic formations but it is unable to provide a clear definition of these geologic formations. Therefore, the Agency has allowed in today's rule, the opportunity for an owner or operator of a new MSWLF unit or lateral expansion to demonstrate to the Director of an approved State that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the MSWLF and will be protective of human health and the environment. Section 258.29 of today's rule also specifies that the demonstration must be placed in the operating record of the facility. This approach requiring review and approval of the Director of an approved State is consistent with other sections of today's rule for variances or waivers from the specified self-implementing requirement.

EPA recommends that owners or operators use a map published by the U.S. Geological Survey in 1978 to determine the location of Holocene faults in the United States. For locations in which movement along a Holocene fault has occurred more recently than 1978, owners or operators of new MSWLFs and lateral expansions would need to perform a geologic reconnaissance of the site and its environs to map fault traces and to determine the faults along which movement has occurred in Holocene time, and then to determine the appropriate 200-foot setback zone(s).

5. Section 258.14 Seismic Impact Zones

The proposed criteria required owners or operators of new MSWLF units or lateral expansions located in a seismic impact zone to design the unit to resist the maximum horizontal acceleration in lithified material for the site. The design features affected include all containment structures (i.e., liners, leachate collection systems, and surface water control systems). Seismic impact zones were defined in the proposal as areas having a 10-percent or greater probability that the maximum expected horizontal acceleration in hard rock, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10g in 250 years.

Several commenters suggested that the requirement for seismic impact areas be revised so that the maximum expected horizontal acceleration is based on site-specific assessments rather than on one performance criterion (exceedance of 0.10g in 250 years) for all sites. Some commenters supported the proposed criterion, while others favored the use of a 100-year return period rather than a 250-year period. These commenters believe that using a 250-year return period to evaluate site peak ground motion would result in more expensive studies and design in these areas, when the 100-year return period provides adequate protection to human health and the environment.

EPA has rejected the commenters' suggestion to allow the maximum expected horizontal acceleration to be set on a site-specific basis. Because of the self-implementing nature of today's rule, EPA believes that to ensure adequate protection of human health and the environment it is essential to establish a standard performance criterion for horizontal acceleration. Today's final standard still provides owners and operators of new MSWLF units and lateral expansions significant flexibility in selecting appropriate facility design on a site-specific basis to meet the specified performance criterion.

EPA also decided to retain the proposed criterion using the 250-year return period rather than changing to a 100-year period as some commenters suggested, for two reasons. First, commenters did not present any data demonstrating that the 100-year return period was as protective of human health and the environment. In lieu of supporting data, EPA is hesitant to adopt what it considers to be a less protective standard. Defining seismic zones by using the 250-year interval includes more area within the zone than a 100-year and, therefore, will be more protective of human health and the environment. Second, as a practical matter, 100-year interval maps are not available for most areas in the U.S. This would require owners or operators to do possibly costly studies to identify these areas if today's rule used the 100-year interval. The maps for the 250-year intervals, on the other hand, are readily available for all of the U.S. in the U.S. Geological Survey Open-File Report 82-1033, entitled "Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States."

Several commenters noted that EPA used the terms "lithified material" and "hard rock" interchangeably in the proposed rule. Commenters requested that these terms be defined or clarified. EPA agrees that these terms were used interchangeably, and that this results in confusion. Because the term "hard rock" can be ambiguous—raising questions such as what is "hard" rock as opposed to "soft" rock—the Agency revised the rule language to use the term "lithified earth material" consistently throughout the rule. This term best defines the material the Agency is addressing in this part of the rule. The term "lithified earth material" includes all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. The term specifically excludes man-made materials such as fill, concrete, and asphalt, as well as unconsolidated earth materials, soils, or regolith lying at or near the earth's surface.

Like all of today's final rule, the final seismic impact zone requirements are self-implementing. As such, today's final rule requires the owner or operator to place the specified demonstration in the operating record and to notify the State Director. This provision ensures that the owner or operator retains the

documentation necessary to show that a demonstration has been made in compliance with this requirement.

6. Section 258.15 Unstable Areas

The proposed criteria required owners and operators of new MSWLF units, lateral expansions, and existing MSWLF units located in unstable areas to demonstrate to the State's satisfaction the structural stability of the unit. Such demonstrations would have to show that engineering measures have been incorporated into the design of the unit to mitigate the potential adverse impacts of establishing events on the structural components of the unit. These structural components include liners, leachate collection systems, final cover systems, run-on and run-off control systems, and any other component necessary for protection of human health and the environment.

The proposed criteria also required a 6½ year phase-out of existing MSWLF units located in unstable areas that could not make the demonstration. This was corrected in the final rule to make the closure deadline five years from today's date, as originally intended. However, States could grant an extension to the phase-out if there were no available disposal alternative and no potential threat were posed to human health and the environment. (See appendix B for discussion on closure of existing units).

Several commenters requested that the Agency clarify its definition of "unstable areas." Today's final rule provides that "unstable areas" are locations that are susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for preventing releases from a landfill. Unstable areas are characterized by localized or regional ground subsidence, settling (either slowly, or very rapidly and catastrophically) of overburden, or by slope failure. Unstable areas generally include:

(1) Poor foundation conditions—areas where features exist that may result in inadequate foundation support for the structural components of the MSWLF unit (this includes weak and unstable soils);

(2) Areas susceptible to mass movement—areas where the downslope movement of soil and rock (either alone or mixed with water) occurs under the influence of gravity; and

(3) Karst terraces—areas that are underlain by soluble bedrock, generally limestone or dolomite, and may contain extensive subterranean drainage systems and relatively large subsurface voids whose presence can lead to the rapid development of sinkholes.

The term "karst" refers to a type of topography that under certain climatic conditions develops on soluble rock, most commonly limestone or dolomite. Karst areas are characterized by the presence of certain physiographic features such as sinkholes, sinkhole plains, blind valleys, solution valleys, losing streams, caves, and big springs, although not all these features are always present. EPA's intent is to include as an unstable area only those karst terraces in which rapid subsidence and sinkhole development have been a common occurrence in recent geologic time. Many of the karst areas are shown on the U.S. Geological Survey's National Atlas map entitled "Engineering Aspects of Karst," published in 1984. This is a very small scale map, and even though a review of that map suggests that a site is not in an area with historical subsidence problems, owners and operators should undertake a more site-specific investigation to show that the potential for subsidence at their site is very limited or nonexistent. Guidance on this issue will be included in the technical guidance document for this rule the Agency plans to issue within six months.

Specific examples of natural or human-induced phenomena include: Debris flows resulting from heavy rainfall in a small watershed; the rapid formation of a sinkhole as a result of excessive local or regional ground-water withdrawal; rockfalls along a cliff face caused by vibrations set up by the detonation of explosives, sonic booms, or other mechanisms; or the sudden liquefaction of a soil with the attendant loss of shear strength following an extended period of constant wetting and drying. Various naturally-occurring conditions can make an area unstable and these can be very unpredictable and destructive, especially if amplified by human-induced changes to the environment. Such conditions can include the presence of weak soils, oversteepened slopes, large subsurface voids, or simply the presence of large quantities of unconsolidated material near a watercourse.

The preamble to the proposed rule specified "weak and unstable soils" as an example of an unstable area. Several commenters requested that EPA clarify its definition of "weak and unstable soils," with some suggesting that engineering criteria be substituted. Based on comments received, EPA is clarifying the definition of "weak and unstable soils" in this appendix. Weak and unstable soils are of two basic types: (1) Expandable soils and rocks sensitive to water, and (2) soils and rocks subject to rapid settlement when saturated. Naturally-occurring expandable materials include smectitic clays, anhydrous sodium sulfate, and some shales. Loess, which is a primarily silt-sized material, is the principal material subject to rapid settlement upon saturation. Liquefaction and the subsequent sudden loss of bearing strength is a major problem with many of these materials, and if any of the above materials are present at a proposed MSWLF site, detailed geotechnical and geological studies should be undertaken to examine and document the performance of the soil under all likely climatic and technical settings. This is to ensure that poor foundation conditions are not now present, and that they are not likely to occur in the future under changes in climatic and other conditions that may reasonably be expected to occur. As an example, the bearing strength of soils at a site where there are seasonal cycles of wetting and drying should be documented under both conditions. Guidance on this issue will be included in the technical guidance EPA is developing for this rule.

One commenter argued that all MSWLFs should be banned in karst terraces instead of allowing a demonstration of structural stability because such areas are commonly prone to catastrophic subsidence. The commenter further argued that it is extremely difficult to show that ground-water monitoring and corrective action can be effectively performed in many, if not most, karst terraces, particularly those where ground water moves along large, discrete conduits.

The Agency recognizes that rapid sinkhole formation that occurs in some karst terraces can pose a serious threat to human health and the environment by damaging the structural integrity of liners, caps, run-on/run-off control systems, and other engineered structures. However, EPA did not propose an outright ban of MSWLF units in all karst terraces because of concerns regarding the impacts of such a ban on solid waste disposal capacity in certain regions of the country. For example, several States (i.e., Kentucky, Tennessee) are comprised mostly of karst terraces and the banning of all MSWLF units in karst terraces would cause severe statewide disruptions in capacity available for solid waste management. Moreover, the Agency believes that some karst terraces may provide sufficient structural support for MSWLFs and the final rule should provide flexibility for siting in these areas. Therefore, today's rule allows the construction of new MSWLF units or

lateral expansions and the continued operation of existing MSWLF units in karst terraces where the owner or operator demonstrates to the State Director the structural integrity of the components of the unit as allowed for in § 258.15(a). The Agency believes this approach will provide adequate protection of human health and the environment for subtitle D units.

Although the standards set forth in this section pertain to the issue of structural integrity of MSWLF units in karst terraces, EPA acknowledges that there are additional problems in establishing an effective ground water monitoring system in some karst terraces. EPA believes that the ground water monitoring requirements under subpart E of today's rule adequately address the establishment of a ground water monitoring system at all MSWLF units for subtitle D purposes, including those located in karst terraces. New units and lateral expansions in karst terraces that are not able to demonstrate compliance with subpart E are not allowed to begin operations, even if compliance with § 258.15(a) can be demonstrated. Similarly, existing units that are not able to demonstrate compliance with subpart E, even if compliance with § 258.15(a) can be demonstrated, are required to close in accordance with § 258.16. This will provide additional protection of human health and the environment.

Today's final unstable area restrictions incorporate an editorial change suggested by a commenter. This commenter indicated that the language in one sentence of § 258.15(a) as proposed was confusing (i.e., "The owner or operator of an MSWLF unit located in an unstable area must demonstrate to the State that engineering measures have been incorporated into the unit's design to ensure the stability of the structural components of the unit.") The commenter suggested that the language be revised as follows (changes underlined): "* * * have been incorporated into the unit's design to ensure *that the integrity* of the structural components of the unit *will not be disrupted*." The Agency agrees with this editorial comment and revised the final rule language as suggested.

Like all of today's final rule, the final unstable area restrictions are self-implementing. As such, today's final unstable area restrictions require the owner or operator to place the specified demonstrations in the operating record and to notify the State Director. This provision ensures that the owner or operator retains the documentation necessary to show that a demonstration has been made in compliance with this requirement.

7. Section 258.16 Closure of Existing Units

The proposed rule, under § 258.15, required owners and operators of existing MSWLF units that were located in unstable areas and unable to demonstrate the structural integrity of the unit, to close within 6½ years (October 9, 1996) unless the State extended the deadline. Extensions could only be granted by the State after considering the availability of alternative waste disposal capacity and the potential risk to human health and the environment.

As discussed earlier, § 258.15(c) erroneously stated that existing units in unstable areas that are unable to make the demonstration, must close within 5 years of the effective date of the rule. As this is read, it allows 6½ years for MSWLFs to close. The Agency has corrected this in today's final rule to reflect its original intention to allow a maximum of 5 years from today's date for MSWLF's unable to make the appropriate demonstrations, to close.

Several commenters expressed concern that States could extend this phase-out period for existing units beyond the intended five years with no limitations. EPA agrees with the commenters that there should be a limit on the time period for extensions. Therefore, in today's rule, EPA is limiting the length of an extension that the Director of an approved States may grant to two years after the initial five-year extension. EPA believes that five years will, in most cases, be adequate time to complete proper and effective facility closure in unstable areas, and to arrange for alternative waste management. However, there may be cases where alternative waste management capacity may not be readily available or where the siting and construction of a new facility may take longer than five years. EPA believes the two-year extension provides sufficient time to address these potential problems. EPA continues to believe that impacts on human health and the environment need to be carefully considered before such extensions are granted. For this reason, the final rule retains the provision that an extension be given only after consideration of threats to human health and the environment. Specifically, today's final rule requires the owner or operator to demonstrate that there is no available alternative disposal capacity and there is no potential threat to human health and the environment.

To further ensure careful consideration and review of human health and environmental impacts, time extensions must be approved by the Director of an approved State. Therefore, these extensions will not be available to owners and operators of MSWLFs in unapproved States.

In reviewing comments on the proposal, the Agency recognized that the proposed rule was unclear regarding closure of existing MSWLF units that could not make the demonstrations under the airport safety and floodplains location criteria. Therefore, to clarify this issue, EPA has specified under this new section (258.16) that existing MSWLF units that cannot meet the demonstration requirements under the airport safety or floodplain location restrictions must also close under the same schedule discussed above for the unstable area restrictions. As discussed earlier in this preamble, EPA expects that most, if not all, existing MSWLFs should be in compliance with the airport safety and floodplain provisions because they have been in effect under existing part 257 since 1979. Thus, the Agency does not expect many existing units in these two locations to close. Nonetheless, closure of existing units that cannot make the demonstrations required in today's rule was the original intent of the Agency. This section now explicitly provides for closure of existing units where required and clarifies the Agency's original intent on this matter.

8. Other Location Areas

EPA specifically requested comments on whether other location restrictions in addition to those proposed should be imposed for MSWLFs. The Agency received several suggestions for additional location restrictions. The major suggestions included areas of high-quality, vulnerable ground water and unmonitorable areas. However, the Agency decided not to include them in today's final rulemaking for the reasons discussed below.

The Agency recognizes the concern with siting MSWLF units over areas of high-quality, vulnerable ground water. EPA agrees that high-quality, vulnerable ground water should be protected. However, as noted earlier, this rule is intended to be self-implementing. As yet, the Agency does not have adequate information to develop acceptable national and self-implementing criteria to identify high-quality, vulnerable ground water. The Agency is still examining this issue and developing those types of criteria for determining areas of high-quality, vulnerable ground

water. Such specific criteria are critical for an effective, implementable siting requirement. Therefore, restrictions on siting MSWLF units over areas of high-quality, vulnerable ground water are not included in today's final rule. If EPA decides to establish a new siting restriction for MSWLFs in these areas after this analysis is completed, the Agency will propose appropriate revisions to this rule. Before this time, the Agency expects that the multitude of State ground-water protection laws, including those affecting siting, will be used to protect high-quality, vulnerable ground water as an interim measure. The Agency also intends to study further the efficacy of these State measures in developing the national self-implementing criteria that may be needed.

Several commenters suggested that MSWLFs should be banned from locating in unmonitorable areas and that these areas should be included as a location restriction. The Agency agrees with these commenters, but believes that this issue is adequately addressed by the ground-water monitoring requirements under subpart E of today's rule. Specifically, § 258.50 of subpart E requires new MSWLF units to be in compliance with the ground-water monitoring requirements prior to waste being placed in the unit for disposal, and existing units to establish ground-water monitoring requirements according to a specified schedule (see appendix F to today's preamble). In addition, § 258.51 requires that the number, spacing, and depths of monitoring systems be determined based on a thorough site-specific characterization of the aquifer and geologic units or materials overlying the aquifer. If an owner and operator is unable to comply with these requirements due to unmonitorability of a particular location, he/she cannot site or operate an MSWLF at that location. EPA believes that this approach effectively meets the objective of the commenters.

9. Wellhead Protection

As part of today's rulemaking, the Agency is emphasizing the State wellhead protection program established under Section 1428 of the Safe Drinking Water Act. By including a note to today's location restrictions this puts owners and operators on notice that wellhead protection programs may exist in their States and the appropriate State program should be contacted to determine the nature of any additional requirements. The wellhead protection program is not a part of the subtitle D rule and the Agency is not implying a direct connection between the two rules by incorporating the note in today's rule.

Appendix D—Supplemental Information for Subpart C—Operating Criteria

1. Section 258.20 Procedures for Excluding the Receipt of Hazardous Waste

The proposed rule would require the owner or operator of an MSWLF to implement a program to detect and prevent attempts to dispose of hazardous wastes (regulated under subtitle C of RCRA) and polychlorinated biphenyl (PCB) wastes (regulated under the Toxic Substances Control Act) at the facility. The program, as proposed, included random inspections of incoming loads, inspections of suspicious loads, recordkeeping of inspection results, training of personnel to recognize hazardous waste, and procedures for notifying the proper State authorities if a regulated hazardous waste was found at the facility.

Commenters expressed concern that some proposed program elements might be impracticable and/or dangerous, especially for smaller landfills and sites that are unattended during open hours. EPA recognizes the potential hazards involved, but believes that with proper training (as required under today's rule) these risks should be minimized. In addition, a program for detection and removal of hazardous materials would reduce inadvertent contact with hazardous materials by other employees of the facility and would discourage attempts to dump regulated hazardous waste illegally at MSWLFs. EPA believes that, although the proposed program elements are not currently standard procedures, the elements are generally feasible at most MSWLFs, are highly protective of human health and the environment, and after implementation should involve only slightly more additional work for the owner or operator.

However, the Agency recognizes that at certain facilities, particularly smaller facilities, which may be unmanned during all or portions of the time the waste is received, certain program elements, specifically routine inspections of incoming loads, may be impractical. The Agency also recognizes that random inspections may be unnecessary if the waste exclusively originates from households. In order to accommodate these concerns, the Agency revised the proposed language, by providing that the owner or operator of an MSWLF can avoid random inspections of incoming loads if other steps are instituted to ensure that such loads do not contain regulated hazardous wastes. These steps may include instituting source controls, including restricting the type of waste received to household waste. Under such conditions, the owner or operator has eliminated the key potential sources of regulated hazardous waste (i.e., commercial and industrial waste generators).

Commenters were also concerned about the difficulty in determining what constitutes a "suspicious" load. The Agency's intent was to target those incoming loads that have characteristics suggesting the presence of hazardous waste or PCB wastes. However, the Agency agrees with the commenters that the term "suspicious" is vague and difficult to define. The requirement for inspections of suspicious loads, therefore, was deleted from the final rule. EPA believes, however, that today's final requirements discussed below regarding random inspections or other steps ensuring that incoming loads do not contain hazardous waste or PCB wastes will achieve the Agency's goal of targeting incoming loads that raise concerns.

The final rule requires the implementation of a program at the facility for detecting and preventing the disposal of regulated hazardous wastes and PCB wastes. This program must include: (1) Random inspections of incoming loads unless other steps are instituted to ensure that incoming loads do not contain regulated hazardous waste or PCB wastes; (2) records of any inspections; (3) training of facility personnel to recognize regulated hazardous waste and PCB wastes; and (4) procedures for notifying authorized States under Subtitle C of RCRA or the EPA Regional Administrator if a regulated hazardous waste or PCB waste is discovered at the facility.

Commenters requested that EPA define what constitutes an inspection and what is meant by a random inspection. These issues are discussed below.

Under today's rule, an inspection would involve discharging a waste load and viewing the contents prior to actual disposal of the waste at the facility, allowing the facility owner or operator to refuse to dispose of wastes deemed inappropriate. Inspections could be performed near or adjacent to the working face of the landfill. Alternatively, inspections could be performed on a tipping floor located near the facility scale house or inside the site entrance. Inspections could also be performed at the tipping floor of transfer stations, prior to the transfer of the waste to the facility. An inspection

at a transfer station could operate in lieu of a random inspection of incoming loads at the MSWLF. Inspections should be performed by facility personnel trained to recognize regulated hazardous waste or PCB wastes.

For an inspection to be adequate, the inspector should know the nature of all materials received in the load and whether or not they are regulated hazardous waste or PCB wastes. Because it is not practicable to inspect every load, random inspections are required (unless other steps or procedures are taken to ensure that incoming loads do not contain regulated hazardous waste or PCB wastes). Waste brought to the facility in containers used for hazardous materials, in containers not ordinarily used for the disposal of household wastes (e.g., in 55-gallon drums), or in unmarked containers may warrant inspections. Loads may also warrant inspections if brought to the facility in vehicles not typically used for disposal of municipal solid waste or if transported by haulers who usually transport hazardous waste. For wastes of unknown nature received from sources other than households (e.g., industrial or commercial establishments), the inspector should question the transporter about the composition of materials brought to the facility for disposal.

Commenters also requested that the Agency clarify what frequency constituted "random" inspections. Today's final rule does not specify a minimum frequency because EPA believes the appropriate frequency for inspections will vary significantly based on site-specific factors. Such factors include the owner or operator's knowledge of the waste generator and hauler and the type of waste received. For example, wastes received from a waste generator that the owner or operator has little prior experience with may require more frequent inspections. Likewise, wastes from commercial or industrial sources may require more frequent inspections than wastes predominantly from households. The owner or operator should consider these factors, as well as others applicable to his or her facility, in developing an appropriate inspection program. EPA plans to provide additional guidance on this issue in the technical guidance on this rule described in section VI of today's preamble.

Owners and operators of MSWLFs must ensure that all relevant personnel are trained to identify potential regulated hazardous waste and PCB wastes. Relevant personnel may include supervisors, spotters, designated inspectors, equipment operators, and weigh station attendants. The training should emphasize methods to identify containers and labels typical of hazardous waste and PCB waste. Training should also address the proper handling of hazardous waste. Some of this information is provided in courses currently offered to comply with the Occupational Safety and Health Act (OSHA), under 29 CFR 1910.120.

Section 258.20 of today's rule requires records of all inspections. Under § 258.29 of today's rule, these records must be included and maintained in the operating record. Inspection records should include the date and time wastes were received during inspection, names of the hauling firm and driver, source of the wastes, vehicle identification numbers, and all observations made by the inspector. The final rule, however, does provide flexibility to Directors of Approved States, to establish alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements.

Numerous commenters asked what should be done with hazardous waste left at the gate or inadvertently accepted at the MSWLF. This includes: What an owner or operator should do if hazardous material is discovered; who is responsible for removal of the waste; and, should testing be necessary to determine whether or not a material is hazardous, who is responsible for storing the material during testing and what storage protocols apply.

Under today's rule, owners and operators must develop procedures to notify the proper authorities if a regulated hazardous waste is discovered at the facility, as discussed below. The proper authorities should include the State Director in a State authorized to run a hazardous waste program under subtitle C of RCRA and, in an unauthorized State, the EPA Regional Administrator.

The owner or operator may be responsible for the regulated hazardous waste upon its discovery at the facility and thus should comply with the applicable regulations. In a State authorized under subtitle C of RCRA, the applicable regulations are generally State regulations. In an unauthorized State, the applicable regulations are the appropriate Federal regulations (primarily those found at 40 CFR parts 260 through 270). Generally, if the owner or operator is able to identify the waste as a regulated hazardous waste while the material is still in the possession of the transporter, and refuses to accept the waste at the MSWLF, the waste remains the responsibility of the transporter. However, if the owner or operator discovers regulated hazardous waste at the MSWLF, the owner or operator must ensure that the wastes are treated, stored, or disposed of in accordance with RCRA and applicable State requirements. He or she may choose to keep the wastes on site or to transport them off site to a RCRA subtitle C facility. If the owner or operator transports the wastes off site, he or she must ensure that the wastes are properly manifested and packaged in accordance with 40 CFR part 262 or the analogous authorized State requirements. This would include designating a facility permitted to treat, store, or dispose of the hazardous waste. If the owner or operator decides to treat, store, or dispose of hazardous wastes on site, he or she must comply with the applicable State and Federal requirements. The requirements for treatment, storage or disposal of hazardous waste vary from State to State. Thus, when located in a State with an authorized program, the owner or operator should consult the State regulations.

2. Section 258.21 Cover Material Requirements

The proposed rule specified application of suitable cover material at the end of each operating day, or at more frequent intervals, if necessary, to control disease vectors, fires, odors, blowing litter, and scavenging. Under the proposal, the States could temporarily waive the daily cover requirement on a case-by-case basis in the event of extreme seasonal climate conditions, such as heavy snow or severe freezing, that make this requirement impractical.

In the preamble to the proposed rule, EPA recommended that if earthen materials were used, six inches be applied and requested comment on using this approach for the final rule. Many commenters supported the use of earthen materials, suggesting that it either be a minimum of six inches or be sufficient to hold down paper. Commenters also recommended that this be incorporated in the final rule.

In response to these comments, the final rule requires the owner or operator of an MSWLF unit to cover disposed solid waste with six inches of earthen materials (i.e., soils) unless an approved State approves alternative cover materials. The Agency selected a six-inch depth based on data that show that six inches of compacted sandy loam are necessary to prevent fly emergence (Response to Comments Document—Operating Criteria). The Agency

believes that by requiring six inches of earthen materials, it will be easier to implement and enforce today's rule. EPA believes this requirement will not significantly affect many facilities because 45 States and Territories already specifically require six inches of earthen material as daily cover and the practice is standard operating procedure at most MSWLFs.

The rule as proposed allowed other suitable materials to be used as cover and EPA specifically requested comment on what other materials might be suitable. In response, commenters suggested materials that included geotextiles, foams, plastic sheets, tarps, sewage sludge, "fluff" (non-metallic residue from metal shredding operations), municipal waste combustion ash, paper mill sludges, used asphalt material from street maintenance, composted yard wastes, wood chip grindings from tree trimmings, and even "materials ordinarily disposed of in landfills."

In today's final rule, the Agency has not specified appropriate alternative materials because the Agency does not have sufficient information on all materials that could be used as daily cover and does not want to preclude the use of materials that may be found at a later date to be adequate daily cover material. However, to allow owners and operators of MSWLFs to take advantage of new technologies or to use cover materials that address specific geographic situations, the final rule provides that the approved States may allow alternative materials of alternative thicknesses. Under § 258.21(b), the owner or operator must demonstrate that the alternative material and thickness will control disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment. The Agency plans to provide guidance on this issue, including methods for evaluating alternative materials, in the technical guidance for this rule described in section V of today's preamble. In this guidance, the Agency will discuss the various alternative materials suggested by commenters and the Agency's concerns regarding the use of certain materials (e.g., MWC ash).

An important aspect of this alternative cover provision is that decisions can be made only by States with EPA-approved programs. These approved programs will ensure that the State will interact with the owners or operators when approving an alternative cover material, thus ensuring that the alternative material will be protective of human health and the environment. Therefore, only owners or operators located in States with approved programs have the opportunity to demonstrate to the State that alternative materials can be used.

The proposed rule specified that cover be applied at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors, blowing litter, and scavenging. EPA requested comments on the appropriate frequencies for application of cover. Numerous commenters addressed this issue. Many rural communities criticized the requirement for daily application of cover, arguing that weekly cover extends the life of the landfill and, given their rural location, there was little potential of health hazards. Some commenters suggested that the type of waste received (e.g., inert materials) be used to determine the frequency of application. Several commenters suggested that the requirement be revised to state that waste should not be exposed for a specified time period, such as 16 or 24 hours, rather than requiring daily cover.

Today's final rule retains the proposed daily cover requirement because the Agency does not believe the commenters provided sufficient information to warrant modifications. Daily cover serves several specific purposes for protecting human health and the environment: (1) It helps in disease vector and rodent control; (2) it helps contain odor, litter, and air emissions, which may threaten human health and environment and/or be aesthetically displeasing; (3) it lessens the risk and spread of fires; and (4) it reduces infiltration of rainwater by increasing run-off and thereby decreases leachate generation and surface and ground-water contamination. Cover material applied less frequently will not be as effective in meeting these above purposes. As an additional benefit, daily cover material enhances the site appearance and its utilization after completion.

EPA proposed temporarily waiving daily cover for extreme seasonal climatic conditions. EPA also asked for comment on whether there are other reasons besides extreme seasonal climatic conditions for temporarily exempting daily cover. Commenters suggested that, in addition to climate, States be allowed to consider the types and quantities of wastes received, the location of the facility, the facility design and operation, and the practicable capability of the operator.

The Agency decided that the rationales provided by commenters for including factors in addition to extreme climatic conditions were not persuasive enough to be included in the final rule. The Agency rejected these comments because daily cover is a necessary good housekeeping practice and should be required regardless of waste types, location of the facility, and the design and operation of the facility. Unlike extreme climatic conditions, which make the placement of daily cover very difficult, the conditions cited by commenters do not pose significant obstacles to daily cover operation. The Agency believes that the protection provided to human health and the environment by daily cover outweighs any of the difficulties cited by commenters.

Today's final rule provides that only States with approved programs may approve temporary waivers for extreme seasonal climatic conditions because the Agency believes that the State should be involved in deciding whether a waiver is necessary. In addition, States without approved programs may not have the procedures or authority to implement these waivers.

3. Section 258.22 Disease Vector Control

The Agency did not receive any comments on the proposed disease vector requirement and has retained it in the final rule. Thus, as proposed, today's rule requires that each owner or operator of an MSWLF prevent or control on-site disease vector populations using appropriate techniques to protect human health and the environment. This standard is intended to prevent the facility from being a breeding ground, habitat, or feeding area for disease vector populations. Vector control activities are to be undertaken in conjunction with the application of cover material required by § 258.21. If cover material requirements prove insufficient to ensure vector control, other steps must be taken by the owner or operator to ensure such control, (e.g., shredding the waste). Methods for controlling disease vectors will be discussed in the technical guidance document for this rule.

4. Section 258.23 Explosive Gases Control

The decomposition of solid waste (in particular, household waste) produces methane, an explosive gas. The accumulation of methane in MSWLF structures can result in fire and explosions that can injure or kill

employees, users of the disposal site, and occupants of nearby structures, and can damage containment structures and thereby cause the emission of toxic fumes. For this reason, EPA established an explosive gas criterion in § 257.3–8 of the original subtitle D Criteria to control the concentration of methane in facility structures and at the property boundary. Specifically, § 257.3–8 required that the concentration of methane generated by the MSWLF not exceed 25 percent of the lower explosive limit (LEL) in facility structures (excluding gas control or recovery system components) and that it not exceed the LEL itself at the property boundary. EPA expanded this requirement in § 258.23 of the proposed rule by requiring the owner or operator to conduct subsurface and facility structure gas monitoring at least quarterly to ensure methane control. In addition, EPA proposed that if methane exceeds the limits specified, the owner or operator must take necessary steps to ensure protection of human health and immediately notify the State of the level detected and the steps taken to protect human health. Such steps could include evacuation and ventilation of affected buildings. The Agency also proposed that the owner or operator submit a remediation plan to the States within 14 days of the methane limits having been exceeded. This plan must describe the nature and extent of the problem and the proposed remedy.

The proposal listed site-specific factors that control the rate and extent of gas migration, which should be considered to determine the type and optimal frequency of monitoring (which in some instances may be more than quarterly). These factors include: soil conditions, hydrogeologic conditions surrounding the disposal site, hydraulic conditions surrounding the disposal site, and the location of facility structures relative to property boundaries.

Many commenters criticized the minimum frequency of quarterly monitoring and recommended that States be allowed to specify the monitoring frequency. Some also suggested that exceptions to quarterly monitoring be permitted based on climate (either dry or cold), type or quantity of waste disposed, and distance from structures or other facilities.

The Agency decided to retain the minimum quarterly monitoring frequency requirement because the Agency was not persuaded that dry or cold climates, type or quantity of waste disposed, and location of the facility should be factors for waiving quarterly monitoring. Catastrophic results may occur if methane levels remain unchecked; therefore, the Agency believes for safety reasons it is necessary to retain the minimum quarterly frequency for methane monitoring in the final rulemaking. The Agency believes that methane monitoring is critical because it provides an early warning of potential methane build-up that may lead to explosions, and that quarterly monitoring accounts for the seasonal variations in subsurface gas migration patterns.

As mentioned above, EPA also proposed that certain steps be taken if methane gas levels exceeding the specified limits are detected. The Agency did not receive any comments on the proposed § 258.23(c) (1) and (2), which required the owner or operator to take all necessary steps to protect human health and immediately notify the State of methane levels detected and actions taken. Therefore, EPA retained these provisions as proposed, with minor modifications in keeping with the self-implementing aspects of today's final rule. EPA has clarified the rule language by requiring the owner or operator to notify the State immediately when the methane limits have been exceeded, and within seven days place in the operating record documentation of the methane gas levels detected and a description of the interim steps taken to protect human health. The Agency believes that seven days is adequate time for the owner or operator to place the documentation in the operating record. However, the Agency is allowing the State Director to establish alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements. The Agency included the operating record provision to ensure that there is proper documentation if methane levels are exceeded and to facilitate citizen suits.

EPA received numerous comments regarding proposed § 258.23(c)(3), which required the owner or operator to submit a methane remediation plan within 14 days. Many commenters criticized the 14-day period for submitting a remediation plan as being unrealistically short. Commenters said that plans for interim measures could be submitted in that time frame to ensure the immediate protection of human health and the environment, but that determination of the problem and the exact nature of remediation would take much longer. Proposed time schedules ranged from 30 to 90 days. The Agency agrees with these commenters that the 14-day response time was not a realistic time period to allow an owner or operator to make a complete determination of the methane problem and to adequately evaluate the alternatives for remedial action to alleviate the problem and to submit a remediation plan.

The Agency considered the alternative time frames, ranging from 30 to 90 days, suggested by the commenters. The Agency determined that 60 days will provide adequate time for an owner or operator to develop and place in the operating record a remediation plan that would describe the nature and extent of the problem and the proposed remedy without causing undue threat to human health, and modified the final rule accordingly. This 60-day time period is needed to provide adequate time for the owner or operator to contact, if necessary, knowledgeable outside parties to assist in the development of the remediation plan, which should include determination of the exact location and extent of the methane gas problem, determination of the need for and location of interceptor gas collection trenches, and a decision as to whether venting of structures and subsurface gas withdrawal is necessary. EPA does not believe that allowing this additional time compromises the protection of human health and the environment because, under § 258.23(c)(1), the owner or operator still must take all necessary steps to ensure immediate protection of human health, including interim measures, if methane gas levels exceed the specified limits. Rather, a reasonable specific time period for the development of a plan facilitates the self-implementing nature of today's rule.

The Agency also modified the rule to require the owner or operator to place the remediation plan in the operating record and to notify the State. The plan is then to be implemented once it has been placed in the operating record. The Agency added this requirement to the final rule to provide a mechanism to ensure that the owner or operator develops a remediation plan, when necessary, and that the plan is made available for State and public review. The final rule allows Directors of approved States to establish alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements.

5. Section 258.24 Air Criteria

Under § 258.24(a), EPA proposed to require that MSWLFs not violate applicable requirements of State Implementation Plans (SIPs) under section 110 of the Clean Air Act (CAA). Section 258.24(b) proposed to prohibit open burning (i.e., uncontrolled or unconfined combustion) of solid waste

but allow infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, debris from emergency cleanup operations, and ordnance (e.g., ammunition and bombs). These requirements were already in effect under part 257. In the proposed rule, the Agency clarified that empty pesticide containers or waste pesticides were not exempted agricultural wastes. This interpretation has been used by the Agency in implementing the air criteria requirements for solid waste disposal facilities under 40 CFR part 257 (see 44 FR 53438).

Today's final rule is unchanged from that proposed, with the exception that ordnance has been deleted from the list of wastes that may be burned at MSWLFs. This is because the Agency recognizes that ordnance (e.g., ammunition and bombs) may be capable of detonation and exhibits the characteristic of reactivity, and is thus regulated as a hazardous waste (40 CFR 261.23). Under existing regulations, all hazardous waste must be transported to a hazardous waste treatment, storage or disposal facility that has received either interim status or a RCRA part B permit under 40 CFR part 270; therefore, ordnance may not be open-burned at an MSWLF.

In the preamble to the proposal, EPA noted that MSWLF air emissions, other than from open burning, would be regulated under the CAA section 111(b) for new landfills and section 111(d) for existing landfills at some future date. Several commenters criticized the Agency's decision to regulate emissions from MSWLFs under these sections of the CAA, stating that the CAA's structure is cumbersome and ill-suited to address the control of air emissions from landfills. They suggested that these emissions be regulated under subtitle D.

EPA disagrees with these commenters. The Clean Air Act is the Agency's primary statutory authority for addressing air quality concerns. As such, EPA believes it is appropriate to regulate air emissions from MSWLFs under the CAA. Therefore, under section 111(d), EPA is planning to propose air emission regulations to be adopted and used by the States to prepare plans for controlling air emissions from MSWLF units.

Although a few commenters expressed support for the ban on open burning, small rural communities expressed widespread opposition. Commenters opposing the ban stated that burning reduces the volume to be buried and thereby extends the useful life of a landfill, poses less of a threat to the environment than does burying raw garbage (i.e., that pollution caused by burning was probably less of a problem than ground-water pollution caused by burying), does not attract rodents and wild animals, and eliminates the methane problem. Many commenters argued that the burning of yard waste (particularly brush, tree limbs, undiseased trees, and untreated wood products) should be allowed. Some commenters argued that prohibiting open burning would increase the cost of solid waste disposal. Others argued that if existing small landfills were forced to close, uncontrolled burns and midnight dumping would increase. EPA originally established the ban on open burning in 1979 in the part 257 Criteria. The rationale for banning open burning of solid waste in 1979 is equally applicable today; that is, the hazards posed to human health by allowing the open burning of solid waste (e.g., the increase in particulate emissions, decreased safety) outweigh any benefits derived from the practice. For example, EPA has data indicating that smoke from open burning can reduce aircraft and automobile visibility and has been linked to automobile accidents and deaths on expressways. Open burning may result in uncontrolled emissions of hazardous constituents that pose a threat to human health and the environment. Furthermore, commenters did not submit data to support their claims that open burning poses less of an environmental threat than does landfilling the waste. EPA decided that any cost savings did not outweigh the benefits to human health and the environment in this case. For the reasons described above, EPA retained the open burning prohibition in today's final rulemaking.

Numerous commenters expressed support for burning yard waste at MSWLFs using trench incinerators, pit burners, or air curtain destructors. Commenters stated that air curtain destructors have been shown to reduce waste volume by 98%, and particulate air emissions by 80–90%. EPA carefully reviewed the data submitted by commenters on this issue. Although there has been some improvement in this technology over the last ten years, EPA concluded that these devices still emit unacceptable levels of particulates. While trench incinerators, pit burners and air curtain destructors reduce air emissions by 80–90%, EPA's test data indicates that such particulate emissions are similar to particulate emissions from open burning (Reference: Background Document—Operating Criteria). Furthermore, because these devices do not control the emission of combustion products, they are considered "open burning." Open burning is defined under § 258.2 as the combustion of solid waste (1) without control of combustion air to maintain adequate temperature for efficient combustion; (2) without containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion; and (3) without the control of the emission of the combustion products (see also 40 CFR 257.3–7(c)).

The Agency would also like to note that although open burning of most wastes is prohibited at MSWLFs under the final rule, infrequent burning of certain materials is permitted. Materials that may be burned infrequently are agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, and debris from emergency cleanup operations. This approach is consistent with EPA's existing requirements at 40 CFR part 257 for solid waste disposal facilities and practices (see 44 FR 53458, September 13, 1979). The open burning of these materials is not typically an ongoing practice and, thus, does not present a significant environmental risk. In addition, destruction of disease-carrying trees or debris from emergency operations provides an added environmental benefit in preventing chances of disease or accident. Today's final criteria do require that the conduct of these infrequent acts of burning must be in compliance with applicable requirements under the State SIPs. In response to comments, EPA is clarifying today that the open burning of yard wastes, pesticide containers, and wooden pallets is not an allowed practice. Open burning should be conducted in areas dedicated for that purpose at a distance from the landfill unit so as to preclude the accidental burning of other solid waste.

6. Section 258.25 Access Requirements

EPA proposed to require control of public access to new and existing MSWLF units to prevent illegal dumping of wastes, public exposure to hazards at MSWLFs, and unauthorized vehicular traffic. Access control is a key element in preventing injury or death at these facilities. The proposal also required the use of artificial or natural barriers, as necessary, to prevent illegal dumping of wastes and unauthorized vehicular traffic. This requirement is intended to prevent the illegal disposal of regulated hazardous waste as defined under 40 CFR part 261 and PCB wastes as defined under 40 CFR part 761 and unauthorized vehicular traffic when the facility is closed, not to prevent access for controlled disposal.

A few commenters were concerned that dumping outside the MSWLF would occur if the site were not accessible at all times. They recommended that the rule be revised to ensure site access at all times.

The Agency disagrees that requiring the facility to be accessible to the public at all times to prevent the problem of dumping wastes outside the landfill area during off-hours outweighs the potential problems that may occur with uncontrolled access. Access control is necessary to prevent illegal dumping of hazardous wastes and direct public exposure to solid waste and is a key element in preventing injury or death at MSWLFs. The importance of access control cannot be overstated, because people have suffered injury and even death at uncontrolled waste disposal facilities. The most effective means of minimizing the risk of injury to persons (other than users of the MSWLF) is to completely prohibit (e.g., by suitable fencing) access to the site by unauthorized users. Minimizing the risk of injury to users of the MSWLF, another purpose of today's requirement, can be met by strictly controlling disposal on site. In areas where access is necessary after the landfill is closed, the owner or operator may want to place a waste receptor just outside the facility for disposal of waste during hours that the facility is closed. For the above reasons, EPA decided to retain, in the final rule, the proposed approach.

7. Section 258.26 Run-on/Run-off Control Systems

The proposed rule required the owner or operator of an MSWLF to design, construct, and maintain a run-on control system to prevent flow onto the active portion of the MSWLF during peak discharge of a 25-year storm. The purpose of the run-on standard is to minimize the amount of surface water entering the landfill facility. Run-on controls prevent (1) erosion, which may damage the physical structure of the landfill; (2) the surface discharge of wastes in solution or suspension; and (3) the downward percolation of run-on through wastes, creating leachate.

The proposed rule also required that the owner or operator of an MSWLF design, construct, and maintain a system to control run-off from the active portion of the landfill. The run-off control system must collect and control, at a minimum, the water volume resulting from a 24-hour, 25-year storm. Run-off from the active portion of the unit must be handled in accordance with § 258.27 of the proposal in order to ensure that the CWA NPDES requirements and CWA sections 208 and 319 requirements are not violated. The Agency chose the 24-hour period because it is an average that includes storms of high intensity with short duration and storms of low intensity with long duration.

Several commenters suggested that (1) the run-on/run-off control system be required to handle a 100-year storm and (2) the run-off be collected, sampled, and analyzed prior to its release to surface waters rather than after the water is released.

In today's final rule, the Agency retained the language of the proposal because EPA believes that the 25-year storm requirement is more appropriate than the 100-year storm requirement for MSWLFs. The former is a more widely used standard and is the current standard used for hazardous waste landfills. In addition, the Agency could not identify any existing case studies that challenged the Agency's assumption that the 25-year storm design is protective of human health and the environment. EPA has no information that warrants a more restrictive standard for MSWLFs than for hazardous waste landfills.

In response to the comment regarding testing of run-off, the Agency would like to clarify that the proposed rule, and today's final rule, calls for the owner or operator to collect and control the run-off from the active portion of the landfill. It does not require that the collected run-off be sampled or treated, but rather that it be handled in accordance with the requirements of the Clean Water Act including, but not limited to, the NPDES requirements (see § 258.27(a)). The owner or operator's NPDES permit may require the facility to sample run-off prior to surface water release. EPA believes that the Clean Water Act is the appropriate mechanism for ensuring that point source discharges are protective of human health and the environment.

8. Section 258.27 Surface Water Requirements

It is essential that solid waste activities not adversely affect the quality of the nation's surface waters. The regulations as proposed prohibited any MSWLF unit from (1) causing a discharge of pollutants into waters of the United States, including wetlands, that violates any requirement of the CWA, including, but not limited to, NPDES requirements; and (2) causing a nonpoint source of pollution to the waters of the United States, including wetlands, that violates any requirements of a state-wide or area-wide water quality management plan under section 208 or section 319 of the CWA. The proposed § 258.27 requirement is the same as the surface water criterion currently in effect under part 257.

Commenters were concerned over the proposed relationship between RCRA and the CWA. One commenter recommended that monitoring requirements for MSWLFs be developed either under subtitle D or under the NPDES program and that they be tailored for solid waste disposal facilities. Another commenter requested that the proposed subtitle D rules specify requirements to be added to NPDES permits.

The Agency decided to retain, in the final rule, the proposed approach. Under section 1006 of RCRA, EPA is required to integrate, to the maximum extent practicable, the provisions of RCRA with other statutes, including the CWA. Under today's approach, NPDES requirements for landfills will be implemented under the NPDES permitting program, because NPDES permits are site-specific and NPDES permit writers are in the best position to ensure that the surface water requirements are met for MSWLFs. Moreover, as discussed previously, enforcement under subtitle D is limited to instances where EPA has found the State program to be inadequate. The CWA does not have similar limitations on EPA's enforcement authority. Thus, the Agency believes that compliance with surface water regulations is best suited to mechanisms already established under the CWA.

Under today's final regulations, any discharge of pollutants from MSWLF units into the waters of the United States must comply with regulations developed under the CWA, including section 402 (NPDES permits). Regulations that specifically address compliance of MSWLF units with the CWA will be developed under the CWA as needed. Although EPA has not yet specifically established national limits for discharge to surface water from MSWLFs, discharge limits are set on a case-by-case basis. The Agency may, however, issue national limits for MSWLF discharges at a later date.

A commenter requested that the proposed regulations specify the circumstances that trigger the Army Corps of Engineers' jurisdiction with regard to NPDES permits. Under section 402 of the CWA, EPA (and States approved by EPA) has jurisdiction for the discharge of all pollutants (other than dredged and fill material) into waters of the United States. Under section 404 of the CWA, both the Corps of Engineers and EPA have jurisdiction over the discharge of dredged and fill materials into waters of the U.S.

The Agency retained § 258.27(b) of the proposed rule in the final rulemaking. This requirement specifies that any discharges of a nonpoint source of pollution from an MSWLF into waters of the United States must be in conformance with any established water quality management plan developed under section 208 or section 319 of the CWA.

9. Section 258.28 Liquids Restrictions

EPA's proposed rule prohibited the disposal in MSWLFs of bulk or noncontainerized liquid wastes, except (1) household wastes (other than septic wastes) and (2) leachate and gas condensate that is derived from the MSWLF unit where the unit is equipped with a composite liner and a leachate collection system (LCS) designed and constructed to maintain less than 30 centimeters of leachate over the liner. Containers of liquid waste could be placed in MSWLFs only when the containers (1) were small containers of the size typically found in household waste; (2) were designed to hold liquids for use other than storage; or (3) held household waste. The proposed rule required the owner or operator to determine if the wastes (e.g., septic wastes, municipal wastewater sludge) are liquid wastes by the Paint Filter Liquids Test method (Method 9095 as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846). The rationale for each of these proposed provisions is included in the preamble to the proposed rule (see 53 FR 33340, August 30, 1988).

Numerous commenters expressed opposition to the general concept of restricting the amounts of liquids that are disposed of in MSWLFs. Many commenters believed that the proposed restrictions would require separate disposal facilities for liquid waste.

The Agency believes that liquids restrictions are necessary because the disposal of liquids into landfills can be a significant source of leachate generation. By restricting the introduction of liquids into landfills through a ban on the disposal of bulk (except nonseptic waste from households and recirculated leachate and gas condensate at facilities that meet the specific design requirements) and containerized wastes, EPA expects to minimize the leachate generation potential of landfills. This should reduce the quantity of free liquids to be managed in MSWLFs, which in turn should reduce the risk of liner failure and subsequent contamination of the ground water. The ban on containerized free liquids (except those from households) will also reduce the problem of subsidence and possible damage to the final cover upon possible deterioration of the waste containers.

EPA does recognize that restricting certain small volume liquids may be impractical and unnecessary to protect human health and the environment. For example, small amounts of liquid will be present in household wastes when disposed and may be difficult to effectively identify, separate, and restrict from disposal. For this reason, the final rule exempts household waste, except septic wastes, from the bulk and noncontainerized liquids restrictions. Septic waste is not exempted because it can be easily identified and will contain significant amounts of liquid if it fails the Paint Filter Liquids Test method.

As proposed, the final rule continues to exempt certain small containers (e.g., beverage containers) and certain other wastes from the containerized liquids ban because they are not likely to contribute substantial amounts of liquids to most landfills. However, the Agency recognizes that certain small containers (e.g., paint cans) contain household hazardous wastes; the Agency recommends that such wastes be managed through household hazardous waste collection programs present in many communities.

Commenters suggested considering soil, ground-water levels, climate, and history of landfill operations to determine if liquid wastes can be accepted at a particular landfill without endangering the environment or operation of the landfill. Many commenters believed that the State should have more flexibility determining whether bulk or non-containerized liquids should be disposed of in MSWLFs.

The Agency does not agree with these comments. EPA believes that the problems associated with disposal of bulk and containerized liquids, as discussed above, are relevant to all landfills regardless of location (i.e., climatic and geologic factors), and thus waivers to this requirement based on location would not be appropriate (Reference: Background Document—Operating Criteria).

Numerous commenters were concerned with the practicability of finding alternative disposal methods for wastes such as septic tank, grease trap, oily water, and sand trap wastes. EPA believes that the 18-month period between the promulgation date and the effective date of the rule is adequate time to allow liquid waste disposers to develop alternatives to liquids disposal in MSWLFs. However, the Agency wishes to clarify that although liquid materials, such as septic tank, grease trap, oily water and sand trap wastes that fail the Paint Filter Liquids Test method are banned, they can be solidified prior to their disposal in MSWLFs. Possible solidification methods include the addition of absorbent materials. The solidified wastes must pass the Paint Filter Liquids Test method.

The Agency specifically requested in the preamble to the proposed rule the submittal of any data on the benefits or effects of leachate recirculation. The Agency received numerous differing opinions regarding leachate recirculation. Some commenters expressed support, stating that moisture promotes the decomposition of wastes and stabilization of the landfill and conserves the nutrients required for stabilization, improves leachate quality, increases the quantity and quality of methane production, and decreases the time the landfill is generating contaminated leachate. Those opposed to leachate recirculation noted that it was unlikely that a collection system could maintain a leachate head of 30-centimeters in a humid area. They recommended that EPA only allow leachate recirculation in arid locations for which field experience shows that recirculation will not produce a significant leachate head within the unit.

The Agency recognizes that landfills are, in effect, biological systems that require moisture for decomposition to occur and that this moisture promotes decomposition of the wastes and stabilization of the landfill. Limited studies have indicated that leachate recirculation has certain benefits, which include increasing the rate of waste stabilization, improving leachate quality, and increasing the quantity and quality of methane gas production. Leachate recirculation may also be a very useful tool for management of leachate (Reference: Background Document—Operating).

On the other hand, the Agency believes that many landfills, particularly those in humid areas, already have sufficient liquid for decomposition and thus the intentional addition of liquids is unnecessary. The wastes received at landfills already contain moisture (10 percent to 35 percent by volume), and more is added by rainfall and by the decomposition process itself. Moreover, the Agency recognizes that potential operational problems associated with leachate recirculation, such as increase in leachate production, clogging of the leachate collection system, buildup of hydraulic head within the unit, increase

in air emissions and odor problems, and increase in potential of leachate pollutant releases due to drift and/or run-off, may result in adverse impacts on human health and the environment.

The Agency recognizes that there are pros and cons on the issue of leachate recirculation and that the information on leachate recirculation is limited in some areas. Because the Agency has data that indicate that there are benefits associated with recirculating leachate, the Agency believes that a ban on leachate recirculation is inappropriate (Reference: Background Document—Operating Criteria). The Agency believes that leachate recirculation should only be allowed when (1) specified design controls have been installed at the MSWLF unit and (2) recirculation does not produce a significant leachate head within the unit.

The proposed rule specified that leachate and gas condensate derived from the MSWLF unit would be exempt from the liquids prohibition if the unit were equipped with a composite liner and a leachate collection system designed and constructed to maintain less than 30-centimeters of leachate over the liner. The Agency received several comments on the proposed design for leachate and gas condensate recirculation. In general, those that commented objected to the proposed liner requirements for leachate recirculation. Commenters said that the composite liner was an unnecessary prerequisite for the recirculation of leachate. Several stated that liners should not be required for all landfills, one commenter noting that the composite liner described would be difficult to construct in many areas due to the absence of clay. Others supported a waiver based on geology, precipitation, evapotranspiration, use of a leachate collection system, and spraying patterns. One commenter recommended that alternative designs be considered (e.g., the use of slurry walls).

The Agency believes that a composite liner is necessary for leachate and gas condensate recirculation. Specifically, a composite liner with a leachate collection system designed and constructed to maintain less than a 30-centimeter depth of leachate over the liner is necessary to ensure protection of human health and the environment. The Agency believes that the composite liner design, which consists of a two-foot layer of compacted soil with hydraulic conductivity of no more than (1×10^{-7}) centimeters per second with a 30-mil flexible membrane liner (FML) component installed in direct and uniform contact above the compacted-soil component, provides protection necessary to ensure that contaminant migration to the aquifer is controlled. First, the FML portion of the liner will increase leachate collection efficiency and provide a more effective hydraulic barrier. Second, the soil portion will provide support for the FML and the leachate collection system and act as a back-up in the event of failure of the FML. The composite liner with a leachate collection system design is the same as that used for the uniform design standard under § 258.40(a) of this rule. For a detailed discussion on the requirements and rationale for the composite liner, see the design criteria discussion in appendix E.

Unlike other MSWLFs, those operating with leachate recirculation must be designed, at a minimum, with the composite liner described above. The Agency considered less stringent designs but determined that variances to the composite design should not be allowed, even in approved States, because the composite design ensures leachate collection efficiency, a necessary component of a successful leachate recirculation program. Therefore, owners or operators of MSWLFs in approved States cannot use alternative designs provided for in § 258.40 of today's rule if they wish to recirculate leachate.

The owner/operator must notify the State Director that documentation of the landfill design is located in the facility's operating record. Today's final rule allows the State Director to specify alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements.

Other commenters recommended use of a double flexible membrane system with a leachate collection system either beneath the bottom liner or between the two liners in lieu of the composite liner. Another commenter stated that, given the greater potential for release of liquid from the facility, the most stringent containment requirements should be applied to facilities that recirculate leachate.

EPA does not agree that a double flexible membrane liner system without a soil component would be as protective as the composite liner, as defined. A compacted-soil component is necessary for proper function of the FML component. It provides support and a back-up mechanism in case of failure of the FML component. The Agency also believes that the composite liner and leachate collection system is the most stringent design necessary for MSWLF units that recirculate leachate or gas condensate. The rationale for choosing this design is discussed in detail in appendix E of today's rulemaking.

The proposed rule defined gas condensate as "the liquid generated as a result of the gas collection and recovery process at the municipal solid waste landfill units." Several commenters stated that it is not clear whether gas condensate recirculation means solely the discharge of liquid condensate into the refuse mass or whether it includes the combination of the condensate and the leachate from the leachate collection system.

The Agency uses the term "gas condensate recirculation" to mean the discharge of the liquid condensate into the refuse mass. If the condensate is combined into the leachate collection system and the leachate is discharged back into the refuse mass, then this also is recirculation and the necessary design is required. In order to clarify this even further, the Agency revised the definition of gas condensate to include only the condensate generated from the gas recovery process and not to include the condensate that is inadvertently generated from the gas collection system.

EPA received no comments supporting a ban of gas condensate recirculation. As a result, the Agency decided to allow gas condensate recirculation at facilities with the design described above because the quantities involved are small, and gas collection has benefits to the environment through the recovery of energy and the control of gas migration.

10. Section 258.29 Recordkeeping Requirements

The proposed rule required that information be recorded and retained by the owner or operator of each MSWLF. Information to be retained included: Inspection records, training procedures, and notification procedures required under § 258.20; gas monitoring results from monitoring required by § 258.23; closure and post-closure plans as required by §§ 258.30(b) and 258.31(c); and monitoring, testing, and analytical data required by the ground-water monitoring requirements under subpart E.

Although the proposed rule specified that certain documents be retained (including ground-water monitoring, testing, and analytical data required by subpart E), EPA received comments requesting that additional documentation prepared by the owner or operator be retained. Commenters specifically requested that documentation concerning the siting process design plans, and the financial

status of the facility be included. Today's rule adds additional recordkeeping requirements consistent with the intent of the proposed rule and comments received. The following documents have been added to the recordkeeping requirements: Any location restriction demonstration required under subpart B; unit design documentation for leachate and gas condensate recirculation as required under § 258.28(a)(2); and any cost estimates and financial documentation required by subpart G of this part.

Today's rule provides that the information be maintained in an operating record. EPA's intent, stated in the preamble to the proposed rule, was that the recordkeeping documents be kept in a single location. By requiring the owner or operator to keep the recordkeeping documents in the operating record, today's final rule clarifies EPA's stated intent. Today's final rule requires that the operating record be maintained near the facility. The appropriate location may be the facility itself, or the corporate headquarters or city hall, depending on the size of the landfill and/or the ownership of the landfill. Records should be retained throughout the life of the facility, including post-closure care. Documents should be organized, legible, dated, and signed by the appropriate personnel. Upon completion of each document required in the operating record, the owner or operator must notify the State Director of its existence. This requirement applies to owners and operators in both approved and unapproved States. The Director of an Approved State has the flexibility to establish alternative locations for recordkeeping and alternative schedules for recordkeeping and notification requirements.

Commenters recommended making MSWLF records available to the public, suggesting that these data were relevant for citizen enforcement. Several commenters suggested that the omission of any requirements in the proposed rule to submit data to the State or to make them available to the public could effectively eliminate any citizen enforcement of the regulation. On the other hand, another commenter proposed that EPA allow the States more flexibility to determine what records should be kept at the facility and made available for public review.

EPA agrees that public access to MSWLF records either directly from the owner or operator or through the state is essential. Therefore, today's final rule requires the owner or operator to retain the operating record near the facility and to furnish the information to the State upon request, or to make it available to the State during reasonable times. The information should be available in most States to citizens through a State Freedom of Information Act request.

Appendix E—Supplemental Information for Subpart D—Design Criteria

1. Overview of Proposed Rule

Section 258.40(a) of the proposal established a performance standard based on risk that would require new MSWLFs to be designed with liner systems, leachate collection systems (LCSs), and final covers, as necessary to meet the design goal in the aquifer at the waste management unit boundary or an alternative boundary, as specified by the State. As proposed, the design goal would be an overall ground-water carcinogenic risk level established by the State. At a minimum, the design goal under proposed § 258.40(b) would have to fall within the protective risk range of 1×10^{-4} to 1×10^{-7} and encompass risks posed by over 200 hazardous constituents listed in the proposed appendix II.

To comply with the proposed requirements, an owner or operator would have to develop and propose a design that would achieve the State-specified design goal in the aquifer at the waste management unit boundary or alternative boundary. This would involve modeling the release of appendix II constituents from the landfill equipped with the proposed design, to predict the concentration of the various constituents in ground-water, and then determining whether the combined risks posed by these constituents fell within the State-specified design goal. Under proposed § 258.40(c), the State would evaluate the proposed design considering the following factors: (1) The hydrogeologic characteristics of the facility and surrounding land, (2) the climatic factors of the area, (3) the volume and physical characteristics of the leachate, (4) the proximity to ground-water, and (5) the quality of ground-water.

In the preamble to the proposed rule, EPA described and requested comments on several possible alternatives to the proposed approach. These alternatives include various alternative performance standards, a uniform design standard (with and without variances), and the categorical approach (see 53 FR 33354 through 33365; August 30, 1988).

As indicated above, the Agency proposed one design standard for new MSWLFs that addressed the liner and leachate collection system, as well as the final cover system. In developing the final rule, EPA determined that it would be clearer and more appropriate to present separate design requirements for the liner/leachate collection system and the final cover system in the final rule. Each of these containment components play unique roles in minimizing releases from the landfill. The liner/leachate collection system is relied on to minimize releases primarily during the operating life of the MSWLF, while the final cover provides the primary long term protection after closure of the landfill. Therefore, EPA is presenting the requirements applicable to these components in separate sections of today's rule. Specifically, the liner/leachate collection system requirements have been retained in subpart D, while the final cover requirements for new and existing units have been moved to subpart F.

2. Summary of Comments

While a few commenters generally supported the proposed risk-based performance standard, the majority of commenters opposed it. Several commenters argued that this approach failed to establish minimum national standards, while nearly all commenters raised major concerns about the implementation of the proposed approach. These concerns were reflected not only in written comments, but also expressed by State and local governments, the waste management industry, and environmental groups during meetings held with EPA during the public comment period. Summaries of these meetings can be found in the docket for this rulemaking.

Several commenters asserted that if EPA adopted the proposed approach it would be abdicating the Agency's role of setting minimum national standards. These commenters argued that it is EPA's role, not the States', to set the design goal (i.e., risk level in groundwater) for MSWLFs. Second, many commenters viewed the proposed risk-based approach to be so complex that it would result in inadequate designs in many cases.

Commenters also raised three major concerns about the implementation of the proposed approach. First, commenters believed that there is insufficient technical information available to implement a risk-based approach. Numerous commenters questioned whether risk assessment methodologies were far enough developed to support the proposed approach. Some commenters strongly criticized EPA's draft risk algorithm, which EPA suggested as a preliminary

tool for implementing the proposal. Others pointed out that the lack of EPA-approved concentration or risk levels for many of the hazardous constituents in proposed appendix II would make implementation even more difficult.

Second, numerous commenters stated that most States and owners and operators do not have the technical expertise or resources necessary for successful implementation of the proposed standard. These commenters argued that most States do not have the resources to establish acceptable concentration or risk levels for compounds that lack EPA-approved standards, or to review designs based on complex modeling. Other commenters stated that owners and operators do not have the expertise or resources in most cases to complete comprehensive modeling addressing all appendix II compounds. Some commenters indicated that local governments would likely end up spending an inordinate amount of their limited resources on analysis, rather than on actual construction of a safe landfill.

Third, due to the complexity of the analysis, and the lack of public understanding of risk-based decisions, many commenters were concerned that it would be very difficult to obtain public acceptance of a risk-based design. They felt that the proposed approach would exacerbate an already very difficult siting process.

To address these concerns, commenters suggested a variety of alternative approaches. However, the majority of commenters recommended one of the following two alternatives for the final design criteria. The first major alternative suggested was the categorical approach, which would establish different design requirements for MSWLFs in four location categories that would be distinguished based on two factors—the hydrogeology of the location (measured in terms of time of travel to the aquifer) and precipitation. Numerous commenters liked this general approach of setting forth different national standards for different locations, but all recognized that certain modifications were needed to address deficiencies in the specific scheme proposed. However, the types of modifications suggested varied significantly and no commenter provided a fully developed alternative scheme. Nevertheless, these commenters believed a somewhat modified categorical approach would be flexible, yet provide more certainty and be easier to implement than the proposed risk-based approach.

Some commenters, on the other hand, objected to the categorical approach, stating that it was technically and conceptually flawed. These commenters argued that the approach is overly simplified and not technically justified. Of particular concern to these commenters is the reliance on only two factors—hydrogeology and precipitation—to distinguish location categories, as well as the unjustified cut-off values specified for each of the factors. Others pointed out that it is often very difficult and expensive to obtain reliable data needed to calculate these factors. These commenters suggested that EPA drastically revise the categorical approach or adopt the alternative described below.

The second major approach suggested by commenters included two elements—a uniform design standard and some provision allowing other designs based on site-specific conditions. Commenters differed significantly, however, on the stringency of each of these elements. For example, the uniform designs suggested varied from one identical to that required for hazardous waste disposal facilities under subtitle C of RCRA to one consisting of a single liner of either natural or artificial material with a 1×10^{-7} hydraulic conductivity and a leachate collection system. With regard to site-specific designs, some commenters argued that these should be limited to those that provide protection "equivalent to" the uniform design. However, others envisioned a more flexible approach that allowed site-specific designs that met a clearly specified environmental performance standard.

3. Evaluation of Proposal and Alternatives

In reviewing the alternatives suggested by commenters, it was clear that all preferred an approach that would (1) provide certainty and public acceptability, (2) include flexibility for variation based on site-specific conditions, and (3) be implementable, considering the availability of technical information and the technical expertise and resources of local and State governments. As a result, EPA considered each of these factors in evaluating the proposed rule and each of the alternatives suggested by commenters.

EPA carefully reevaluated the proposed risk-based approach in light of the comments described above. The Agency disagrees with commenters' arguments that EPA would fail to establish minimum national standards for MSWLFs if the proposed approach was adopted. The proposed approach would establish a national framework with substantial State flexibility to address site-specific conditions. EPA continues to believe that sufficient flexibility is essential for effective program implementation across the nation. However, EPA does agree with commenters' concern that it may be difficult to obtain public acceptance of a risk-based design, resulting in increased siting difficulties. Furthermore, EPA recognizes that many States and local governments do not have adequate technical expertise and resources to implement the proposed approach. Specifically, most States do not have the resources to establish risk levels for the large number of compounds that do not have EPA-approved standards, and most local governments and States do not have adequate resources to complete and review the complex analysis necessary to implement the risk-based approach. Therefore, the Agency rejected the proposed risk-based performance standard.

EPA then evaluated the two major alternatives discussed in the proposed rule and addressed by commenters (53 FR 33355). In examining the first alternative, the categorical approach, EPA carefully reviewed the modifications suggested by those who favored the general approach as well as the data and arguments presented by commenters who criticized the approach. In response to commenters' concerns, EPA looked closely at the technical adequacy of the categorical scheme, particularly the technical basis for the two factors (i.e., hydrogeology and precipitation) used to distinguish the location categories.

Based on this re-examination, the Agency acknowledges that it has inadequate technical information to support the methodology used to measure the hydrogeologic character of a site (i.e., the time of travel equation), as well as the specific cutoff values specified for the two factors (53 FR 33364). In addition, no commenters presented modifications that would address these technical concerns. Therefore, while EPA believes a categorical approach theoretically could provide both certainty and flexibility, the Agency rejected this alternative for the final rule because of the technical problems inherent in such a scheme.

The second major alternative examined by EPA was a uniform design standard in combination with a provision allowing alternative designs based on site-specific conditions. While the stringency of this approach varies depending on the uniform design specified as well as the structure of the

site-specific design provision, EPA believes this general approach best addresses the concerns raised by commenters. First, this approach provides more certainty to address public concerns during the siting process. Second, it provides flexibility by allowing designs based on consideration of site-specific factors. Finally, this approach should be the easiest to implement of the various approaches considered because it provides those States and local governments that have limited technical expertise and resources with an EPA-approved design, thereby avoiding the analysis and modeling that would have been needed to justify an alternative design or to implement a complex performance standard, such as the proposed risk-based approach. For these reasons, the Agency selected this general approach for the final rule. The specific elements of this approach are discussed below.

4. Final Rule Approach

The final rule approach selected by EPA includes two elements—a provision allowing site-specific designs in approved States and a uniform design standard. Specifically, today's final rule provides that new MSWLFs and lateral expansions must be constructed with either (1) in approved States, a design that is approved by the Director of an approved State and meets the performance standard specified in § 258.40, or (2) a composite liner and leachate collection system. The rationale for each of these elements is discussed below.

a. Site-Specific Designs Based on Performance Standard

The first element of today's final design criteria allows site-specific designs in approved States. As indicated above, some commenters preferred that these site-specific designs be based on an "equivalence" approach, while others favored a more flexible approach based directly on environmental performance. Under the "equivalence" approach, an owner or operator would have to demonstrate that a site-specific design would prevent migration of hazardous constituents into ground water at least as effectively as the uniform design described below. The somewhat more flexible approach would require an owner or operator to demonstrate that an alternative design would achieve a clearly specified environmental performance standard. For example, some commenters suggested that site-specific designs be permitted when the owner or operator can demonstrate that such designs will ensure the Maximum Contaminant Levels are met in ground water.

The Agency decided not to adopt the "equivalence" approach because EPA believes it would significantly limit the ability of owners and operators to utilize alternative protective designs. For example, it would likely be difficult for an owner or operator to demonstrate that a clay liner of any thickness would prevent migration as effectively as a composite liner, which includes a flexible membrane liner that, by definition, is impermeable. EPA believes that flexibility to account for site-specific conditions is particularly important for MSWLFs because municipal solid waste disposal capacity will be needed across the country in a wide range of settings.

Therefore, EPA adopted the second approach—environmental performance criteria—as the basis for site-specific designs in approved States. Specifically, § 258.40(a)(1) of today's rule specifies that these designs must ensure that the concentrations listed in table 1 will not be exceeded in the uppermost aquifer at the relevant point of compliance specified in accordance with § 258.40(d). The list of constituents in table 1 includes all those compounds with Maximum Contaminant Levels. EPA plans to update this list as new MCLs are promulgated.

Section 258.40(d) provides that the relevant point of compliance specified by the Director of an approved State shall be no more than 150 meters from the waste management unit boundary on land owned by the owner of the MSWLF. In determining the relevant point of compliance, the State Director must consider a set of factors specified in § 258.40(d). Because the relevant point of compliance plays a key role in ground-water monitoring and corrective action, the discussion of this provision, including EPA's response to comments on the proposal, is included in appendix F.

EPA recognizes that the performance standard for site-specific designs in approved States addresses fewer constituents (i.e., those with MCLs) than the proposed risk-based standard, which addressed proposed appendix II compounds. The Agency believes this approach is supported by the comments on the proposal discussed above. While the proposal addressed a more comprehensive list of compounds, commenters pointed out that it was unimplementable because (1) there is insufficient technical information, particularly EPA-approved risk levels for many of the appendix II constituents, to implement the proposed approach; (2) States and owners and operators do not have the technical expertise or resources to develop risk-based standards for all appendix II compounds; and (3) it may be difficult to obtain public acceptance of a risk-based design that is based on standards for appendix II compounds that have no EPA established risk levels. Thus, today's final standard is a direct outgrowth of EPA's proposed approach, modified to address the implementation problems raised by commenters.

Because today's design provision in approved States establishes clear, EPA-approved concentration limits for constituents in ground-water (i.e., MCLs), EPA believes it responds to several problems with the risk-based proposal. First, it eliminates the problems associated with risk calculations which were called for in the proposal. Such calculations would have to be done for many compounds for which EPA has not yet established any standards. Second, it reduces the level of State resources needed for implementation by being limited to those compounds that have EPA-approved limits. Finally, because today's final design provision is premised on EPA-approved limits (i.e., MCL's) it should provide more assurance to the public than the risk-based approach, which required States with limited technical resources to establish risk-based designs.

Although today's final standard is limited to MCL's, it is backed up by ground-water monitoring and corrective action provisions that address a comprehensive set of compounds comparable to the proposal. Appendix F contains the rationale for this comprehensive set of constituents for ground-water monitoring and corrective action. Specifically, § 258.56(a) of today's rule requires that whenever monitoring results indicate a statistically significant level of any appendix II constituent exceeding the ground-water protection standard, the owner or operator must initiate an assessment of corrective action remedies. This back-up system ensures that designs provide effective protection of human health and the environment.

The Agency acknowledges that implementation of this final design provision will still require modeling and associated analysis. To address commenters' concerns regarding the availability of technical information on this subject, EPA is developing technical guidance on modeling for inclusion in the technical guidance for this rule (see section VIII of today's preamble). In addition, to ensure proper oversight and

review of these analyses, today's rule requires that site-specific designs based on the performance standard be approved by approved States. Thus, owners and operators of MSWLFs located in unapproved States will not have the opportunity to use site-specific designs, but rather must comply with the uniform composite liner requirement discussed below. EPA believes that these two steps will ensure proper analysis and implementation of today's site-specific design provision.

Approved States must consider three factors in determining whether the design meets the performance standard of § 258.40(a)(1). These factors include: (1) The hydrogeologic characteristics of the facility and the surrounding land; (2) the climate of the area; and (3) the volume and physical and chemical characteristics of the leachate. The Agency believes that these factors, which are derived from those proposed for use with the risk-based standard, are relevant and important for evaluating designs because they all influence the nature and extent of releases to ground water. Guidance on consideration of these factors in landfill design will be included in the technical guidance for today's rule.

EPA is concerned that certain owner/operators of new units or lateral expansions may be forced to use the design standard in § 258.40(a)(2), discussed below, in situations where the composite liner specified in that section is not necessary to protect human health and the environment if their State does not have program approval. In these cases, the performance standard under § 258.40(a)(1) may be more appropriate since it would potentially avoid an unnecessarily stringent design.

Therefore, EPA established a petition process in § 258.40(e). This process allows the owner/operator to use the performance standard in § 258.40(a)(1) if the State determines that the owner/operators design meets that performance standard, the State petitions EPA to review its determination, and EPA approves the design. EPA will act on these petitions within 30 days of receipt.

b. Uniform Design

The second element of today's design criteria is a uniform design standard for landfill designs in States without approved programs. In selecting a uniform design, EPA's goal was to identify one that would provide adequate protection in all locations, including poor locations. In the preamble to the proposal, EPA requested comment on a uniform design approach that would consist of a composite liner and leachate collection system. The suggested composite liner system consisted of an upper flexible membrane liner and a lower soil layer at least three feet thick with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. The leachate collection system would need to be constructed to maintain less than 30 cm depth of leachate over the liner. EPA considered comments on this design in selecting today's final approach.

Commenters suggested a variety of uniform designs. These suggestions included (1) double liner systems identical to those required for hazardous waste disposal facilities under subtitle C of RCRA, (2) composite liner system similar to that described above, and (3) a single liner of either natural or artificial material with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. In addition, commenters suggested a composite liner system for MSWLFs located in Category IV (poor locations) under the categorical scheme.

While EPA recognizes that subtitle C double liner systems would provide added protection, EPA's Regulatory Impact Analysis (see section III.B of today's preamble) indicates that requiring such systems at all new MSWLFs and lateral expansions would impose high costs on communities, and would contribute significantly to causing today's set of final requirements to be beyond the practicable capability of owners and operators. For a typical MSWLF, EPA estimates that a subtitle C liner system would cost nearly 75 percent more than a composite liner system. Therefore, the Agency rejected the subtitle C design approach for MSWLFs.

EPA also rejected the third option suggested (i.e., single liner) because the Agency believes that both a flexible membrane liner (FML) and a compacted soil component are necessary to ensure adequate protection in poor locations. (Of course, in good locations, such alternative designs may meet today's performance criteria described below.) The upper FML component provides a highly impermeable layer to maximize leachate collection and removal, while the lower soil component serves as a back up in the event of FML liner failure.

The Agency believes the second option, a composite liner system, encompasses the essential components for a protective uniform design standard for MSWLFs. Today's final rule adopts the system described by EPA in the preamble to the proposed rule with two modifications. First, today's rule clarifies that the FML must have a minimum thickness of 30-mil, or if high density polyethylene (HDPE) is used, a minimum thickness of 60 mil. Based on EPA's experience with these liner materials, these are the minimum thicknesses necessary to ensure adequate liner performance, including being able to withstand the stress of construction and to ensure that adequate seams can be made (see U.S. EPA, RREL, Lining of Waste Containment and Other Impoundment Facilities. EPA/600/2–88/052. September 1988).

Second, today's rule specifies a minimum lower soil component thickness of two feet rather than three feet, which is required for hazardous waste disposal facilities. The Agency's most recent data indicate: (1) With sound construction practices, a two foot thick soil liner can be constructed with a hydraulic conductivity of 1×10^{-7} cm/sec; (2) soil liners less than two feet thick have a high probability of having a hydraulic conductivity greater than 1×10^{-7} cm/sec.; and (3) for composite liners, an extra foot of thickness (i.e., three foot versus two foot thickness) generally provides little improvement in liner performance, but may be appropriate to add as a "factor of safety" in certain cases. (see Note on Thickness of Compacted Soil Liners, Daniel, D.E., April 9, 1990).

EPA believes that requiring this "factor of safety" is appropriate as part of the liner system for hazardous waste disposal facilities, but not for MSWLFs. In comparison to hazardous waste disposal facilities, MSWLFs are located and needed in every region of the country. In some of these locations, clay materials for a soil liner are unavailable locally and must be shipped in from long distances. In many cases, shipping these materials in is very expensive for the community. While these communities will have the opportunity to use a site-specific design, as described above, increasing the thickness of the soil component of the composite liner would likely make the composite liner option prohibitively expensive for these communities. Even assuming minimal shipping costs, EPA estimates that requiring an additional one foot "factor of safety" would increase the cost of a composite liner for a typical MSWLF by nearly 25 percent. Given the unique characteristics of MSWLFs, EPA believes a two foot minimum soil layer provides the best balance between protection of human health and the environment and the practicable capabilities of MSWLF owners and operators.

Appendix F—Supplemental Information for Subpart E—Ground-Water Monitoring and Corrective Action

1. Section 258.50 Applicability

a. Suspension of Ground-Water Monitoring Requirements

Today's final ground-water monitoring and corrective action requirements apply to the owners and operators of all new and existing MSWLFs that do not qualify for the small community exemption. However, the Agency recognizes that certain hydrogeologic settings may preclude the migration of hazardous constituents from MSWLFs to ground-water resources. In the preamble to the proposed rule, the Agency stated that requiring ground-water monitoring in these settings would place an additional financial burden on owners and operators and would provide little or no additional protection to human health and the environment. Therefore, the proposed rule allowed suspension of ground-water monitoring requirements in §§ 258.51 through 258.55 for a MSWLF unit upon demonstration by the owner or operator that there is no potential for migration of hazardous constituents from the landfill unit to the uppermost aquifer during the active life, closure, or post-closure periods. The proposed rule required that the demonstration be certified by a qualified geologist or geotechnical engineer.

The Agency received a few comments regarding the practicality of the waiver. Commenters noted that it would be virtually impossible and/or very expensive to make the demonstration of no potential for migration. Several commenters also questioned the meaning of the words "no potential for migration" in § 258.50(b). Many felt that a change in the wording of the rule is necessary because, if strictly interpreted, it is impossible to demonstrate "no potential" for migration.

The Agency agrees with the commenters that it will be difficult for many facilities to meet the "no potential for migration" standard in the regulations though it does not agree that it is impossible. The Agency reminds commenters that the "no migration" waiver has been a component of the subtitle C groundwater monitoring program for many years. The Agency stresses that the suspension of monitoring requirements is intended only for those MSWLFs that are located in hydrogeologic settings in which hazardous constituents will not migrate to ground water during the active life of the unit, closure, and post-closure periods. As stated in the proposal, the Agency believes that these cases will be rare. The Agency also understands that the demonstration of no potential for migration may be difficult and costly because of the high degree of confidence necessary in the demonstration before an exemption will be allowed. EPA encourages MSWLF owners and operators to carefully consider their chances to obtain a suspension before attempting such a demonstration.

Other commenters suggested that the Agency consider limiting the stringency and term of the suspension so that an MSWLF owner or operator would have to make periodic demonstrations to retain the suspension. The Agency decided against limiting the term of the monitoring suspension by requiring periodic demonstrations every five or ten years. EPA believes that periodic demonstrations are not necessary because the demonstration required under this program must be so rigorous that no potential for migration is ensured for the active life plus the closure, and post-closure periods. Additionally, the Agency believes that the costs associated with continual re-application for the suspension would outweigh the benefits associated with it.

Several commenters requested that EPA establish additional conditions under which ground-water monitoring would be unnecessary or under which a suspension of ground-water monitoring requirements is warranted. These commenters suggested the following additional conditions be included: (1) Remote areas, including areas where there is great distance to (drinking) water wells; (2) extremely dry areas with little rainfall and great depths to ground water; (3) areas where ground water is not potable, is unusable, is of low value, or is classified as class III ground water; (4) areas underlain by unfractured bedrock or by thick sections of impermeable or slightly permeable soils or geologic materials; (5) areas where travel time calculations indicate little or no threat to human health or the environment; and (6) aquifers lacking reasonable quantity or recharge characteristics rendering any potential use unlikely.

The Agency considered these comments and believes that owners and operators of MSWLFs with some of the specified conditions, such as extremely dry areas or slow time of travel areas, might be able to demonstrate no potential for migration under § 258.50(b). However, EPA does not believe that the current ground water quality or potential future use of water is an appropriate factor for consideration in granting exemptions from ground water monitoring. EPA believes it is important to monitor for contamination at the relevant point of compliance regardless of the quality or anticipated future use of the ground water. Such considerations are more appropriately factored into determining the appropriate frequency of monitoring and the proper levels and schedule for remedy implementation for ground water cleanup or whether clean up requirements should be waived by an approved State (found in § 258.57). Furthermore, HSWA requires EPA to include in the revisions to section 4010 guidelines for ground-water monitoring, as necessary, to detect contamination. Therefore, today's final rule does not provide for waivers from ground-water monitoring requirements except where the owner or operator in an approved State can demonstrate no potential for migration of hazardous constituents to the uppermost aquifer during the active life of the unit, closure, or post-closure periods.

After consideration of the above comments, the Agency decided to promulgate § 258.50(b), as proposed, with four modifications. First, the suspension of ground-water monitoring requirements in §§ 258.51 through 258.55 is available only for owners and operators of landfills located in approved States. Owners and operators of MSWLFs not located in approved States will not be eligible for this waiver and will be required to comply with all ground-water monitoring requirements. The Agency has limited the availability of the waiver to approved States because the Agency recognizes the need for the State to review a no-migration demonstration prior to granting a waiver from ground-water monitoring.

Second, in response to comments discussed below, the final rule requires demonstrations of no potential for migration to be supported by both site-specific data and predictions that maximize contaminant migration. The proposed rule required that the demonstration of no potential for migration be based on site-specific hydrogeologic information or, if detailed data were unavailable, the owner or operator could make the demonstration based solely on predictions using assumptions that maximize the rate of hazardous constituent migration.

Two commenters objected to the use of predictions in establishing the demonstration of no potential for migration. Both commenters remarked that the suspension should not be allowed if site-specific data was not available. One commenter added that site-specific data must be used in a

water balance or recharge model to determine the potential for migration of hazardous constituents. The Agency agrees with the commenters and is requiring in today's final rule that the demonstration of no potential for migration be based on actual field data collected at the site. Field testing is necessary to establish the site's hydrogeological characteristics and should include an evaluation of unsaturated and saturated zone characteristics to ascertain the flow rate and pathway by which contaminants will migrate to ground water.

The Agency also agrees with the commenter that modeling is useful for assessing and verifying the potential for migration of hazardous constituents. Furthermore, the Agency believes that predictions (i.e., models) should be based on actual field collected data to adequately predict potential ground-water contamination. Therefore, today's final rule requires the owner or operator to use both field collected data and predictions that maximize contaminant migration for demonstrating no potential for migration.

Another commenter remarked that the term "adequate margin of safety" in the proposed rule is too subjective. Because the final rule requires predictions that maximize contaminant migration in all demonstrations, the term "adequate margin of safety" is unnecessary. The Agency believes that using predictions or models that maximize contaminant migration and consider impacts on human health and the environment will, in itself, provide an adequate margin of safety in protecting human health and the environment. Therefore, the Agency has deleted this phrase from today's final rule.

Third, today's final rule requires no potential for migration demonstrations to be certified by a "qualified ground-water scientist and approved by the Director of an approved State." The proposed rule required the demonstration to be certified by a "qualified geologist or geotechnical engineer." Comments received and the Agency's rational for the final provision are discussed later in the preamble.

In summary, today's final rule allows an approved State to suspend ground-water monitoring requirements (§§ 258.51 through 258.55) if the owner or operator can demonstrate that there is no potential for migration of hazardous constituents from that unit to the uppermost aquifer during the active life of the unit including the closure and the post-closure periods. This demonstration must be certified by a qualified ground-water scientist and be based on site-specific, field collected measurements, sampling, and analysis of physical, chemical, and biological processes affecting contaminant fate and transport. The demonstration also must include contaminant fate and transport predictions that maximize contaminant migration and consider impacts on human health and the environment. Procedures for conducting these evaluations can be found in the OSWER Ground-Water Monitoring Guidance Document for Owners and Operators of Interim Status Facilities (1983).

b. Compliance Schedule

As a result of shortages in qualified technical personnel and licensed drilling companies, the Agency proposed to gradually phase in the requirements to ease the burden of installing ground-water monitoring systems at all new and existing MSWLFs. In the proposed rule, the Agency allowed States to set a compliance schedule for installing ground-water monitoring systems at existing facilities and provided a "fall-back" schedule for States choosing not to set a schedule. The fall-back schedule was based on distance to the nearest drinking water intake. For States choosing to set a schedule, the Agency set requirements for the percentage of units that had to be in compliance. These requirements were: (1) Within two years—25 percent of the units had to be in compliance; (2) within three years—50 percent of the units had to be in compliance; (3) within four years—75 percent of the units had to be in compliance; and (4) all units had to be in compliance within five years. States were to set schedules to meet these requirements based on the potential risks posed by facilities after evaluating the proximity of human and environment receptors, design of the unit, age of the unit, and resource value of the underlying aquifer.

The Agency received several comments in favor of the five year phase in. One commenter in particular, noted that in addition to the technical demands placed on hydrogeologists and drilling companies by the subtitle D program, other regulatory programs (CERCLA, State clean-up programs, the Underground Storage Tank program, and RCRA's subtitle C monitoring and corrective action program) also will significantly impact the availability of competent consultants. This same commenter requested that the phase in period be extended to ten years. Another commenter, though understanding of the constraints imposed by the availability of competent hydrogeologists and drilling companies, was opposed to the length of the Agency's schedule, but did not suggest an alternative. The Agency also received a few comments opposing the phase in period. These commenters believe that a phase in period will allow facilities to delay installation of ground-water monitoring systems without justification.

In response to these commenters, EPA carefully reevaluated the five year phase-in period for ground-water monitoring to determine if it was appropriate and necessary. In EPA's Report to Congress on solid waste disposal (1980), it was reported that approximately 19 percent of the existing landfills monitor ground water. This means that approximately 4,800 of the nearly 6000 existing landfills will need to install ground-water monitoring systems for the first time. The Agency recognizes that installing new groundwater monitoring systems will take time, especially since the pool of available, qualified ground-water scientists is limited. Assessing site-specific hydrogeologic conditions and preparing a hydrogeological report with findings and recommendations must be completed before well construction can begin.

The Agency estimated that there are currently 271 firms "certified" (National Water Well Association certification) to install ground-water monitoring wells. If each of these 271 drilling firms can install monitoring wells at 18 of 4800 MSWLFs and if, for example, four monitoring wells are installed at each MSWLF (however, many more may be needed), each of the drilling contractors will install 72 wells. Again, EPA realizes that drilling firms vary widely in size, in their ability to accept additional work, and in their capacity and desire to grow. EPA also realizes that drilling firms and MSWLFs are not evenly distributed across geographical areas. However, in estimating the amount of time it would take for the 271 drilling firms to install the minimum number of monitoring wells at all 4800 facilities, EPA decided that an average of 72 wells per drilling firm was a reasonable estimate.

EPA estimated the time it would take for one firm to install 72 monitoring wells for each of three different size drilling firms. EPA assumed, for each firm size, that each drilling firm currently has the capacity to install additional monitoring wells above and beyond its current demand. EPA then assumed that in the first year after publication of today's final rule, all of the drilling firms' additional capacity is dedicated to installing monitoring wells for the MSWLF program. EPA then assumed that in each of the following

years, the total number of wells that a drilling firm can install increases by ten percent over current capacity. EPA also assumed that after the first year, one half of this additional capacity will be used to install wells at MSWLFs.

Given these assumptions, EPA then estimated the time needed for each of the three different sized firms to install 72 monitoring wells. A firm that is currently installing 2400 monitoring wells a year and has additional capacity to install 20 percent more wells, will require less than one year to install 72 wells; a firm that is currently installing 35 monitoring wells a year, with additional capacity to install 80 percent more wells, will also require less than a year to install 72 wells; however, a firm that is installing 150 monitoring wells a year and has no additional capacity will require over four years to install 72 monitoring wells.

In addition to this varying capacity of drilling firms, it is also the Agency's experience that it may take more than six months for a facility owner or operator to retain a qualified hydrogeologist and drilling firm, implement initial site characterization activities, draft plans and implement final drilling programs, perform site characterization activities, and prepare sampling and analysis plans. Based on the Agency's evaluation of each of the considerations presented above, the Agency concludes that approximately five years will be necessary for the installation of ground-water monitoring systems at all landfills.

Commenters requested both longer and shorter compliance schedules and noted that the proposal was unclear as to whether the compliance schedule started on the date of publication or the effective date. This would yield either a five year or a six and half year time for compliance. The above analysis indicates that the shorter schedule (i.e., a five year compliance schedule beginning at the date of publication) is feasible. Therefore, the Agency has clarified in today's rule that the five year compliance schedule for installing ground-water monitoring systems begins on the date of publication (i.e., today's date).

As part of the self-implementing approach in today's final rule, the Agency is promulgating a set compliance schedule for the phase-in while still allowing approved States to implement an alternative schedule. Within five years of the publication date of today's final rule, all existing units must be in compliance with ground-water monitoring requirements. New units must comply with the ground-water monitoring requirements before accepting waste because the need for ground-water monitoring systems can be anticipated in the planning process. Owners and operators of existing units, and lateral expansions of existing units, are required to comply with the ground-water monitoring requirements according to the following schedule: (1) Less than one mile from a drinking water intake—within three years; (2) greater than one mile but less than two miles—within four years; (3) greater than two miles—within five years. While this method does not assess the risk of individual landfills, it is objective and it will be easy for owners and operators to determine. This schedule was originally proposed as a "fall-back" schedule if a State chose not to set a compliance schedule.

In general, lateral expansions must meet the requirements of today's final rule (e.g., ground-water monitoring, liner, and leachate collection system) prior to acceptance of waste into the unit. The Agency is allowing ground-water monitoring requirements to be phased-in at existing units because of the lack of qualified drilling firms and hydrogeologists. For this same reason, the Agency believes ground-water monitoring at lateral expansions must also be phased in. Therefore, the Agency has decided to also phase-in the ground-water monitoring requirements for lateral expansions of existing units on the same schedule as the existing unit.

Furthermore, the Agency believes that Congress has expressed a desire to avert serious disruptions of the solid waste disposal industry. The Agency believes that disruptions in solid waste disposal could occur if existing units cannot laterally expand until ground-water monitoring systems are in place, limiting the much needed capacity created by lateral expansions. The Agency also recognizes that it is more practical to design one system encompassing both the existing unit and the lateral expansion. This approach will allow the owner or operator to utilize all of the information generated during site characterization and design a ground-water monitoring system in view of all of the conditions that exist at the facility.

As discussed earlier in the preamble, the Agency has chosen 24 months from today as the effective date for most of the standards promulgated. However, in one departure from the 24 month effective date, EPA is promulgating a phase-in of the ground-water monitoring requirements over a five-year time period beginning on the date of rule publication.

The statutory language authorizing the promulgation of revised criteria for subtitle D facilities receiving household hazardous and small quantity generator wastes does not specify an effective date. Thus, the Agency believes that is has broad discretion in determining the most appropriate effective date for different provisions of the revised criteria. Congress, in the legislative history to subtitle D, recognized that many facilities subject to the revised criteria may have difficulty meeting all requirements by a particular compliance date due to the "practicable capabilities" of facilities, which EPA has interpreted to refer to cost and technical considerations. Thus the legislative history explicitly suggests that EPA phase-in the revised criteria over time. During floor debate, Senator Randolph stated, "Requirements imposed on facilities, may vary from those for subtitle C facilities, however, and still meet this standard (protection of human health and the environment). They may be phased in over time, as the Administrator deems appropriate, to take account of the practicable capability of the facilities covered." 130 Cong. Rec. S 13814 (October 5, 1984).

While the Agency also recognizes that the legislative history indicates that Congress did not favor the phase-in of the ground-water monitoring requirements, it does not view this as a bar to such a phase-in. First, this indication is limited to the legislative history. The legislative history on this issue also is found in remarks by Senator Randolph, where he stated, "The Administrator could phase in new requirements other than ground-water monitoring and corrective action over time." *Id.* The statutory language, however, does not contain any language that would prevent the Agency from phasing in the ground-water monitoring requirements. Second, this statement in the legislative history must be read in the context of Congress' general approval of a phase-in of the revised criteria where the "practicable capabilities" of the owners and operators is at issue. Finally, the facts motivating the Agency to phase-in the ground-water monitoring requirements must be considered. As explained earlier, considering the substantial number of MSWLFs that need to have wells installed and the estimated number of firms capable in installing ground-water wells, EPA believes that it is physically impossible for all wells to be installed at all MSWLFs by the effective date of today's rule.

As discussed earlier, the proposed rule provided targets and evaluation factors for States choosing to set compliance schedules. One commenter

requested that the Agency provide more flexibility to States in setting a compliance schedule. Another commenter noted that the five year schedule does not provide States any support to achieving compliance at MSWLFs that do not meet current State ground-water standards. The commenter requested that the rule direct a more aggressive compliance schedule and refer to more stringent State rules where they apply. The Agency also received comments on the methodology to be used by States in setting facility compliance schedules for implementing monitoring programs. One commenter remarked that States should set priorities by relying upon the categorical location criteria (precipitation and time of travel) as well as the factors for identifying risk (e.g., characteristics of the leachate, designations of local water use, documented adverse impacts, and use of containment and mitigation technology). The commenter also suggested that special emphasis be placed on the DRASTIC index score, a standardized system for evaluating ground-water pollution potential using hydrogeologic settings. Similarly, another commenter suggested that schedules be based on a risk assessment of facilities focusing on an analysis of key pathways to sensitive receptors and activities (i.e., drinking water sources; exposed populations; sensitive biologic communities; and past, current, and future use of the site and adjacent property).

In response to comments requesting more flexibility for States, today's final rule allows approved States to establish an alternative compliance schedule for phasing in the ground-water monitoring requirements at existing units and lateral expansions of existing units. These alternative schedules must ensure that 50 percent of all existing units are in compliance within three years and all existing units are in compliance within five years. In setting an alternative compliance schedule approved States must consider the potential risks posed by each facility to human health and the environment based on the factors specified in § 258.50(d). This approach for approved States is consistent with the proposal except that the Agency has deleted the interim requirements of 25 percent compliance within two years and 75 percent compliance within four years. These interim milestones were dropped in response to commenters request for additional State flexibility on this issue. Though these two interim requirements have not been included in today's final rule, the Agency does not believe that any adverse impacts to human health and the environment will result. The final rule also allows approved States to set alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements.

In considering the request for more aggressive compliance schedules, the Agency notes that States are not precluded by this section from requiring installation of ground-water monitoring systems on a faster schedule.

The Agency considered the commenter's request to use DRASTIC scores, but believes that States may not have all the information readily available to score facilities. DRASTIC is a method used for systematically evaluating and numerically scoring the ground-water pollution potential of any hydrogeologic setting in the United States. Scores are based on ratings of the following factors: Depth to water, net recharge, aquifer media, soil media, topography, impact of vadose zone media, and hydraulic conductivity. The purpose of the factors to assess relative risk is to allow for quicker installation of monitoring systems at those facilities that pose the greatest risks to human health and the environment. The Agency does not believe that a full hydrogeologic assessment is necessary to rank facilities, and therefore, has not adopted the use of DRASTIC into today's final rule.

The Agency considered the other risk factors suggested by commenters and believes that the majority of the specific factors suggested by commenters fall into the broader categories proposed by the Agency. For example, designations of local water use and drinking water sources could be considered part of the resource value of the aquifer. Similarly, exposed population and sensitive biologic communities fall under the first factor, proximity of human and environmental receptors. The Agency does not believe that requiring information on the additional suggested factors will enable approved States to more accurately assess relative risks posed by facilities. For this reason, the Agency believes that the factors provided in today's final rule, (§ 258.50(d)), are sufficient for assessing risks posed by facilities. These factors include: (1) Proximity of human and environmental receptors; (2) design of the unit; (3) age of the unit; (4) the size of the unit; and (5) resource value of the underlying aquifer including (i) current and future uses; (ii) proximity and withdrawal rate of users; and (iii) ground-water quality and quantity. This list is the same as that originally proposed except for the addition of two factors: (1) Waste types and quantities, including sewage sludge and (2) unit size.

Waste type and quantity, including sewage sludge, was added as an additional factor because commenters suggested that waste characteristics may be an important factor in assessing the potential risk of a facility. Size was added as a factor for consideration in today's final rule because of the comments received requesting relief for small communities. As discussed earlier in the preamble, the Agency has allowed approved States the discretion to exempt owners and operators of small landfills from the ground-water monitoring and corrective action requirements as long as certain conditions are met.

However, the Agency understands that many small communities not meeting the criteria defining small communities in today's final rule may need more time to locate expertise and acquire funding for installation of ground-water monitoring systems. Therefore, the Agency is allowing approved States to consider the impacts to small communities during the phase in period. Approved States may establish lower priorities for small communities by applying the criteria set forth in §§ 258.50 (d)(1), (d)(4), and (d)(5)(ii). These are the risk factors considering the proximity of human and environmental receptors, the size of the unit, and the proximity and withdrawal rate of users. Approved States will always have the option, however, to immediately address those MSWLFs with environmental problems that are serving small communities.

c. Professional Certification

The proposed rule required that the owner or operator obtain certification from an independent professional in at least two instances: The demonstration of no potential for migration (by a qualified geologist or geotechnical engineer) and certification of remedy completion (an independent professional skilled in the appropriate technical discipline). Because the Agency is providing for self-implementation of many portions of today's final rule, the Agency believes it is necessary to have an independent party review, and certify certain other programs or demonstrations required by today's final rule. As one commenter noted, few owners and operators of MSWLFs have the technical capability to comply with the proposed ground-water monitoring and corrective action requirements without the support of professional hydrogeologic consultants

Therefore, five provisions of today's final rule require certification by an independent, qualified ground-water scientist: (1) No potential for migration demonstration (§ 258.50(b)); (2) number, spacing, and depths of monitoring systems (§ 258.51(d)); (3) determination that contamination was caused by another source or that statistically significant increase resulted from an error in sampling, analysis, or evaluation (§§ 258.54(c)(3) and 258.55(h)(2)); (4) determination that compliance with a remedy requirement is not technically practicable (§ 258.58(c)(1)); and (5) completion of remedy (§ 258.58(f)).

EPA recognizes that approved States may have hydrogeologists fully capable of reviewing and approving the ground-water monitoring and corrective action demonstrations or programs described above. Therefore, today's rule allows the owner or operator to obtain the approval of the Director of an approved State in lieu of the certification of an independent, qualified ground-water scientist.

One commenter suggested that States take the responsibility for establishing the criteria for licensing hydrogeologists because of the reliance of MSWLF owners and operators on the advice of consultants and hydrogeologists in implementing the regulations. The commenter stated that the variability of the opinions and approaches among different professionals would be a barrier to implementation. A second commenter suggested that there should be minimum professional requirements. The Agency agrees that those professionals certifying the requirements of today's final rule should meet certain qualifications. The Agency has defined a "qualified ground-water scientist" to be a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in ground-water hydrology and related fields as may be demonstrated by State registration, professional certification, or completion of accredited university programs that enable that individual to make sound professional judgments regarding ground-water monitoring, contaminant fate and transport, and corrective action. This requirement is included at § 258.50(f). The Agency believes that specialized coursework and training should include, at a minimum, physical geology, ground-water hydrology or hydrogeology, and environmental chemistry (e.g., soil chemistry or low temperature geochemistry). Some national organizations, such as the American Institute of Hydrology and the National Water Well Association, currently certify or register ground-water professionals. States may of course establish more stringent requirements for these professionals including mandatory licensing or certification.

2. Sections 258.51–58 Overview of Ground-Water Monitoring and Corrective Action Requirements

The Agency received numerous comments on the ground-water monitoring and corrective action requirements presented in the proposed rule. In general, most commenters requested that the rule be made simpler, less costly, and provide States with more flexibility. In responding to the commenters, the Agency has made a significant number of changes from the proposed rule. Among these changes are the elimination of the trigger level and a general reorganization and streamlining of the ground-water monitoring and corrective action requirements.

Section VII of today's preamble provides a summary of today's final rule, including the ground-water monitoring and corrective action provisions. As indicated in this summary, EPA has reorganized the ground-water monitoring and corrective action requirements into four major groupings: Establish Program, Detection Monitoring, Assessment Monitoring, and Corrective Action. The following more fully discusses each of these sections, including specific comments received, and the rationale for the final approach.

Establish Program

The following sections discuss the requirements for ground-water monitoring systems (§ 258.51) and the procedures for sampling and analysis that must be used by owners and operators (§ 258.53). As discussed later in the preamble, § 258.52, which pertained to the establishment of trigger levels for the appendix II constituents, was deleted.

3. Section 258.51 Ground-Water Monitoring Systems

Section 258.51 of the proposed rule specified requirements pertaining to appropriate methods for designing and installing ground-water monitoring systems. Recognizing the similar intent of ground-water monitoring under subtitle C and subtitle D, the Agency proposed performance standards for ground-water monitoring system design that reflected those specified for hazardous waste disposal facilities in 40 CFR part 264. The Agency proposed these requirements to ensure that consistent, reliable ground-water monitoring data are collected at all MSWLFs.

The proposed rule required that monitoring wells be placed at the closest practical distance from the waste management unit boundary or the alternative boundary designated by the State under § 258.40. The proposed rule also allowed the State to designate another appropriate location for down-gradient wells where subsurface conditions cause hazardous constituents to migrate past the boundary before descending into the uppermost aquifer. The system had to consist of a sufficient number of wells at appropriate locations and depths to yield samples that represent background ground-water quality and the quality of ground water passing the unit or alternative boundary. Individual wells had to be constructed to prevent contamination of ground water and be operated and maintained so as to perform to design specifications throughout the life of the monitoring program. Wells had to be cased in a manner maintaining the integrity of the monitoring well bore hole and this casing had to be screened and packed with gravel or sand, where necessary, to enable collection of ground-water samples. The annular space above the sampling depth had to be sealed to prevent contamination of samples and the ground water. The State could allow a multi-unit ground-water monitoring system at facilities that have more than one landfill unit provided that the multi-unit ground-water monitoring system would be as protective of human health and the environment as individual monitoring systems for each unit.

Because hydrogeologic conditions vary widely from one site to another, the proposal did not establish requirements specifying the exact number, location, and depth of monitoring wells needed to adequately monitor ground water in the aquifer. A few commenters supported this approach, while another commenter argued that EPA should specify a minimum number of wells. The commenter, however, did not suggest the necessary minimum number of wells. The commenter was concerned that the proposed rule might encourage the installation of an excessive or inappropriately large number of wells. EPA disagrees that wording of today's final rule directs owners and operators to install an excessive or inappropriately large number of wells. The Agency still believes it is important to provide owners and operators flexibility in determining the appropriate number of wells to meet the performance standard, and therefore

has retained the proposed approach in today's final rule.

The proposal included a provision that the number, spacing, and depth of monitoring systems be based on site-specific technical information including a thorough characterization of: (1) Aquifer thickness, ground-water flow rate, and ground-water flow direction; and (2) the saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, including, but not limited to: thicknesses, stratigraphy, lithology, hydraulic conductivities, and porosities. All commenters generally supported this provision, although a few suggested certain improvements. One commenter believed that further improvements could be made in the site characterization process and that the ground-water provisions needed to be far more explicit than proposed. Specifically, the commenter believed that proposed § 258.51(e) should require that the following specific characterization requirements be performed prior to final ground-water monitoring well installation: (1) Installation of soil/rock borings; (2) determination of ground-water flow paths and rates (including ground-water level measurements, vertical flow components, seasonal and temporal variation in ground-water flow, and hydraulic conductivities); (3) identification of the uppermost aquifer, especially its lower boundary and any hydraulic interconnection; and (4) the use of confirmatory analyses.

Another commenter believed that § 258.51(e) should be clarified to preclude multi-level detection systems. The commenter believed that aquifer thickness, flow rate, flow direction, and the characteristics of the material overlying the aquifer were important factors in developing ground-water monitoring systems. The commenter believed that for the purposes of detection monitoring, a flow path analysis could define a single location and single elevation or depth of well screen which would meet the RCRA criteria for "immediate" detection of contamination from a facility.

In response to the first suggestion, the Agency agrees that site hydrogeology must be thoroughly characterized and the lower boundary of the uppermost aquifer be defined. Such information will enable the MSWLF owner or operator to identify potential pathways of contaminant migration and determine whether the complete vertical extent of the uppermost aquifer, including hydraulically interconnected zones of saturation, is being monitored. (See the technical guidance for this rule that is discussed in section VI of this preamble.) Therefore, the Agency expanded the factors for consideration in determining the number, spacing, and depth of monitoring wells to include requirements to (1) thoroughly characterize ground-water flow direction, including seasonal and temporal ground-water flow, and to (2) thoroughly characterize not only the saturated and unsaturated geologic and fill materials overlying the uppermost aquifer, but those that comprise the uppermost aquifer and the confining unit which defines the lower boundary of the uppermost aquifer as well.

In response to the comments regarding multi-level detection systems, the Agency believes that the use of these systems is often necessary and desirable to adequately detect potential ground-water contamination. Ground-water contamination may not be detected by wells screened at a single elevation under certain circumstances including landfills where: (1) Both sinking and floating contaminants could potentially be detected; (2) multiple, interconnected aquifers exist; (3) aquifers are variable in lithology, or contain discontinuous structures; or (4) discrete zones of fracture exist.

The Agency would like to emphasize that all components of any ground-water monitoring program, from site characterization, well location and installation, to sample analysis and data evaluation, must follow technically sound procedures to achieve high data quality objectives and, consequently, reliable and accurate results. Some EPA publications that address data quality objectives for ground-water monitoring include: RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (September, 1986), Test Methods for Evaluating Solid Waste (SW-846) (3rd Edition, November, 1986), RCRA Facility Investigation Guidance (May, 1989), and Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (April, 1989).

The rule as originally proposed required substantial State interaction in designing and approving the ground-water monitoring system. However, because today's final rule is self-implementing, the Agency has instead required certification of monitoring systems to ensure that such systems have been adequately designed and installed. Therefore, § 258.51(d)(2) of today's final rule requires that the ground-water monitoring system be certified by a qualified ground-water scientist as defined in § 258.50(f). This certification must be placed in the facility's operating record and the State director must be notified within 14 days.

In addition to those comments discussed above, the Agency received comments concerning the uppermost aquifer, determination of background ground-water quality, multi-unit ground-water monitoring systems, and the alternative boundary. These comments are discussed individually below.

a. Uppermost Aquifer

The Agency received a number of comments specifically addressing the Agency's use of the term "uppermost aquifer." The commenters' opinions regarding monitoring of the uppermost aquifer varied greatly. A few commenters expressed confusion with the definition of uppermost aquifer since it was not explicitly stated in the rule. A number of commenters objected to the Agency's emphasis on monitoring solely the uppermost aquifer. Some of these commenters asserted that if zones (both saturated and unsaturated) above the uppermost aquifer are contaminated, then impacts to the uppermost aquifer are inevitable. Accordingly, these commenters argued that requiring monitoring of any ground-water, instead of solely the uppermost aquifer, would provide for the earliest detection of contamination. Other commenters believed that the Agency should require monitoring of aquifers below the uppermost aquifer because ground-water contamination may not be detected in the uppermost aquifer before migrating to a lower aquifer or because the uppermost aquifer may be hydraulically connected to lower aquifers.

In contrast to the above opinions, several commenters were concerned that the rule may require monitoring of saturated or unsaturated zones (e.g., aquitard) that may not satisfy the definition of "aquifer." In their opinion, the ground-water monitoring program should focus on monitoring only aquifers that may provide drinking water or other beneficial uses.

The Agency agrees with the commenters concerns regarding the need for a definition of "uppermost aquifer." In response to these concerns, the Agency is adopting the definition of uppermost aquifer in § 260.10 for today's final rule at § 258.2. The proposed rule defined an aquifer as: A geological formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs which is consistent with the definition of aquifer given in § 260.10. The Agency's position

has always been that the definition of uppermost aquifer should address situations in which the uppermost aquifer is interconnected with lower aquifers, and therefore, the term "uppermost aquifer" is defined in § 260.10 and in today's final rule as: the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer, within the facility's property boundary. If lower zones of saturation are hydraulically connected to the uppermost aquifer, they collectively comprise the uppermost aquifer. Consequently, a number of facilities will be required to monitor lower aquifers that are hydraulically connected to the aquifer nearest the natural ground surface.

The Agency currently is evaluating the appropriate scope of ground-water monitoring requirements at subtitle C facilities. On July 26, 1988, the Agency proposed to amend 40 CFR part 264, subpart F to give the Regional Administrator explicit authority to require monitoring in any zones of saturation including saturated zones that are not part of the uppermost aquifer (such as perched or intermittent water tables), as well as monitoring in unsaturated zones for determining early migration of contaminants (53 FR 28160). The Agency currently is evaluating comments that were received on that proposal and is preparing a final rule. After the final rule is published, the Agency also will consider the appropriateness of proposing comparable changes to monitoring requirements in § 258.51 for municipal solid waste landfills. Today's final rule does not preclude States, however, from requiring monitoring in the unsaturated zone or in saturated areas in addition to the uppermost aquifer.

b. Determination of Background Ground-Water Quality

In the proposed rule, EPA allowed States to determine alternate background ground-water quality on a site-specific basis if true background ground-water quality could not be detected on site (§ 258.53(g)). The alternate background ground-water quality was to be based on monitoring data from the uppermost aquifer that were available to the State. In the preamble to the proposed rule, the Agency elaborated that background ground-water quality should be based on actual monitoring data from the aquifer of concern.

A number of commenters stated that § 258.53(g) of the proposed rule which allowed the State to determine alternate background water quality based on wells in similar hydrogeologic areas, is inadequate. They contended that there are often no similar hydrogeologic areas that provide representative background water quality and that adjoining areas may be unrepresentative due to other activities in the area (e.g., irrigation and fertilization practices). Further, they contended that this provision does not provide any criteria, geological or hydrogeological, by which States can determine whether two areas are hydrogeologically similar. They believe such criteria are necessary since many factors, including aquifer lithology, will directly affect groundwater geochemistry.

Based on consideration of these comments, the Agency has deleted proposed § 258.53(g) from the final rule. The Agency initially proposed to not set the criteria to determine alternate background ground-water quality to provide States with maximum flexibility. However, the Agency agrees with commenters that the proposed § 258.53(g) was vague and believes that proposed § 258.53(f) (§ 258.51(a) in today's rule) provides owners and operators with the needed flexibility to determine background ground-water quality. Proposed § 258.53(f) allowed the owner or operator to establish ground-water quality at existing units based on sampling of wells that are not upgradient from the waste management area if: (1) Hydrogeologic conditions do not allow the owner or operator to determine what wells are upgradient; and (2) sampling at other wells will provide an indication of background ground-water quality that is as representative or more representative than that provided by upgradient. The Agency did not receive comments opposing proposed § 258.53(f) and has retained this provision in today's final rule (§ 258.51(a)(1) of today's final rule). This provision may be used when hydrogeologic conditions do not allow the owner or operator to determine which wells are hydraulically upgradient and when sampling at other wells will provide an indication of background ground-water quality that is equally or more representative than that provided by upgradient wells. Examples of such situations, as discussed in the background document for the proposed rule, include: (1) Waste management areas above ground-water mounds; (2) waste management areas located above aquifers in which ground-water flow directions change seasonally; (3) waste management areas located close to a property boundary that is in the upgradient direction; (4) waste management facilities containing significant amounts of immiscible contaminants with densities greater than or less than water; (5) waste management facilities located in areas where nearby surface water can influence ground-water flow directions (e.g., river floodplains); (6) waste management facilities located near intermittently or continuously used production wells; and (7) waste management facilities located in karst areas or faulted areas where fault zones may modify flow. In all cases, facilities should ensure wells are appropriately located and screened to allow determination of background ground-water quality that has not been affected by possible leakage from the landfill unit. The location of background wells also will be included in the certification required by § 258.51(d).

c. Multi-Unit Ground-Water Monitoring Systems

As previously discussed, the proposed rule allowed the State to approve grouping of landfill units for ground-water monitoring systems. The multi-unit ground-water monitoring system, however, had to be as protective of human health and the environment as individual monitoring systems for each unit. The Agency recognizes that local conditions may make it difficult to install a monitoring system around each landfill unit.

The Agency did not receive any comments opposing this concept so it has been retained in § 258.51(b) of today's final rule. However, because the Agency is providing for the self-implementation of today's final rule, only approved States will be allowed to approve the use of multi-unit systems. Unless an approved State allows the grouping of units, the owner or operator will be required to install a ground-water monitoring system for each individual unit.

If used, the multi-unit system must be as protective of human health and the environment as individual monitoring systems for each unit. Because of general commenter concerns that States need more guidance in implementing today's final rule, the Agency added five factors for approved States to consider in approving the use of multi-unit systems. These factors, found in § 258.51(b), include: (1) Number, spacing, and orientation of units; (2) hydrogeologic setting; (3) site history; (4) engineering design of the units; and (5) type of waste handled. These factors are similar to those factors proposed for the Regional Administrator's consideration in approving a multi-unit ground-water monitoring system for hazardous waste

facilities regulated under subtitle C (53 FR 78162). The rationale for these factors is discussed in the preamble to the July 26, 1988 proposed rule (53 FR 78162).

Multi-unit monitoring systems also must consist of a sufficient number of wells, installed at appropriate locations and depths, to yield ground-water samples from the uppermost aquifer that represent the quality of background ground water and represent the quality of ground water passing the relevant point of compliance. As discussed below, § 258.51(a)(2) requires that the downgradient monitoring system be installed at the relevant point of compliance (not to exceed 150 meters from the unit on land owned by the owner or operator) designated by an approved State. In determining where to place monitoring wells in a multi-unit facility in compliance with § 258.51(a)(2), the approved State should draw an imaginary line around all units at the facility. This line would constitute the relevant point of compliance for a multi-unit system. Therefore, wells must be placed at this imaginary line. Of course, the approved State must first make the determination that it is appropriate and protective to use a multi-unit monitoring system based on the factors described above.

d. Ground-Water Monitoring and the Alternative Boundary

The proposed rule allowed the placement of monitoring wells at the closest practical distance from the waste management unit boundary or alternative boundary selected by the State under § 258.40(d). This ground-water monitoring performance standard was linked directly to the design goal of the landfill unit by requiring placement of the monitoring system so as to monitor the performance of the landfill design at the unit or alternative boundary. For example, if the unit was designed to meet the design goal at an alternative boundary, monitoring wells were to be installed at the alternative boundary.

The alternative boundary could be no more than 150 meters from the waste management unit boundary, and had to be on land owned by the MSWLF owner or operator. Under the proposal, States would be required to consider eight factors before establishing an alternative boundary: (1) The hydrogeologic characteristics of the facility and surrounding land; (2) the volume and physical and chemical characteristics of the leachate; (3) the quantity, quality, and direction of flow of ground water; (4) the proximity and withdrawal rate of the ground water users; (5) the availability of alternative drinking water supplies; (6) the existing quality of the ground water, including other sources of contamination and their cumulative impacts on the ground water; (7) public health, safety, and welfare effects; and (8) practicable capability of the owner or operator. The Agency's rationale for allowing an alternative boundary for meeting the design goal was to allow for consideration of the practicable capability of owners and operators by allowing contaminant concentrations to diminish due to degradation, dispersion, and attenuation. Its purpose was also to allow for greater State flexibility in setting design requirements.

The Agency received a number of comments regarding the alternative boundary designation which would permit ground-water monitoring wells to be placed at distances up to 150 meters from the waste management unit boundary. Several commenters asserted that the 150 meter boundary was overly conservative and too inflexible. A number of commenters suggested other locations for alternative boundaries including: the property boundary and unlimited locations, based on the risks posed by the facility. These arguments were countered, however, by other commenters who expressed concern that the allowable distance was excessive, would simply allow dilution of contamination, and would delay detection of contamination. Several of these commenters argued that monitoring wells should be placed at the waste management unit boundary.

The Agency recognizes that establishing the boundary designation for ground-water monitoring is an important feature of today's final rule, and may substantially influence the facility design and the types, timing, and costs of corrective action. Therefore, the Agency carefully reexamined the proposed approach to address concerns that this approach was either too stringent or not protective.

The Agency disagrees with commenters who argued that the proposed approach was unnecessarily stringent. In developing the proposed rule, EPA considered setting the alternative boundary at the property boundary or not stipulating any limit. These options obviously would provide the greatest flexibility in addressing the practicable capability of owners and operators of MSWLFs. However, due to the size of some MSWLF facilities, EPA is concerned that large expanses of ground water could be contaminated before detection and, therefore, circumvent the intent of this rule. Thus, the Agency believes it is essential to set a maximum distance limit for the alternative boundary (referred to in today's rule as the "relevant point of compliance") that would limit ground-water contamination, yet still provide some flexibility to owners and operators of MSWLFs. The Agency also specified in the proposed rule, and in today's final rule, that the alternative boundary (or the relevant point of compliance) must be located on property owned by the owner or operator to prevent contamination off site. The Agency believes this approach provides sufficient flexibility, while at the same time, limiting the area of contamination.

The Agency acknowledges that allowing the relevant point of compliance to be set at a point beyond the waste unit boundary would allow dilution or contamination in some cases and delay detection of contamination. Although EPA generally prefers the installation of ground-water monitoring wells at the waste management unit boundary to provide the earliest opportunity to detect contamination, EPA believes the unique characteristics of MSWLFs warrant the flexibility afforded by today's final rule. First, the technical and economic resources of MSWLF owners and operators is limited in many cases. Corrective action is a significant cost component of today's rule and providing flexibility on the boundary designation for ground-water monitoring can in some cases serve to reduce costs by allowing the owner or operator to take advantage of a limited dilution and treatment zone in the ground water. In addition, the owner or operator will be able to avoid overdesign and thus reduce costs.

Second, EPA expects that in most instances, there will be very little potential for human exposure to contaminated ground water that remains within the property line (and no more than 150 meters from the unit boundary) of a MSWLF. Most MSWLFs are owned by local governments, who should be able to control ground-water use within the facility boundary. Section 258.40(d) of today's final rule requires that the relevant point of compliance be approved by an approved State after consideration of a wide range of site-specific factors. This approach ensures that careful consideration is given before a relevant point of compliance is set.

EPA decided to retain the proposed site-specific factors in setting the relevant point of compliance. However, one of the factors used to establish a relevant point of compliance (factor 6) has been changed to reflect the

provisions outlined in EPA's 1991 Ground Water Task Force Report. This report calls for the enhanced role of the States in setting ground-water protection strategies to meet State-specific needs. As discussed in the preamble to today's rule, States may use ground-water classification and resource evaluations in making decisions regarding ground-water protection. Accordingly, factor 6 has been amended to include consideration of whether the ground water is currently or reasonably expected to be used for drinking water. EPA believes that this approach is protective of human health and environment, and provides the necessary flexibility to address the unique ground-water protection strategies of the States.

As mentioned above, the proposed rule also allowed for the placement of wells at the closest practical distance from the waste management unit or alternative boundary to account for the presence of physical obstacles, such as gas and power lines, that would be impaired or destroyed by well installations in the area. Further, this provision allows for the installation of a well network while considering the locations of landfill design components such as run-off controls and liner anchors. The proposal also recognized that other factors can affect the placement of monitoring wells. For example, perched water tables or other hydrogeologic phenomena may cause leachate from a MSWLF to travel horizontally for a significant distance before reaching the uppermost aquifer. For this reason, § 258.51(a) of the proposed rule allowed the State to select the closest practical distance downgradient from the waste management unit boundary or the alternative boundary if the uppermost aquifer would not be affected directly beneath the appropriate boundary from releases by the MSWLF.

In general, commenters supported the provision allowing monitoring wells to be located at the closest practical distance from the appropriate boundary (or relevant point of compliance), so this provision has been retained, with some modifications, in today's final rule. First, a number of commenters urged the Agency to require that monitoring wells be located at the closest practical distance hydraulically downgradient from the landfill. The Agency agrees with these commenters and has added "hydraulically downgradient" to § 258.51(a)(2) of today's final rule.

The second change simply incorporates the use of the phrase "relevant point of compliance." The final rule specifies that owners or operators of existing units locate wells at the closest practical distance from the relevant point of compliance where existing physical obstacles prevent installation at the relevant point of compliance. The Agency believes that owners and operators of lateral expansions, new, or replacement units will be able to account for the presence of structures or obstacles in the planning process and will be able to place monitoring wells at the relevant point of compliance. However, this may not hold true for existing units that were constructed without consideration of the need for ground-water monitoring well installation. Therefore, the Agency is continuing to allow owners and operators of existing units to install ground-water monitoring systems at the closest practical distance from the relevant point of compliance.

Finally, other commenters expressed confusion with the proposed provision allowing the State to select a location for well placement if subsurface conditions cause hazardous constituents to migrate horizontally past the selected boundary before descending into the uppermost aquifer. One commenter in particular noted that it was unclear if this additional location would create a second alternative boundary.

To eliminate confusion, the Agency has modified § 258.51(a)(2) in today's final rule to require that the monitoring system be installed at the relevant point of compliance that ensures detection of ground-water contamination in the uppermost aquifer. Therefore, as an example, if contamination could migrate past the relevant point of compliance because of a perched zone that does not qualify as the uppermost aquifer, the monitoring system must be placed at the relevant point of compliance appropriate boundary, and be capable of detecting contamination that would enter the uppermost aquifer. As mentioned before, the placement of monitoring wells must be certified by a qualified ground-water scientist, or approved by the Director of an approved State.

4. Section 258.52 Determination of Ground-Water Trigger Level

The proposed rule required States to set trigger levels for all appendix II constituents prior to initiation of Phase I monitoring. The trigger level was a health-based or environmental-based level which was determined by the State to be an indicator for protection of human health and the environment. When available, these levels were to be maximum contaminant levels (MCL) promulgated under section 1412 of the Safe Drinking Water Act. If an MCL had not been established, the level was to be a health-based level that met four specified criteria. Contamination exceeding trigger levels indicated a potential threat to human health or the environment that could require further study. The owner or operator would be required to conduct an assessment of corrective measures whenever concentrations of hazardous constituents in the ground water exceeded trigger levels.

Many commenters objected to the requirement that States establish trigger levels for all appendix II constituents. Their rationale was that the task of establishing risk-based trigger levels was too complex and unduly burdensome for States; many States would lack both the technical and financial resources necessary to set trigger levels. Several commenters pointed out that even EPA had set very few MCLs, and that many States would have even fewer resources for this challenging task. Additionally, commenters alleged that allowing States to set trigger levels would lead to inconsistencies among the various States. Several commenters also pointed out that adequate toxicological information was not available for all appendix II constituents, and that establishing health-based trigger levels for those constituents would be impossible.

In response to the overwhelming number of commenters objecting to each State setting its own trigger levels for all appendix II constituents, EPA has deleted § 258.52 in today's final rule. The Agency agrees with commenters that this exercise would be costly, time consuming, and difficult for States to implement. However, to insure an appropriate level for cleanup activities, it is necessary to have a ground-water protection standard for corrective action. Therefore, in today's rule at § 258.55(i), EPA is requiring that the ground-water protection standard for those constituents detected above background during assessment monitoring be either the MCL, if available, or background concentration. An approved State may set alternative health-based or environmental-based levels determined by the factors provided in § 258.55(j). The requirements for ground-water protection standards are discussed more fully in the section on assessment monitoring.

As mentioned previously, EPA determined that the ground-water monitoring program can be simplified by eliminating the establishment of the trigger level. The ground-water

protection standard will be used in place of the trigger level to determine when a facility should evaluate and select corrective action remedies. This change does not reduce the level of protection afforded by the rule; it merely streamlines the program (thus improving its implementation).

5. Section 258.53 Ground-Water Sampling and Analysis Requirements

The proposed rule required MSWLF owners and operators to develop a ground-water monitoring program that includes consistent sampling and analysis procedures that would ensure accurate ground-water monitoring results. The sampling and analysis procedures were required to provide an accurate representation of both the background ground-water quality and the quality of ground-water at monitoring wells placed down gradient from the landfill site. The proposed rule set minimum requirements for the facility ground-water monitoring program's sampling and analysis procedures and techniques. The procedures and techniques were to be documented in the facility's operating record and were to include: (1) Sample collection; (2) Sample preservation and shipment; (3) Analytical procedures; (4) Chain of custody control; and (5) Quality assurance and quality control.

The proposed rule also set general performance standards for ground-water sampling and analytical methods that included: (1) The method used must accurately measure hazardous constituents and other monitoring parameters; (2) the procedures and frequency of the method must be protective of human health and the environment; (3) the sampling method employed must ensure that the statistical procedure used would have an acceptably low probability of failing to identify contamination; (4) ground-water elevations must be measured in each monitoring well immediately prior to sampling; (5) the rate and direction of the ground-water flow in the uppermost aquifer must be determined each time ground-water gradient changes were indicated by previous sampling measurements; and (6) the background ground-water quality be established at a hydraulically upgradient well for each of the monitoring parameters or constituents required by the applicable ground-water monitoring program (requirements for determining the applicable program for each landfill unit were provided in § 258.54(a) and § 258.55(a) of the proposed rule).

The proposed rule allowed for variances to the requirement that background ground-water quality be based upon sampling at monitoring wells upgradient from the unit or area. The variance was allowed if either the hydrogeologic conditions do not allow the owner or operator to determine which wells are upgradient and if sampling at other wells would provide an indication of background ground-water quality that is as representative or more representative of background quality than upgradient monitoring wells. The proposed rule also provided that a State may determine background ground-water quality if background quality could not be determined on site.

The requirements for applying statistical procedures in the proposed rule were the same as the statistical procedures proposed on August 24, 1987 for hazardous waste facilities under subtitle C of RCRA (Statistical Methods for Evaluating Ground-Water Monitoring Data from Hazardous Waste Facilities, 52 FR 31948). The Agency believed that the proposed subtitle C procedures also were appropriate for MSWLFs and provided sufficient flexibility to allow effective State implementation. The Agency noted that the final statistical procedures promulgated under § 258.53 would reflect comments received on this proposal as well as the final statistical package promulgated under 40 CFR part 264.

The proposed requirements provided that the owner or operator must select an appropriate statistical procedure to determine if samples taken from downgradient monitoring wells represent a statistically significant increase over background values for each parameter or constituent that occurs in the downgradient sample. The proposed rule required the owner or operator to employ one of four statistical procedures or an alternative procedure that would protect human health and the environment and meet the ground-water protection standard provided in § 258.52(b) of the proposed rule. The four statistical procedures provided in the proposed rule include: (1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination; (2) An analysis of variance based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination; (3) A tolerance or prediction interval procedure; and (4) A control chart approach. The proposed rule also allowed the State to develop an alternative sampling procedure and statistical test if necessary to protect human health and the environment. In establishing an alternative statistical test, the State was to consider the factors provided in § 258.53(h)(3) (i)–(v).

The proposed rule required the owner or operator to determine whether or not there is a statistically significant increase over background levels for each parameter and constituent the owner or operator is required to monitor for under the appropriate program. The owner or operator was required to make these statistical determinations each time he or she assessed ground-water quality. In making this comparison, the owner or operator was to apply a statistical procedure provided for in the proposed rule and make any determinations of whether there has been a statistically significant increase or decrease over background within a reasonable time period, set by the State, after completing sampling. A reasonable time to perform statistical analysis would typically be upon receipt of analytical data from the laboratory.

EPA received many comments in response to both this rule and the August 24, 1987 proposed statistical methods for ground-water monitoring at hazardous waste facilities. As indicated in the preamble to the subtitle D proposal, the Agency considered comments to both proposed rulemakings when establishing the requirements in today's final rule.

In response to the subtitle D proposal in particular, EPA received comments covering the following areas: (1) The use of statistical significance; (2) the required frequency of sampling and the number of samples collected; (3) the establishment of Type I and Type II error levels; (4) the measurement of the rate and direction of ground-water flow in the uppermost aquifer each time ground-water gradient changes; (5) consistency with subtitle C statistical procedures; and (6) sample filtration. Comments received in each area and the Agency's responses are discussed below.

a. Statistical Tests

Many commenters expressed concern over the use of statistical comparisons to background data to trigger assessment (Phase II) monitoring. Commenters believe that the rule should be more flexible, and that other methods of data analysis should be available for evaluating ground-water monitoring data. Two commenters believe that because ground-water data are subject to several kinds of random variability resulting from spatial, temporal, sampling, and analytical sources, the use of the proposed statistics would result in excessive false positives. One

of these commenters believes that particular procedures should not be specified in the rule because ground-water data evaluation is a site- and waste- specific issue. Commenters suggested that the final rule allow for the use of trend analysis, graphical statistics such as box plots and time versus concentration plots, descriptive statistics, and "action levels." Two commenters suggested that decisions be based on careful data evaluation, interpretation by competent experts in water quality interpretation, or sound engineering judgement.

The Agency carefully considered the comments suggesting that the Agency allow methods of data evaluation other than statistical tests. However, because of the decision to provide for the selfimplementation of today's final rule, the Agency is requiring a quantitative data evaluation method that could be consistently and objectively implemented according to a set of performance standards. Therefore, today's final rule requires that facilities evaluate ground-water monitoring data using a statistical method provided in § 258.53(g) that meets the performance standards of § 258.53(h). It is important to note that § 258.53(g) contains a provision allowing for an alternative statistical method that may include some forms of trend analysis and graphical methods such as control charts, as long as the performance standards of § 258.53(h) are met.

Today's rule provides several options for owners and operators who are choosing statistical methods, thus giving them the flexibility to consider site-specific factors when choosing statistical methods. EPA believes that at least one of these types of procedures will be appropriate for virtually all facilities. The statistical tests provided by today's final rule include: (1) Parametric analysis of variance (ANOVA) followed by multiple comparisons; (2) ANOVA based on ranks followed by multiple comparisons; (3) a tolerance or prediction interval procedure; and (4) a control chart.

In deciding which statistical test is appropriate, the owner or operator will need to consider the theoretical properties of the test, data availability, the site hydrogeology, and the fate and transport characteristics of potential contaminants at the MSWLF. The owner or operator will then have to determine whether the procedure is appropriate for the site-specific conditions at the facility, and ensure that it meets the performance standards of § 258.53(h). Guidance on choosing appropriate statistical methods can be found in Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (EPA 530–SW–89–026, NTIS Number: PB89–151–047).

The proposed rule provided an allowance for States to establish an alternative statistical procedure and statistical test for any of the appendix II constituents or the proposed § 258.54(b) parameters if necessary to protect human health and the environment. The proposed rule listed several factors that a State should consider for establishing an alternative statistical procedure, including: (1) If the distributions for different constituents differ, more than one procedure may be needed; (2) each parameter or constituent must be tested for separately in each well, and tests for individual constituents are required to be done at a Type I error level (an indication of contamination when it is not present) of no less than 0.01 while multiple well comparisons may use a Type I experiment-wide error rate no less than 0.05; (3) the owner or operator must ensure that the number, location, and depth of monitoring wells will detect hazardous constituents that migrate from the MSWLF; (4) the statistical procedure should be appropriate for the behavior of the parameters or constituents involved and should include methods for handling data below the limit of detection; and (5) the statistical procedure used should account for seasonal and spatial variability and temporal correlation. The proposed rule also allowed States to require statistical tests of trend, seasonal variation, autocorrelation, or other interfering aspects of the data if contamination is detected in samples from downgradient monitoring wells and the State or the owner or operator suspects that the detection is an artifact caused by some feature of the data other than ground-water contamination. These trend analyses would be required to establish whether the significant result is indicative of natural variation or of actual contamination.

EPA received several comments on the proposed rule's allowance for States to establish alternative statistical procedures. Some commenters felt this provision was too general, while other commenters felt the provision did not give the State enough flexibility in establishing alternative procedures.

One commenter maintained that the requirement that an alternative statistical procedure, employed under § 258.53(h) (2) (v) of the proposed rule, "be protective of human health and the environment" was vague and lacked meaning. The commenter contended that a statistical procedure is a data evaluation tool, not a method to determine the potential for human and environmental impacts.

Although the Agency believes that the protection of human health and the environment is the goal of a ground-water monitoring program, the Agency agrees that use of this general requirement as the sole performance objective of an alternative statistical test is not sufficiently specific. Therefore, in response to comments, today's rule has been modified to require that an alternative statistical method employed by an owner or operator meet each of the performance standards given in § 258.53(h) of today's final rule. The owner or operator must notify the State of the use of an alternative statistical test and place a justification for the alternative test in the facility's operating record. The justification must demonstrate that the alternative method meets the performance standards of § 258.53(h). The performance standards presented in § 258.53(h) are the same as those required for all statistical tests listed in § 258.53(g) of today's rule.

The Agency realizes that the statistical methods outlined in today's final rule may not be applicable to every single MSWLF, and that the implementation of an inappropriate statistical test would not be protective of human health and the environment. EPA therefore recognizes the importance of allowing MSWLFs to choose an alternate statistical test when the statistical tests presented in today's rule are inappropriate for a facility's specific circumstances. The Agency anticipates that as State programs become approved, States will be taking on the responsibility of approving alternate statistical tests proposed by MSWLFs.

b. Frequency of Sampling and the Number of Samples Collected

Many commenters were concerned that the use of statistical analyses would require fairly large data sets or that the required sampling frequencies would not provide large enough data sets during the initial periods of monitoring to determine statistical significance. EPA received similar comments to the proposed subtitle C ground-water monitoring requirements (August 24, 1987) 53 FR 31948. In responding to comments for the subtitle C requirements, EPA determined that it is necessary to conduct at least four independent sampling events from each well at least semi-annually before a meaningful statistical analysis can be performed.

Today's final rule requires the owner or operator to determine whether there has been a statistically significant increase over background, at each well, after the completion of required sampling and analysis (§ 258.53(i)). Therefore, this will require the owner or operator to collect four samples from each well before the first statistical test can be performed, or in other words; collect four samples from each well during the first six months of monitoring for each monitoring parameter. This first sampling event (i. e., four samples from each well) within the first six months of monitoring would apply not only to detection monitoring, but also during assessment monitoring and corrective action monitoring whenever any new appendix II parameters are detected in downgradient wells and background must be established. It should be noted that § 258.55 of today's rule allows the Director of an approved State to designate a subset of wells for the owner or operator to sample and analyze during assessment monitoring and corrective action monitoring rather than each well. A further discussion regarding this flexibility is provided later in this appendix. During subsequent sampling events after background concentrations have been established; however, today's final rule requires a minimum of one sample from each well. Additional samples may be required depending on the statistical method used. Each successive sample will be added to the sampling data base so that a statistical evaluation can be performed.

This provision differs in some regard from the sampling procedure specified in § 264.98 (g)(1) of 40 CFR part 264 for hazardous waste facilities. The subtitle C regulations require owners and operators to take a sequence of at least four samples, at an interval that assures, to the greatest extent technically feasible, that an independent sample is obtained while considering the uppermost aquifer's effective porosity, hydraulic conductivity, hydraulic gradient, and the fate and transport characteristics of potential contaminants. This sampling procedure is to be used unless the alternate provision under § 264.98(g)(2) is approved by the Regional Administrator. The alternate sampling procedure may allow the owner or operator to take fewer than four samples semiannually if it is shown that the facility's hydrogeologic setting (e.g., slow rates of ground-water flow) would preclude one from obtaining four independent samples during a six month period (Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (April, 1989)). The intent of this provision was to allow for flexibility in designing site specific sampling procedures and to reduce the effects of autocorrelation (a measure of dependence among sequential observations from the same well) in ground-water samples.

For subtitle D MSWLFs, a minimum of one sample for subsequent sampling events, after background is established for each parameter, was chosen primarily because of practicable capability considerations. The sampling and analysis costs would quadruple if four samples were required during each semiannual sampling event. A MSWLF for example, with 25 wells screened in the same interval, would be required to sample and analyze 100 ground-water samples every six months. If the facility were in detection monitoring, the semiannual analytical costs alone would exceed $35,000.00, and field sampling costs could nearly double that figure. A number of MSWLFs have more than 25 monitoring wells that are screened throughout several saturated intervals. The Agency therefore believes that sampling and analytical costs associated with a procedure requiring four semiannual samples would far exceed the practicable capability of many MSWLF owners and operators.

Additionally, the Agency would like to emphasize that although the rule requires a "minimum" of one sample for subsequent sampling events after background has been established, § 258.53(c) of today's rule requires that sampling procedures and frequency be protective of human health and the environment. Section 258.53(f) also requires that the number of samples collected be consistent with the appropriate statistical procedures determined pursuant to paragraph (g). Therefore, the owner or operator may find it necessary to take more than one sample during each sampling event to meet the rule requirements.

c. The Establishment of Type I and Type II Error Levels

The Agency received two comments regarding the establishment of type I and type II error levels. A type I error occurs when a test incorrectly indicates contamination or an increase in contamination. A type II error occurs when monitoring fails to detect contamination or an increase in a concentration of a hazardous constituent. One commenter objected to § 258.53(c) of the proposed rule, which required that the sampling requirement ensure that the statistical procedure used to evaluate samples have an "acceptably low" probability of failing to identify contamination. The commenter believed that the Agency should instead provide a specific level for type I errors, of no greater than 0.05, and preferably 0.01. Another commenter was opposed to the error levels that were required for state-established alternate statistical procedures in § 258.53(h)(3)(ii). The commenter believed it is arbitrary to specify type I and type II error levels without taking into account the monitoring system, the nature of the constituents, and analytical and sampling techniques. The commenter believed that the Agency should allow error rates to be based on site- and waste-specific conditions to ensure that a statistical test will both reasonably detect releases and keep the sampling and analytical requirements within a practicable scope.

The Agency agrees that it is necessary, particularly in light of the self-implementing nature of today's rule, to specify type I error levels for individual well comparisons and multiple well comparisons. The Agency believes that individual facility owners and operators would have difficulty in accurately defining a type I error rate that would provide an "acceptably low" probability of failing to identify contamination. Consequently, the Agency included in today's rule the same performance standards for statistical tests promulgated on October 11, 1988 for RCRA subtitle C (53 FR 39720). The performance standards contained in today's rule specify type I error levels that apply to all individual wells and multiple well comparison procedures, as well as any alternate statistical procedures established by the State as was proposed.

EPA's basic concern in establishing performance standards for statistical methods is to achieve a proper balance between the risk that the procedures will falsely indicate that a regulated unit is causing background values or concentration limits to be exceeded (false positives) and the risk that the procedures will fail to indicate that background values or concentration limits are being exceeded (false negatives). The approach promulgated today, as for subtitle C, is designed to address that concern directly. EPA is limiting the type I error level (false positive) for the purpose of controlling the type II error level (false negative). The Agency has set the type I error level at 0.01 for individual well comparisons and at 0.05 for multiple comparisons. The Agency believes statistical analyses and sampling procedures that meet the performance standards presented in

today's rule would have a low probability of indicating contamination when it is not present, and of failing to detect contamination that actually is present. Further, the provisions in §§ 258.54(c)(3) and 258.55(g)(2) allow owners and operators to demonstrate that the indication of contamination resulted from an error in statistical evaluation. These provisions will allow owners and operators to control false positive rates.

The Agency believes facility owners and operators would find it difficult to quantify type I and type II error levels that are based on factors such as monitoring systems, the nature of constituents, and analytical and sampling techniques. Thus, the Agency is requiring that any statistical method selected under § 258.53(g) should meet the performance standards outlined in § 258.53(h) of today's rule.

d. Measurement of the Rate and Direction of Ground-Water Flow

EPA received several comments regarding the determination of ground-water flow rate and direction. Two commenters were concerned that the rule requires water level measurement prior to well sampling, but does not clearly state that the measurement of water levels should occur prior to well purging. These commenters were concerned that owners and operators may measure water levels in wells shortly after the wells are purged, thereby obtaining unrepresentative water level measurements.

EPA agrees with the concerns expressed by these commenters. Static water levels should be measured prior to well purging. Further, the Agency realizes that in many situations ground-water recovery in purged wells may take a considerable amount of time. Ground-water level measurements made in wells that have not fully recovered will yield unrepresentative results, leading to errors in the determination of ground-water flow directions, hydraulic gradients, and ground-water flow rates. In order to avoid this problem, the Agency has modified § 258.53(d) of today's rule to require that owners and operators measure water levels prior to well purging.

Two other commenters wished to ensure that facility owners and operators measure ground-water levels in all wells over a short time frame so that accurate water level elevations can be determined. One commenter, recognizing that a facility may not sample all of their wells on the same day, suggested that rather than requiring owners and operators to determine water level measurements prior to sampling, EPA could require that water level measurements be performed at specified intervals.

In response to these commenters' concerns, § 258.53(d) of today's rule requires that, for wells that monitor the same waste management area, owners and operators must measure water level elevations within a period of time short enough to avoid temporal variations in ground-water flow that could preclude accurate determination of ground-water flow rate and direction. As the commenter noted, in some instances ground-water sampling at a given waste management area may take more than one day. The Agency believes that water level measurements from boreholes, piezometers, or monitoring wells used to construct a single piezometric surface should be collected within a 24-hour period. Moreover, certain situations necessitate that all measurements be made within a period of time less than 24 hours. These situations include: tidally influenced aquifers; aquifers affected by river stage, impoundments, or unlined ditches; aquifers stressed by intermittent pumping of production wells; and aquifers being actively recharged due to a precipitation event. Consequently, facilities must measure water levels in all wells prior to initiating well purging and sampling.

Several commenters believed that the requirement that the owner or operator determine the rate and direction of ground-water flow in the uppermost aquifer each time ground-water gradient changes, as indicated by previous sampling period elevation measurements, is overly burdensome, unrealistic, and unnecessary. Commenters maintained that many ground-water flow variations are the result of seasonal factors, especially in dynamic ground-water regimes, and that any fluctuation of any ground-water level will result in a ground-water gradient change, consequently each monitoring event would require a separate evaluation of the rate and direction of ground-water flow.

Commenters suggested a variety of ways in which the proposed rule could be modified, including: (1) Require recording and reporting of ground-water level data, but only require analysis of ground-water level and flow data as necessary to understand or interpret other ground-water data; (2) require evaluation of water level data based boundary conditions for the range of "routine" ground-water gradients expected at a site during normal hydrogeologic cycles; (3) compare water level measurements to other well measurements to determine if redefinition of ground-water flow rate and direction is necessary; and (4) require that ground-water elevations be compared to the normal range of elevations for each well, and if any changes in water level elevation are inconsistent with other wells, indicative of a change in ground-water flow direction, or display gradients beyond ranges observed in past sampling events, then analyze ground-water flow directions and rates for change.

The Agency has considered the comments summarized above, and believes that the requirements for determination of ground-water flow direction and rate do not represent a significant burden to owners and operators. Moreover, it is the Agency's intent to require facilities to monitor changes in ground-water flow rate and direction, particularly in settings where ground-water flow rate and direction change dramatically and/or frequently. Only by maintaining a constant understanding of changes in the direction and rate of ground water flow can facilities ensure that their monitoring systems are adequately designed to detect a release, and that facilities will be able to predict the fate of a release, should a release be detected or corrective action become necessary.

Although subtitle C currently requires facilities to determine ground-water flow direction and rate at least annually, the Agency has proposed requirements for Subtitle C facilities to determine ground-water flow rate and direction more frequently than annually, when justified by site-specific hydrogeologic conditions (53 FR 28160). Because of the self-implementing approach to today's final rule, no mechanism exists for requiring a more frequent determination of ground-water flow direction and rate as provided for under subtitle C. Therefore, today's final rule requires that all facilities determine ground-water flow direction and rate each time ground-water is sampled. The Agency does not believe requiring flow rate calculations for each sampling event will represent any increased burden to owners and operators. Estimating average flow rate generally requires only a simple calculation, using values for porosity, hydraulic conductivity, and hydraulic gradient. The April 1989 EPA publication Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (EPA 530-SW-89-026, NTIS Number: PB89-151-047), provides guidance on determining ground-water flow rate. Values for porosity and hydraulic conductivity should be determined by facilities during their site

investigation activities. Hydraulic gradients can be determined using a simple calculation once ground-water elevation data are available to draw equipotential lines on a map of the facility. Ground-water flow direction also can be determined from a map displaying equipotential lines.

e. Consistency With Subtitle C Statistical Procedures

The proposed statistical procedures were the same requirements as those proposed on August 24, 1987, for hazardous waste disposal facilities regulated under subtitle C of RCRA (see 53 FR 31948). Today's final statistical procedures reflect comments received on the final statistical package promulgated under part 264 of subtitle C. Comments on the statistics rule promulgated under subtitle C addressed the following areas: (1) Power of a statistical test; (2) methods to analyze below detection limit data; (3) establishing background concentrations with downgradient wells; (4) guidance document; (5) data distribution assumptions; (6) obligation of owner or operator to propose statistical methods and sampling procedures; (7) data variability and sampling procedures; (8) procedures at interim status facilities; (9) determining background concentrations; (10) sampling required by proposed § 264.98(g)(2); (11) type I experiment wise error rate; and (12) time intervals for ground-water sampling. Comments also were received in many of these areas on the proposed subtitle D rule and have been discussed previously in today's notice. Additional discussion of these comments is contained in the preamble to the October 11, 1988 final rule which outlines statistical methods for evaluating ground-water monitoring data from hazardous waste facilities (53 FR 39720).

Today's rule incorporates one additional provision of the final subtitle C statistical procedures rule that was not specifically included in the proposed subtitle D rule. In the proposed subtitle C rule, the Agency invited public comment on the methods available for analyzing data where the background level of a constituent is either below the detection limit of the analytical method used or is recorded as a trace level of the constituent. The proposed subtitle D rule required the owner or operator to evaluate different ways of dealing with values below the limit of detection and choose the one that is most protective of human health and the environment.

Several commenters to the subtitle C rule requested EPA to consider establishing national baseline values for compounds that do not occur naturally in ground water, and as a result are frequently recorded as below the limit of analytical detection in background monitoring wells. Specifically, the commenters suggested that EPA conduct a round-robin study involving several different certified chemical laboratories to establish national baseline values for these compounds.

The Agency did not establish national baseline values for each constituent in the final subtitle C rule, but instead, required that the statistical method chosen include procedures to evaluate data that are below the limit of analytical detection. The Agency also added the requirement that any practical quantitation limit (PQL) used must be the lowest concentration level that can be reliably achieved with specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

Accordingly, EPA has added the same requirement to § 258.53(h)(5) of today's final rule. Appendix II of today's final rule lists the method-specific PQL for each constituent. These PQLs are the Agency's best estimate of the practical sensitivity of the applicable method for RCRA ground-water monitoring purposes.

On July 9, 1987, the Agency published a final rule, "List (Phase I) of Hazardous Constituents for Ground-Water Monitoring" (52 FR 25942; July 9, 1987) listing practical quantitation limits (PQLs) for specified analytical methods capable of detecting Appendix IX parameters. The PQLs were established from "Test Methods for Evaluating Solid Waste" (SW–846). SW–846 is the general RCRA analytical methods manual, currently in its third edition. The PQLs listed there and in Appendix II of today's final rule represent EPA's best estimate in 1986 of the lowest concentrations of analyses in ground water that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. These numbers do not represent a determination of detection limits in other matrices (55 FR 22540–42; June 1, 1990). The PQLs are included for guidance purposes only and are not part of today's regulatory requirements. Regulatory authorities may find PQLs useful in checking on a laboratory's performance and in evaluating analytical methods. A background document containing information about analytical methods and their established PQLs can be found in the docket for this rulemaking.

f. Sample Filtration

Many commenters questioned whether the Agency was requiring owners or operators to measure dissolved (filtered samples) or total concentrations (unfiltered samples) of constituents in ground water. As discussed below, the Agency believes that samples should not be field-filtered prior to laboratory analysis.

During ground-water sampling, every attempt should be made to minimize changes in the chemistry of the sample that may result in a non-representative view of the subsurface environment. A sample that is exposed to the atmosphere as a result of field filtering is very likely to lose a significant amount of volatiles, thereby providing non-representative monitoring data. Further, emulsion-trapped organics are lost through field filtering. Field filtration of ground-water samples for metal analyses will not provide accurate information concerning the mobility of metal contaminants. Some mobile metal contaminants may move through fractured, Karstic, and porous media, not only as dissolved species, but also as precipitated phases, polymeric species, or adsorbed to inorganic or organic particles (e.g., colloids) that are likely to be removed by filtration.

Therefore, § 258.53(b) of today's final rule prohibits MSWLF owners and operators from field filtering their ground-water samples in all cases. The Agency recognizes however, that there are certain circumstances where it is necessary to filter or centrifuge the sample under controlled conditions in the laboratory prior to analysis to prevent instrument damage. Sample filtration in the laboratory is permissible if, after acid digestion, insoluble materials (e.g., silicates) remain and could clog the instrument nebulizer. If this step is necessary, the filter and filtering apparatus must be thoroughly cleaned and prerinsed with dilute nitric acid. Laboratory personnel should consult SW–846 for information concerning these procedures.

The Agency would like to note that background concentrations also will be established on the basis of unfiltered samples (as are MCLs) thereby providing a consistent comparative basis for data evaluation between background and downgradient monitoring wells.

b. Section 258.54 Detection Monitoring

The proposed rule set forth a list of parameters that were to be monitored at least semiannually (Phase I monitoring) as the primary means of detecting

ground-water contamination during the active life and closure of a unit. The actual monitoring frequency used was to be based on the ground-water flow rate and the resource value of the aquifer. During post-closure care, however, the proposed rule allowed the State to set a different minimum frequency on a site-specific basis. The proposed monitoring parameters included major cations, major anions, metals, cyanide, and 46 volatile organic compounds (VOCs).

The proposed rule required that an owner or operator expand the Phase I monitoring program to Phase II monitoring when two or more of parameters (1) to (15), any one or more of parameters (16) to (24), or any of the VOCs listed in appendix I were detected at levels that significantly differed from background levels. When this occurred, the owner or operator was required to notify the State of the statistically significant finding within 14 days and implement Phase II monitoring within 90 days or an alternative time period approved by the State. Prior to implementing Phase II monitoring, the owner or operator could demonstrate to the State that an error in sampling and analysis occurred or that the contamination resulted from a source other than the MSWLF.

The Agency received extensive comments on the Phase I monitoring program. The majority of the commenters addressed the list of monitoring parameters. Additionally, other commenters addressed the sampling and analysis procedures, the Phase II monitoring trigger, and the monitoring frequency. These comments are discussed below.

a. Monitoring List

The Agency proposed a list of monitoring parameters that the Agency believed provided a reliable means of detecting the possible presence of releases from MSWLFs while avoiding unnecessary analytical costs to the regulated community. The major cations and anions that were on the Phase I parameter list are those used to classify ground water into geochemical facies. The proposed parameters consisted of:

(1) Ammonia (as N);
(2) Bicarbonate (HCO_3);
(3) Calcium;
(4) Chloride;
(5) Iron;
(6) Magnesium;
(7) Manganese (dissolved);
(8) Nitrate (as N);
(9) Potassium;
(10) Sodium;
(11) Sulfate;
(12) Chemical Oxygen Demand (COD);
(13) Total Dissolved Solids (TDS);
(14) Total Organic Carbon (TOC);
(15) pH;
(16) Arsenic;
(17) Barium;
(18) Cadmium;
(19) Chromium;
(20) Cyanide;
(21) Lead;
(22) Mercury;
(23) Selenium;
(24) Silver; and
(25) The 46 VOCs listed in appendix I.

In the preamble to the proposed rule, the Agency invited public comment on this list of Phase I monitoring parameters. Five commenters supported the list of proposed parameters; however, the majority of commenters felt the list was too extensive for routine monitoring and suggested it be reduced. They contended that the amount of required sampling would not only overwhelm MSWLF owners and operators who would perform and fund analyses, but also would overwhelm the States who would need to devote time for data review and analysis.

In contrast, several commenters suggested additions to the Phase I monitoring list. Specifically, commenters suggested adding tetrachloroethylene, which is currently regulated under the Safe Drinking Water Act, alkalinity (as $CaCO_3$), water temperature (to aid in chemical conversions), radioactive contaminants, specific conductance, carbonate, fecal bacteria, biological oxygen demand (BOD), organic nitrogen, and total Kjeldahl nitrogen.

The Agency reevaluated the list of detection monitoring parameters in response to these comments. The Agency proposed the use of 46 VOCs as indicator parameters because analyses of available data show that VOCs are more mobile than many other organic compounds. These compounds are fairly soluble in water and have low molecular weights, both of which lead to enhanced mobility in ground water. Further, VOCs do not tend to have a high sorptive potential on to matrix aquifer material. Therefore, the Agency believes that volatile organics would be among the best indicators for early detection of a release and has retained them in appendix I.

Commenters generally supported detection monitoring for VOCs but requested that seven chemicals be deleted from Appendix I because of analytical problems: bromochloromethane, 4-bromofluorobenzene, 1,4-difluorobenzene, ethanol, 2-chloroethyl vinyl ether, ethyl methacrylate, and dichlorodifluoromethane. The Agency agrees that these chemicals should be deleted from detection monitoring, except for bromochloromethane. This chemical is amenable to analysis by EPA Methods 8021 and 8260. It is often used as an internal standard, but the Agency believes that other standards are available. Two chemicals, 4-bromofluorobenzene and 1,4-difluorobenzene, were deleted because they are used as internal standards for mass spectrometry determination. Four others were deleted for the following reasons: Ethanol, because it does not purge adequately in the purge-trap-desorb technique; 2-chloroethyl vinyl ether, because of poor purging and instability of standard solutions; ethyl methacrylate, for which conflicting information has been received regarding reliability of determination in routine VOC screening analysis; and dichlorodifluoromethane, because it is the only analyze in this group that requires charcoal in the trap and the charcoal can reduce sensitivity to other Appendix I analyses. The rationale and data supporting each deletion is discussed fully in background documents to this rule.

Eight chemicals are added to the proposed VOCs listed in Appendix I by today's final rule: 1,2-dibromo-3-chloropropane; 1,2-dibromoethane; o-dichlorobenzene; p-dichlorobenzene; 1,2-dichloropropane; 1,1,1,2-tetrachloroethane; tetrachloroethylene; and cis-1,2-dichloroethylene. The first seven are in both the RCRA hazardous waste constituent list (Appendix VIII of 40 CFR Part 261), and the ground-water monitoring list (Appendix IX of 40 CFR Part 264). The cis-1,2-dichloroethylene is in Appendix VIII as an unspecified isomer and is included specifically among VOCs proposed for addition to the National Primary Drinking Water Regulations by EPA in May 1989 (54 FR 22062) under the Safe Drinking Water Act. Today's rule amends appendix I to include each of these constituents because the Agency believes: (1) These constituents may be present in MSWLFs; (2) each of these constituents is of concern in the protection of human health and the environment; and (3) their addition to Appendix I will increase the ability to detect potential migration of contaminants to the ground water from MSWLFs. However, including these constituents on the detection monitoring list will not increase the monitoring cost to MSWLF owners and operators because all of the added VOCs can be identified with the same analytical method (Method 8260) as can be used to identify the other VOCs listed in Appendix I. Therefore, the owner or operator will be better able to monitor the ground water, while

incurring no additional costs. Appendix I of today's final rule now contains 47 VOCs.

A number of commenters suggested that EPA limit the number of VOCs required for analysis to a single analytical method. Several commenters requested that the list be limited to those VOCs that can be analyzed by EPA Methods 601, 602, and 624. One commenter implied that EPA Method 8240 be recommended. In response to these comments, the VOCs on today's final Appendix I list are amenable to a single method. The Agency believes that Method 8260 (capillary column) is the preferred scanning method for all of the VOCs on Appendix I because of its ability to analyze for a large number of compounds; however, the Agency is not requiring a specific method in today's final rule.

The proposed rule identified eight metals to be analyzed during the first phase of monitoring: Arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Several commenters suggested that the metals be removed from monitoring, though one commenter suggested the list of metals be expanded to include copper, nickel, and zinc. Most commenters implied that the metals should be deleted because of their lower mobility. While the Agency agrees that metals are less mobile than the VOCs and that they may be less significant in indicating a release from a newer MSWLF than the VOCs, the Agency believes that the metals pose serious threats to human health and to the environment. Recent scientific studies (available in the docket for this rule) have shown that metals may undergo a facilitated transport phenomenon through sorption to colloidal particles. This process makes metals more mobile in ground-water than previously thought. Further, since the geochemical parameters have been eliminated, the metals will provide a direct indicator for inorganic releases to the ground water. Therefore, the Agency requires monitoring for specified metals in appendix I of today's final rule.

The Agency has, however, revised the list of metals for detection monitoring. In response to comments, the Agency has added copper, nickel and zinc. The Agency has also added antimony, beryllium, cobalt, thallium, and vanadium to the required metals in appendix I. The Agency added these eight metals to the detection monitoring list because they are representative of MSWLF leachate. Additionally, all of the metals are amenable to the same ICP scan, and will not significantly increase the cost of the monitoring requirements. The rationale and data supporting the use of these parameters is discussed fully in background documents to this rule.

The Agency notes that mercury and cyanide were originally proposed as constituents for detection monitoring. However, neither are amenable by the ICP scan method and thus both require separate analytical methods. The Agency does not have specific information indicating that their addition to appendix I would improve the ability to detect a release from a MSWLF; therefore, in today's final rule, EPA is not requiring analysis of these two compounds during routine detection monitoring. However, because of potential threats posed by cyanide and mercury, they have been retained on appendix II and are required for analysis during assessment monitoring to determine their presence in ground water.

A number of commenters supported the use of the inorganic geochemical parameters that were included on the proposed list of appendix I parameters (parameters 1 through 15). The majority of these commenters indicated that these parameters, or a subset of them, provide the best indication of a release from the MSWLF and can be economically analyzed. One commenter indicated that they have witnessed a long history of ground-water monitoring at MSWLFs and found that the geochemical parameters performed well as indicators of a release to ground water. Several commenters however, objected to the commonly and naturally occurring inorganic geochemical parameters that were included on the list. These commenters alleged that these constituents exhibit natural spatial and temporal variability and may falsely indicate releases.

After careful consideration of these comments, EPA has decided against requiring the use of geochemical parameters in detection monitoring (appendix I) for several reasons. Eleven of the proposed parameters are naturally occurring in soils and ground water. The remaining four parameters, COD, TDS, TOC, and pH, are common test parameters that are not specific to any one element or class of man-made chemicals. Moreover, the Agency notes that natural variability (both temporal and spatial) of the geochemical parameters is extremely difficult to characterize, especially in heterogeneous hydrogeologic settings. This could lead to an excessive number of false positives and false negatives during detection monitoring. Also, changes in the geochemical parameters have not been correlated with fate and transport characteristics of hazardous constituents from MSWLFs. Finally, the analytical costs associated with monitoring a large suite of geochemical parameters (e.g., fifteen, as listed in the proposed rule) may significantly exceed the cost of an analytical scan method (e.g., inductively coupled plasma (ICP) emission spectroscopy for metals), that has the capability of providing information on many more hazardous constituents. For these reasons, the Agency did not retain the proposed geochemical parameters in appendix I of today's final rule. However, in response to the relatively large number of commenters in support of the geochemical parameters, the Agency is allowing approved States the flexibility to use the geochemical parameters in lieu of some or all of the heavy metals on a site-specific basis. This flexibility will be discussed below.

One commenter suggested creating different lists of indicators for various waste types. However, the Agency does not believe that wastes in all MSWLFs can be characterized as homogenous. The various lists would place an increased burden on the owner or operator to characterize the waste in the landfill in order to choose a specific list of monitoring parameters. Therefore, EPA believes that one comprehensive monitoring list is appropriate. The Agency realizes that it is difficult to create a detection monitoring list that is capable of identifying every possible release. Therefore, the Agency developed a minimum list that should be able to detect, with reasonable confidence, nearly every type of release from a MSWLF while considering the practicable capability of the regulated community. This list of parameters, as specified in appendix I, includes the 15 metals and 47 volatile organic compounds discussed above.

It is possible to analyze all of the required detection monitoring constituents in appendix I by using only two analytical "scan" methods; a gas chromatographic/mass spectroscopic procedure (GC/MS) for the volatile organic analyses and inductively coupled plasma emission spectroscopy (ICP) for the metals. EPA is not, however, requiring the use of the GC/MS or the ICP spectroscopy. The Agency believes these methods involve high identification reliability, although they are not the only or necessarily the best methods for achieving the lowest detection limits for any specific analyze. The Agency has considered the practicable capability of the regulated community in selecting the constituents

for detection monitoring and believes that the final appendix I list is sufficient to protect human health and the environment while avoiding unnecessary analytical costs.

Due to the self-implementing nature of today's final rule, the Agency believes it is necessary to identify a minimum set of parameters for detection monitoring. However, in response to a number of comments that were received, the Agency is allowing approved States to specify a set of indicator parameters for detection monitoring on a site-specific basis. To provide approved States with additional flexibility, § 258.54(a)(1) of the final rule allows an approved State to remove constituents from the detection monitoring list if it can be determined by an approved State that a constituent is not reasonably expected to be in, or derived from, the waste contained in a MSWLF unit. The Agency believes that an approved State would delete parameters from the detection monitoring list only in rare instances where the owner or operator of the MSWLF can demonstrate definitive knowledge of the nature of the waste being disposed in the landfill. This may occur where the chemistry of the waste is uniform (homogeneous) throughout, such as in municipal waste combustion (MWC) ash monofills. Additionally, an owner or operator of a new MSWLF who maintains accurate records of waste placed in the landfill (via a comprehensive waste analysis plan) may be able to show the unlikelihood of certain constituents appearing in leachate emerging from the landfill. In these situations, an approved State may conclude that some of the appendix I constituents are not appropriate for ground-water monitoring at that MSWLF. This variance is not available to MSWLFs in non-approved States due to the self-implementing nature of today's final rule.

In addition, § 258.54(a)(2) of today's rule allows the Director of an approved State to establish an alternative list of inorganic indicator parameters for a MSWLF unit to be used in lieu of some or all of the heavy metals (parameters 1 through 15 in Appendix I) if the alternative parameters provide a reliable indication of inorganic releases from the MSWLF unit to ground water. In determining the alternative parameters, the Director must consider the factors outlined in § 258.54(a)(2) (i)–(iv). Although the Agency generally feels that geochemical parameters may not be the best indicators of a landfill release (for reasons discussed earlier in this appendix), the Agency feels that the geochemical parameters may be reasonable indicators in those instances where natural background levels are not so high as to mask the detection of a statistically significant release or where there is minimal natural spatial and temporal variability in the geochemical parameters. EPA would like to stress that (1) this alternative list may only be granted by an approved State on a site-specific basis because ground-water chemistry may vary from site to site within a State; (2) the alternative list may contain both metals and geochemical parameters because a complete replacement of metals with geochemical parameters may not be protective in all instances; and (3) this alternative list does not allow removal of the volatile organic constituents (parameters 16 through 62 appendix I).

b. Monitoring Frequency

The Agency requested comments on the minimum semiannual monitoring frequency for Phase I presented in the proposed rule. The proposal required Phase I ground-water monitoring at least semiannually during the active life and closure of a unit. The actual monitoring frequency required by States was to be based on the ground water flow rate and the resource value of the aquifer. During post-closure care, however, the proposed rule allowed States to set a different minimum frequency on a site-specific basis.

The Agency received varied comments on the proposed minimum semiannual monitoring frequency. A few commenters supported the minimum semiannual monitoring frequency while one commenter suggested that monitoring be required quarterly. Several commenters suggested that the minimum semiannual monitoring frequency was excessive and requested only annual monitoring. A number of commenters favored allowing owners and operators to demonstrate an appropriate sampling frequency for their facility based on the flow rate within the underlying aquifer. Finally, some commenters supported a phased approach for Phase I monitoring. This scheme would allow owners and operators to monitor semiannually for a subset of the parameters (e.g., the geochemical parameters) and monitor annually, or less frequently, for the remaining parameters (e.g., the metals or VOCs).

The Agency originally proposed, a semiannual monitoring minimum to prevent large volumes of ground water from being contaminated due to inaccurate measurements or unexpected variability in ground-water flow velocities. The Agency recognizes that across the United States, ground-water flow velocities can range from several feet to greater than 2,000 feet per year. In some geographic areas, a minimum annual monitoring frequency could allow contamination to travel considerable distances before detection. In areas with low ground-water flow velocities, the Agency recognizes that quarterly monitoring could be overly burdensome. The Agency believes that the semiannual minimum monitoring frequency strikes a balance between protection of human health and the environment and the practicable capability of the regulated community. This also is the minimum monitoring frequency required for hazardous waste disposal facilities (40 CFR part 264 subpart F). In addition, due to the self-implementing nature of today's final rule, the Agency believes it is necessary to set a minimum monitoring frequency. Therefore, today's rule requires a minimum of semiannual detection monitoring for owners and operators in States with unapproved programs.

The Agency realizes, however, that the need to vary monitoring frequency may make sense in certain situations and should be evaluated on a site-specific basis. The sampling frequency chosen by the MSWLF must be sufficient to protect human health and the environment (§ 258.53(c)). For example, depending on the flow rate of the ground water and the resource value of the aquifer, less frequent monitoring may be allowable or more frequent monitoring may be necessary. For this reason, the Agency is allowing approved States to specify an alternate frequency for repeated sampling and analyses for appendix I constituents during the active life (including closure) considering the following factors: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer and unsaturated zone; (3) ground-water flow rates; (4) minimum distance between upgradient edge of the MSWLF unit and downgradient monitoring well screen; and (5) resource value of the aquifer. However, the minimum frequency during the active life (including closure) must be no less than annual. Additionally, because there may be a lower probability of releases from a closed MSWLF, the Agency also is continuing to allow approved States to set alternative frequencies for monitoring during the post-closure care period based on the above-mentioned factors.

Finally, the Agency considered the monitoring schemes suggested by commenters whereby owners and operators would monitor semiannually for a subset of the monitoring

parameters and monitor less frequently for the remainder. The Agency believes that this approach would, in a sense, create a complicated three-phased monitoring program. As discussed earlier, the majority of commenters requested that the final rule be simplified. The Agency, therefore, has attempted to simplify all aspects of today's final rule while ensuring that the requirements are adequate to protect human health and the environment. For this reason, the Agency did not incorporate the monitoring schemes suggested by these commenters.

c. Assessment Monitoring Trigger

The proposed rule required the owner or operator to initiate Phase II monitoring if there was a statistically significant increase over background (or decrease in the case of pH) for two or more of parameters (1) to (15), or a statistically significant increase over background for any one or more of parameters (16) to (24) or any of the VOCs listed in Appendix I. The Agency chose to require a statistically significant increase (or decrease) in two or more of the geochemical parameters as a trigger for Phase II monitoring because many of these parameters could be elevated by human activities (e.g., agriculture) or natural geologic and soil variations.

A few commenters objected to the triggering mechanism outlined above because, in their opinion, it ignored the geochemical correlation among several of the parameters. They asserted that relying on statistical changes in one or two of the indicator parameters would lead to false positive readings. Commenters requested that the Agency increase the number of parameters which must exceed background at a statistically significant level.

Because the Agency deleted the geochemical parameters from today's final rule, the Agency believes that the commenters' concerns have been addressed. The detection monitoring parameters provided by today's final rule do not exhibit the high degrees of spatial variability in most hydrogeological environments as do the proposed geochemical parameters. Therefore, § 258.54(c) of today's final rule requires an owner or operator to begin assessment monitoring if there is a statistically significant increase over background for one or more of the constituents listed in appendix I. Because pH has been deleted from the list of detection monitoring parameters, the determination of a statistically significant decrease does not require an owner or operator to establish an assessment monitoring program. It should be noted that the assessment monitoring trigger will not change even if the Director of an approved State allows the use of geochemical parameters in lieu of some or all of the heavy metals. In the situation where an owner or operator suspects that a statistically significant increase in a geochemical parameter is caused by temporal or spatial variability, the owner or operator will have to demonstrate that this increase was due to natural variation to avoid proceeding to assessment monitoring. A discussion of this demonstration is found in section (d) below.

d. Response to Statistically Significant Increase

Proposed § 258.54(d) required that an owner or operator expand the Phase I monitoring program to Phase II monitoring when two or more of parameters (1) to (15), any one or more of parameters (16) to (24), or any of the VOCs listed in Appendix I were detected at levels that significantly differed from background levels. At the point that Phase II monitoring was triggered, the owner or operator was to notify the State of this finding within 14 days, and was to begin a Phase II monitoring program within a reasonable time period as determined by the State. Within seven days of triggering Phase II monitoring, the owner or operator could notify the State that he or she intended to demonstrate that detection of significant changes in ground-water quality during Phase I monitoring was caused by sampling or analytical error, or caused by a source other than the MSWLF. The owner or operator then had 90 days, or an alternative time period approved by an approved State, in which to complete this demonstration. Such a demonstration may show that false positives (i.e., when a test incorrectly shows contamination or an increase in contamination) were caused by errors in sampling (e.g., improper decontamination procedures of non-dedicated bailers), analysis (e.g., lab contamination of sample with internal standards such as methylene chloride), statistics (e. g., false positive problems associated with many comparisons), and/or natural variation in ground-water quality (e. g., temperature and spatial variability). If the demonstration proved that the contamination was not from the MSWLF or was based on inaccurate results, the owner or operator could halt Phase II monitoring.

Many commenters supported the availability of this demonstration provision. One commenter stressed that Phase II monitoring should not be delayed until the demonstration is completed, however, because of the possibility of additional contamination. The Agency agrees with the commenter. Section 258.54(c) (3) of today's final rule requires the owner or operator to initiate an assessment monitoring program if, after 90 days of determining a statistically significant increase over background for any of the constituents listed in appendix II, the owner/operator cannot perform a successful demonstration. This timeframe was proposed as the time allowed for an owner or operator to complete the demonstration that the statistically significant increase resulted from a sampling or analysis error or that contamination resulted from a source other than a MSWLF. Although approved States may modify the 90 day time period (§ 258.50(g)), the 90 day cut-off now sets a definitive time frame for purposes of self-implementation of today's rule.

A few commenters requested that the time allowed for making the demonstration be extended (e. g., to 180 days). They asserted that it would take more than 90 days to resample and have laboratories conduct new analyses. They further added that it would take more than 90 days to conduct field investigations to determine that another source is causing the contamination. The Agency recognizes that it could take more than 90 days to make the demonstration, and as a result, § 258.54(c) (3) of today's final rule does not place a time limit for owners and operators to complete the demonstration. However, if after 90 days the owner or operator has not made a successful demonstration, (s)he must begin an assessment monitoring program. Any owner or operator may demonstrate that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality, or was caused by a source other than the landfill, but this activity does not waive the responsibility of the owner or operator to establish an assessment monitoring program after the allotted timeframe. Owners and operators in approved States should note that the Director of an approved State may modify the 90 day time period for a successful demonstration pursuant to § 258.50(g). If the demonstration proves, after assessment monitoring has been initiated, that the contamination was not from the MSWLF or was based on inaccurate results, the owner or operator may cease assessment monitoring and return to detection monitoring. If the demonstration is successful, the owner

or operator is required by § 258.54 (c) (3) to place a notice in the operating record. Today's final rule no longer requires the owner or operator to notify the State of his or her intent to make the demonstration because of the self-implementing approach of the final regulations. However, because today's final rule is self-implementing, the owner or operator must have the demonstration certified by a qualified ground-water scientist.

Several commenters also requested that the timeframe for notifying the State of a statistically significant increase be extended (e.g., to 30 days). The commenters believe that the proposed timeframes place an unnecessary burden on the owner or operator without a gain in protection of human health and the environment. Although, the Agency does not agree with the commenters that the 14 day timeframe places a burden on owners and operators, the Agency has decided that States should have the flexibility to set their own time frame for notification. Therefore, today's rule requires a 14 day period, for self-implementation purposes, or an alternative period designated by the Director of an approved States. In addition, because of the need to provide for a self-implementing approach to today's final rule, owners and operators are required by § 258.54(c) (1) to also place a notice in the facility's operating record within 14 days of finding a statistically significant increase over background for one or more of the constituents listed in appendix I. Again the Director of an approved State may elect to modify this time frame.

7. Section 258.55 Assessment Monitoring

The proposed rule required initiation of Phase II sampling and analysis if the owner or operator determined that the ground water exhibited significant increases (or decrease in the case of pH) over background levels for two or more of parameters (1) through (15) or one or more of parameters (16) through (24) or the Appendix I VOCs. The purpose of this second phase of groundwater monitoring was to determine the nature and extent of the release to ground water. Triggering Phase II monitoring did not necessarily indicate a threat to human health and the environment. Rather, entering Phase II monitoring signaled the need to analyze for a more extensive list of ground-water analyses and to determine if any of these constituents have exceeded health-based trigger levels.

Proposed § 258.55(c) required owners and operators in Phase II monitoring to sample all wells and analyze those samples for all constituents identified in appendix II to determine which constituents were present at levels statistically significant above background concentrations. This activity was to be completed within 90 days of triggering Phase II monitoring or an alternate time period approved by the State. If the owner or operator determined that none of the Appendix II constituents exceeded background at statistically significant levels, pursuant to § 258.54(d), the State was to determine the appropriate frequency for repeated sampling and analysis of all appendix II constituents. Section 258.55(e) of the proposed rule allowed the owner or operator to return to Phase I monitoring if no constituents were detected above background levels during a specified time period. The State was to determine an appropriate period of time to require the owner or operator to remain in Phase II monitoring, based on consideration of specified factors, before allowing a return to Phase I.

If any appendix II constituents were detected at statistically significant levels over background in either the initial or repeated testing, the owner or operator was to notify the State within 14 days and within 90 days, and quarterly thereafter, sample and analyze for those constituents present above background. The State also was required under proposed § 258.55(d) to specify an appropriate frequency for a full appendix II analysis to determine if any additional constituents had entered the ground water at concentrations that exceed background at statistically significant levels. Proposed § 258.55(g) required the owner or operator to notify the State and submit a report on the concentration of any additional appendix II constituents detected above background levels within 14 days.

If any of the appendix II constituents were detected at a statistically significant level above the ground-water trigger level established under proposed § 258.52, the owner or operator was to notify the State, assess corrective measures required under § 258.56, and continue Phase II monitoring. Before assessing potential corrective measures, the owner or operator could demonstrate, under § 258.55(h) (4), that a source other than the landfill was causing the contamination or that the increase resulted from sampling or analytical error.

The Agency received several comments in favor of eliminating Phase II monitoring (now assessment monitoring) and requiring the owner or operator to implement corrective action once statistically significant increases of the Phase I monitoring parameters occurred. These commenters believe that Phase II monitoring will not result in increased environmental protection and will delay remedial activities. They believe that the elimination of Phase II monitoring will lead to more rapid implementation of corrective action.

The Agency believes that the owner or operator must determine what contaminants have entered the ground water and understand the extent of the plume to develop an efficient and effective corrective action program. The purpose of assessment monitoring (Phase II monitoring) is to evaluate, rather than detect, contamination. The Agency believes that this second phase of monitoring is essential for evaluating the nature and extent of contamination and has retained it in today's final rule.

The proposed rule did not require the owner or operator to continue Phase I monitoring after triggering Phase II monitoring requirements. In the preamble to the proposed rule, the Agency noted that States may require an owner or operator to continue occasional monitoring or particular Phase I monitoring parameters during Phase II monitoring, particularly if that State has established corrective action requirements that involve those parameters. Two commenters objected to the lack of continued monitoring and requested the Agency to require Phase I monitoring to continue after Phase II monitoring has been triggered. Because of the need to provide for a self-implementing approach to today's final rule, the Agency agrees that it is necessary to require continued semiannual monitoring for the appendix I constituents during assessment monitoring (or an alternative frequency, no less than annual, set by the Director of an approved State) and has amended § 258.55(d)(2) accordingly. Similarly, § 258.56(b) requires the owner or operator to continue monitoring for appendix I constituents along with the appendix II constituents during the evaluation of corrective measures.

The Agency received numerous comments on § 258.55 of the proposed rule. The majority of the comments received were on the list of constituents in appendix II. Other commenters addressed the following areas: Different phases of monitoring, full appendix II analyses, return to Phase I monitoring, background determination for appendix II constituents, monitoring frequency, and notification of contamination, to name a few. These comments, along with Agency responses, are discussed more fully in the following sections. This section also addresses comments on the

determination of the ground-water protection standard originally proposed in § 258.57.

a. List of Constituents

The Agency proposed a list of appendix II constituents that were known to pose a risk to human health and the environment and that could potentially migrate to ground water. The proposed constituents were similar to those used in compliance monitoring at hazardous waste disposal facilities under subtitle C of RCRA (40 CFR part 265 appendix IX). Appendix II, as proposed, included almost all of the appendix IX constituents, plus additional constituents that are not included on appendix IX (e.g., Superfund indicators). Several of the constituents that are listed in appendix IX, also proposed in appendix II, are suspected to have analytical problems and the Agency is considering their removal from the appendix IX ground-water monitoring list. The proposed appendix II list was chosen because any of the proposed constituents could be present in the wide variety of wastes disposed at MSWLFs and could be present in ground water beneath facilities at levels threatening to human health and the environment.

The Agency requested comment on the proposed list of 246 appendix II constituents. In general, the commenters thought the list was excessive with only one commenter supporting the list of constituents.

Several commenters suggested that the appendix II parameters instead be selected by the State based on site-specific factors such as operational history of the site, the type of waste accepted, and previous analytical data on leachate samples. However, as discussed in the proposed rule, this approach is unworkable for sites with no leachate collection system (including the majority of existing landfills). Additionally, it does not account for degradation processes occurring during constituent migration through the unsaturated zone and ground water. It would require periodic resampling of the leachate to account for the wide variations in leachate composition over time. The Agency also believes that it may be difficult to determine the types of wastes that may have been historically disposed in many MSWLFs. However in response to these comments requesting a site-specific list, the Agency is allowing approved States, in § 258.55(b), to modify the list of constituents in appendix II if it can be determined that a constituent is not reasonably expected to be in, or derived from, the waste contained in the unit. Approved State modification of the assessment monitoring parameter list may occur only in rare instances. These circumstances are discussed earlier in this preamble with regard to modification of the detection monitoring list of parameters (§ 258.54(a)). Under these circumstances, an approved State may conclude that some of the appendix II constituents are not appropriate for ground-water monitoring at that MSWLF.

A number of commenters requested that the Agency develop a new list of monitoring constituents consisting of compounds that have been identified in MSWLF leachate. This option had been considered for the proposed rule, but was rejected because of limitations of the MSWLF database. As explained in the proposed rule, EPA's current data on 59 landfills identifies 112 compounds that have been found in MSWLF leachate. In most cases, the list of constituents analyzed for at a particular landfill was unknown, so these data may not indicate the full range of constituents that may be found in MSWLF leachate. Further, many of these compounds present analytical problems or require specialized analytical methods making them inappropriate for routine analysis. For these reasons, a list of compounds limited to those found in MSWLF leachate was not proposed and has not been incorporated into today's final rule.

In response to the criticisms of the commenters, however, the Agency did reevaluate the list of appendix II constituents. The Agency considered two options for revising appendix II: (1) Finalizing appendix II as proposed; and (2) making specific additions and deletions from proposed appendix II.

The first option considered was finalizing appendix II as originally proposed. This would have resulted in a list of 246 compounds. The Agency chose not to finalize proposed appendix II, however, based on consideration of commenters' objections. In particular, commenters remarked that the list contained a number of compounds which either could not be measured using existing technology or presented analytical problems. Several commenters also objected to the naturally occurring compounds on the list such as calcium, magnesium, and sodium.

In response to numerous comments on the proposed constituents, the Agency has revised appendix II. As discussed below, the Agency evaluated specific additions to and deletions from proposed appendix II and adopted assessment monitoring constituents similar to those presently listed in appendix IX of 40 CFR part 264. Appendix II is not identical to appendix IX due to expected proposed revisions to appendix IX. The most up-to-date information concerning analytical methods, degradation products, hydrolysis products, and chemical properties (i.e., adsorption to soil) was used to develop appendix II, and also will be used to propose consistent revisions to appendix IX.

For several reasons, EPA believes that it is appropriate for constituents on appendix II to generally be consistent with the constituents required for compliance monitoring under subtitle C of RCRA. First, hazardous wastes were routinely disposed of in municipal solid waste landfills before the amendments to RCRA were promulgated in 1980 (45 FR 33154; May 19, 1980). Second, municipal solid waste landfills may receive hazardous waste from small quantity generators (SQG) and household hazardous waste (HHW). Multiple SQG's and multiple sources of HHW may collectively result in substantial quantities of hazardous wastes at MSWLFs. Further, MSWLFs may not have adequate engineering controls (e.g., either a natural or synthetic liner and a leachate collection system), to prevent hazardous wastes from contaminating ground water. For these reasons, the Agency believes it is appropriate to provide for consistency in selecting ground-water monitoring analyses for both solid waste and hazardous waste disposal facilities.

The specific additions to and deletions from proposed appendix II were based on: (1) The feasibility of determining compounds of concern in ground water by standard screening methods, and (2) comparison with the ground-water monitoring list for hazardous waste facilities. Appendix II as finalized consists of 214 constituents.

Fourteen constituents are added to proposed appendix II by today's final rule. Nine of these constituents currently are required for compliance monitoring for hazardous waste facilities. The remaining constituents have been added to appendix II because they have either been detected at high concentrations in ground water samples collected from RCRA subtitle D facilities or because they are likely to exist in the variety of wastes managed at MSWLFs and are of concern in the protection of human health and the environment. The constituents added to today's final appendix II will not necessarily add to the analytical costs of ground-water monitoring; however, because the additions are amenable by the same

scan methods capable of completing the final appendix II analysis. The constituents added by today's final rule are presented in Table 1. Specific reasons for each of the additions are contained in the background document for today's final rule.

Thirty-nine constituents on proposed appendix II have been deleted by today's final rule. The list of deleted constituents is presented in Table 2. Several commenters suggested that several metals on appendix II could be found naturally in ground water, and, therefore, should not be used for assessment monitoring. The Agency agrees with the commenters. Although these metals are used by the Agency as Superfund indicator compounds, routine testing during assessment monitoring at all MSWLFs is not appropriate because they are not toxic at the levels found naturally in ground water. Another metal (fluoride) is found naturally as an inorganic ion, and was deleted for the same reason. Several commenters also suggested that a number of the proposed appendix II constituents (e.g., 1,3-benzenediol, oxirane, benzenethiol, hexachlorophene) are not easily detected by current analytical methods. The Agency reviewed appendix II and deleted twenty-nine constituents because of serious stability or analytical limitations by standard SW-846 methods. Specific reasons for each of the deletions are given in the background document for today's final rule. The Agency is similarly assessing the appropriateness of all appendix IX constituents based on consideration of the information used in the development of appendix II.

One commenter expressed concern about the monitoring requirements for dibenzofuran. The common name for dibenzofuran in the proposed rule listed various poly-chlorinated dibenzofurans as well as the unchlorinated dibenzofuran. After further review of available ground-water information, the Agency deleted the polychlorinated dibenzofurans as well as 2,3,7,8-tetrachlorodibenzo-p-dioxin (including the polychlorinated dibenzo-p-dioxins) from appendix II because they have been analyzed for and have not been detected in ground-water samples collected from RCRA (municipal and hazardous waste) and CERCLA facilities because of their strong adsorption to soil and their low solubility. Because of their strong adsorption to soil, they also have rarely been detected in surface water. Additionally, these compounds require a special analytical GC/MS method dramatically increasing the cost of assessment monitoring. Therefore, after consideration of the practicable capabilities of owners and operators, and the fact that these contaminants are rarely found in ground water, EPA does not believe it is necessary to routinely require the owner or operator to analyze ground-water samples for these compounds as part of the assessment monitoring program. Although today's final rule does not require monitoring for these compounds, States are not precluded from requiring analyses for these compounds, on a site-specific basis. However, the unchlorinated dibenzofuran has been retained on appendix II, because it is amendable by Method 8270 which is a suggested method for analyzing other appendix II constituents during assessment monitoring.

The Agency notes that appendix II is likely to change over time as modifications are made in analytical methods for detecting contaminants. Today's final appendix II is based upon currently available analytical technology and consideration of the practicable capability of owners and operators of MSWLFs. With the development and standardization of new technologies and methods, appendix II will likely need future revisions. EPA believes that the list of constituents presented in appendix II of today's final rule meets the overall objective of assessment monitoring, that is, to ensure monitoring which evaluates the nature of a release from a MSWLF to ground water.

Concurrent with the addition and deletion of certain compounds, other changes to appendix II have been made to eliminate confusion. The proposed appendix II was alphabetically ordered by systematic name. EPA decided to order the list by alphabetic common name, in keeping with the form used in other Agency lists. As requested by several commenters, the Agency also is including some suggested methods from Test Methods for Evaluating Solid Waste, Third Edition (SW-846) and estimates of a method-specific PQL for each constituent. Additionally, technical corrections to a number of name spellings have been made and several Aroclors are now listed under polychlorinated biphenyls.

Finally, the Agency believes that today's comprehensive list of appendix II constituents is essential for providing a check on the performance of the landfill design and operation. Under today's rule, owners and operators in approved States may design their landfill in accordance with a performance standard based on a more limited set of compounds (i.e., MCLs) (see § 258.40). As discussed earlier in this preamble, EPA limited this performance standard to constituents with EPA approved standards (i.e., MCLs) to provide an approach that could be effectively implemented considering the technical capabilities of the regulated community. EPA believes it is appropriate to specify a comprehensive list of compounds for assessment monitoring for two reasons. First, such a comprehensive list will provide a "back-up" check for landfill design performance (i.e., liner and leachate collection system requirements). Second, the owner or operator is required to routinely evaluate only those appendix II constituents that are detected in the ground water, thereby limiting impacts on the owner or operator.

TABLE 1.—ADDITIONS TO APPENDIX II

Common name	CAS RN
2-Chloroethyl ethyl ether	628-34-2
m-Cresol; 3-Methylphenol	108-39-4
Diallate	2303-16-4
cis-1,2-Dichloroethylene	156-59-2
1,3-Dichloropropane; Trimethylene dichloride	142-28-9
2,2-Dichloropropane; Isopropylidene chloride	594-20-7
1,1-Dichloropropene	563-58-6
Dimethoate	60-51-5
Endosulfan sulfate	1031-07-8
Ethyl methanesulfonate	62-50-0
p-Phenylenediamine	106-50-3
o-Toluidine	95-53-4
O,O,O-Triethyl phosphorothioate	126-68-1
sym-Trinitrobenzene	99-35-4

TABLE 2.—DELETIONS FROM APPENDIX II

Common name	CAS RN
Allyl alcohol	107-18-6
Aluminum	7429-90-5
Aniline	62-53-3
Benzidine	92-87-5
Benzoic acid	65-85-0
p-Benzoquinone	106-51-4
Calcium	7440-43-9
2-Chloroethyl vinyl ether	110-75-8
3-Chloropropionitrile	542-76-7
Dibenzo[a,i]pyrene	189-55-9
Dibenzo[a,e]pyrene	192-65-4
Dibenzo[a,h]pyrene	189-64-0
Dibenzofurans (tetra-, penta-, and hexachlorodibenzofurans)	132-64-9
1,4-Dioxane	123-91-1
3,3'-Dimethoxybenzidine	119-90-4
alpha,alpha-Dimethylphenethylamine	122-09-8
1,2-Diphenylhydrazine	122-66-7
Ethylene oxide	75-21-8
Fluoride	16984-48-8
Hexachlorophene	70-30-4
Iron	7439-89-6
Magnesium	7439-39-4
Malononitrile	109-77-3
Manganese	7439-96-5

TABLE 2.—DELETIONS FROM APPENDIX II—Continued

Common name	CAS RN
4,4'-Methylenebis(2-chloroaniline)	101-14-4
N-Nitrosomorpholine	59-89-2
Osmium	7440-04-2
Pentachloroethane	76-01-7
2-Picoline	109-06-8
Potassium	7440-09-7
2-Propyn-1-ol; Propargyl alcohol	107-19-7
Pyridine	110-86-1
Resorcinol	108-46-3
Sodium	7440-23-5
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6
Tetraethyl dithiopyrophosphate; Sulfotepp	3689-24-5
Thiophenol; Benzenethiol	108-98-5
Trichloromethanethiol	75-70-7
Tris(2,3-dibromopropyl) phosphate	126-72-7

b. Different Phases of Monitoring

The proposed rule required that once one well triggered Phase II monitoring, all wells monitoring the unit were to be sampled and the ground water analyzed for the appendix II constituents. In the preamble to the proposed rule, the Agency requested comment on whether different wells at the same unit or facility should be allowed to be in different phases of monitoring. In other words, some wells would be in Phase I monitoring while other wells would be in Phase II monitoring. In the preamble to the proposed rule the Agency stated that this option could be appropriate in situations where the unit was very large and only a few monitoring wells had triggered the next phase of monitoring, however, once corrective action had been triggered in one well, all of the ground-water surrounding the particular waste management unit would be subject to corrective action provisions. Several commenters supported the idea of allowing different wells to be in different phases of monitoring given the complexity of the movement of leachate, attenuation, dispersion, and ground water movement.

The Agency agrees that, in situations where larger MSWLFs are surrounded by a great number of wells, and the hydrogeology of the area is well known, it may be practical and cost-effective to sample and analyze a subset of wells for both the complete list of appendix II constituents and for the appendix II constituents detected as a result of the complete analysis. The Agency believes that States with approved programs should have the flexibility to make the determination regarding the specific wells to be included in assessment monitoring. Therefore, § 258.5(b) and § 258.55(d)(2) of today's final rule affords the Director of an approved State the flexibility to specify an appropriate subset of wells to be sampled and analyzed during assessment monitoring. This means that some wells would advance to assessment monitoring while all would remain in detection monitoring. However, during corrective action, the owner or operator is required to comply with the ground-water protection standard at all points within the plume of contamination that lie beyond the ground-water monitoring well system (§ 258.58(e)). This will very likely necessitate that all wells be incorporated into the corrective action program. In consort with the self-implementing nature of today's rule, owners and operators of MSWLFs in unapproved States must sample and analyze all wells during assessment monitoring.

c. Appendix II Analysis

The proposed rule, § 258.55(c), required the owner or operator to sample and analyze ground-water for the constituents listed in appendix II within 90 days of triggering Phase II monitoring or an alternate time period approved by the State. If appendix II constituents were not detected, § 258.55(d) required the State to determine an appropriate frequency for repeated sampling and analysis for appendix II constituents during the active life, closure, and post-closure care of the unit. In setting the appropriate frequency, the State was to consider: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer and unsaturated zone; (3) aquifer flow velocities; (4) minimum distance of travel; and (5) nature of any constituents detected. The purpose of this provision was to determine if any additional constituents entered the ground water over time. The Agency proposed to allow States to set the frequency for repeated full appendix II analyses because the Agency believed that site-specific conditions will have a significant impact on the release of any new constituents to ground water from a MSWLF.

A number of commenters objected to the requirement for repeated appendix II analyses, stating that it would be burdensome for MSWLF owners and operators to repeatedly analyze for over 200 constituents. Other commenters argued that the amount of data generated by repeated sampling would be burdensome for States to review. Another commenter felt that EPA should set a maximum limit on the number of scans that could be required within a given period of time while two commenters suggested that the full appendix II list be analyzed annually.

As stated in the preamble to the proposed rule, the Agency believes that periodic analyses for all appendix II parameters are essential to ensure detection of ground-water contamination and for use in determining whether the design of an ongoing corrective action program must be changed to accommodate the treatment or removal of additional constituents. The Agency also believes it is necessary to include a specific requirement for repeated, complete appendix II analyses because of the need to provide for a self-implementing approach to today's final rule. Therefore, the Agency is continuing to require repeated appendix II analyses, as modified below (see § 258.55(c)(2)).

In determining an appropriate frequency for repeated full appendix II analysis, the Agency considered the similarities in the ground-water monitoring programs for MSWLFs and hazardous waste facilities. Because owners and operators of hazardous waste facilities are required to conduct yearly analyses for a comprehensive list of constituents (similar to appendix II) during compliance monitoring (which is similar to assessment monitoring) to determine the presence of additional constituents, the Agency also set an annual monitoring frequency for repeated full appendix II analyses for MSWLF units conducting assessment monitoring. This minimum frequency will serve to ensure protection of human health and the environment from ground-water contamination resulting from MSWLFs. This requirement is found in § 258.55(b) of today's final rule. More frequent analysis is still required for detected constituents as discussed below.

To address commenters' concerns regarding the burdensome nature of this requirement, the Agency is providing approved States with the flexibility to reduce the frequency of the repeated full appendix II analyses (see § 258.55(b)). An approved State is required to consider the following factors in assessing the appropriate monitoring frequency for repeated full appendix II analyses: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer and unsaturated zone; (3) aquifer flow velocities; (4) minimum distance between upgradient edge of unit and downgradient monitoring well screen (minimum distance of travel); (5) resource value of the aquifer and (6) nature of any constituents detected. These are the same factors identified for

State consideration in the proposed rule for determining an alternate frequency for the repeated full appendix II analysis.

The proposed rule also required owners and operators to notify and submit a report to the State within 14 days of identifying appendix II constituents that had not been identified through previous monitoring. This has not changed in today's final rule. Section 258.55(d)(1) requires that within 14 days of detecting appendix II constituents through the initial or subsequent sampling events in assessment monitoring the owner and operator: (1) Place a notice in the operating record identifying the detected appendix II constituents and (2) notify the State Director that this notice has been placed. The Director of an approved State program may modify this time period.

d. Detection of Appendix II Constituents in Ground Water

If any appendix II constituents were detected at statistically significant levels above background, § 258.55(f) of the proposed rule required the owner or operator to: (1) Notify the State within 14 days, or an alternative period approved by the State; and (2) within 90 days, and quarterly thereafter, conduct analyses for those appendix II constituents that were present at levels above background. The State was allowed to determine the appropriate monitoring frequency during the post-closure period upon consideration of: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer and unsaturated zone; (3) aquifer flow velocity; (4) minimum distance of travel; and (5) the nature of the detected constituents.

One commenter remarked that to determine statistically significant increases of appendix II constituents over background would require a background determination for all of the constituents listed in appendix II, which would be beyond the practicable capability of most MSWLF owners and operators. The Agency reevaluated this requirement and agrees that it would require extensive sampling and analysis to determine background concentrations for all of the appendix II constituents in order to determine if a statistically significant increase over background had occurred. Therefore, § 258.55(d)(2) of today's final rule requires owners and operators to continue semiannual monitoring only for those constituents that are detected in ground water as a result of a complete appendix II analysis. In addition, today's rule provides flexibility for the Director of an approved State to specify a monitoring frequency, other than semiannually, for those constituents that are detected in ground water as a result of a complete appendix II analysis. This flexibility is discussed later in this section. So that owners and operators may determine whether appendix II constituents have exceeded the ground-water protection standard at statistically significant levels, § 258.55(d)(3) of today's final rule also requires the owner or operator to establish background concentrations only for appendix II constituents that have been detected in ground water.

The Agency does not mean to suggest, however, that owners and operators should delay sampling of background wells during the first assessment monitoring sampling event until constituents have been detected in downgradient wells. The owner and operator should simultaneously collect ground-water samples from both the background and downgradient wells and send both sets of samples to the laboratory with instructions to first analyze downgradient wells for appendix II constituents and to delay analysis of the background ground-water samples until the results of the downgradient ground-water analysis are available. EPA encourages owners and operators to determine the concentrations of a constituent in the samples through the use of one-point-in-time comparisons between background and downgradient wells. This approach will help reduce the components of seasonal variation by providing for simultaneous comparisons between background well and downgradient well monitoring data. For additional discussion of this approach, see the preamble discussion in 53 FR 39720 (October 11, 1988) concerning the determination of background concentrations and their relationship to statistical analysis of ground-water monitoring data and at RCRA facilities.

Regardless of the sampling delay, the Agency wishes to emphasize that § 258.53 requires each owner or operator to maintain sampling and analysis program documentation that includes procedures and techniques designed to ensure accurate representation of ground-water quality. After the detected appendix II constituents are identified, the owner or operator must analyze the background ground water samples for those constituents and establish background. The Agency believes this procedure will be within the economic means of most MSWLF owners and operators.

In response to statistically significant increases in appendix II constituents, the proposed rule required the owner or operator to conduct quarterly analyses for those appendix II constituents. Section 258.55(f)(3) of the proposed rule did, however, provide the State the flexibility to determine an appropriate minimum monitoring frequency for the detected appendix II constituents during the post-closure period, considering the following list of factors: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer flow velocity; (3) minimum distance of travel (i.e., MSWLF unit edge to downgradient wells); and (4) the nature of the detected constituents.

In general, most commenters stated that quarterly monitoring is excessive and not needed in all situations and recommended that the frequency be determined on a case-by-case basis. After careful review of these comments the Agency agrees that the requirement for quarterly monitoring during the active life and closure may not be necessary in some circumstances. For example, the Agency believes that quarterly assessment monitoring would not be cost-effective for owners and operators of MSWLFs located in areas with low ground-water flow velocities. The Agency believes that, based on the specifics of the MSWLF site, States should have the flexibility to determine an appropriate frequency for repeated sampling and analysis not only during the post-closure period, but the active life (including closure) as well. This flexibility also addresses the practicable capabilities of owners and operators by allowing less than quarterly analysis in situations where it is not absolutely necessary. It should be noted that today's rule does not preclude States from requiring more frequent monitoring if it is warranted.

Therefore, § 258.55(d)(2) of today's final rule provides flexibility for the Director of an approved State to specify a monitoring frequency, other than semiannually, for those constituents that are detected in ground water as a result of a complete appendix II analysis during the active life, closure, and post-closure care period. The Director of an approved State is required to consider the same factors that were listed in the proposed rule for setting an alternative frequency during the post-closure period. These same factors are used to determine an alternative frequency for the full appendix II analysis (see § 258.55(b)).

Because of the self-implementing approach to today's final rule, the Agency is allowing only approved States to determine an alternative monitoring frequency for the detected

appendix II constituents during the active life, closure and post-closure care period. Owners and operators of landfills located in States without approved programs are required to continue semiannual monitoring for detected appendix II constituents throughout the active life, closure, and post-closure care period.

e. Return to Detection Monitoring

Under the proposed rule, if the owner or operator determined that there had not been a statistically significant increase in any appendix II constituents over background, after conducting monitoring for a State approved period of time, § 258.55(e) of the proposed rule allowed the unit to return to Phase I monitoring. (A statistically significant increase over background was the trigger for requiring quarterly monitoring for that constituent.) In determining an appropriate period of time for appendix II monitoring before allowing return to detection monitoring, the State was to consider the following four factors: (1) Lithology of the aquifer and unsaturated zone; (2) hydraulic conductivity of the aquifer and unsaturated zone; (3) ground-water flow rates; and (4) minimum distance of travel.

In general, commenters supported the proposed provision allowing an owner or operator to return to the previous phase of monitoring. Therefore, the Agency has retained this concept in § 258.55(e), but has modified it by adding a minimum time period during which monitoring must be conducted before allowing a unit to return to detection monitoring. This will make it consistent with the self-implementing approach in today's rule.

In the preamble to the proposed rule the Agency requested comments on the appropriateness of a minimum time period during which monitoring must be conducted before allowing a unit to revert to the previous phase of monitoring. Two commenters suggested specific monitoring periods; two monitoring intervals and three consecutive quarterly analyses. The majority of commenters requested that this minimum time period remain site-specific.

The Agency agrees with the commenter's suggestion of a minimum of two monitoring intervals without detection of appendix II constituents is necessary before a facility may return to detection monitoring. The Agency believes that this requirement for two consecutive sampling events will reduce the probability of false-negatives (false negatives occur when monitoring fails to detect contamination or an increase in a concentration of a hazardous constituent). In addition, by specifying a specific time period, the Agency is providing for the self-implementing structure of today's rule. Therefore, § 258.55(e) of today's rule allows an owner or operator to return to detection monitoring if the concentrations of all appendix II constituents are at or below background, using the statistical procedures in § 258.53(g) for two consecutive sampling events.

The Agency believes that this approach balances protection of human health and the environment with the practicable capabilities of owners and operators. It considers the practicable capability of the owner or operator by not requiring repeated analysis of the ground water for the complete list of appendix II constituents, which may yield the same negative results. It is protective of human health and the environment, as is required by § 258.53(c) of the rule, because the owner or operator is still required to continue to monitor the ground-water and respond to statistically significant changes in ground water quality. Once a unit has returned to detection monitoring, the owner or operator will be required to establish an assessment monitoring program if subsequent monitoring indicates a statistically significant increase of any appendix I constituent over background levels. This will, once again, require the owner or operator to sample all monitoring wells, or in approved States, an appropriate subset of monitoring wells. The ground water samples collected must then be analyzed for all of the constituents listed in appendix II.

For the purpose of clarification, today's rule also includes a new § 258.55(f). This addition simply states that if the concentration of any appendix II constituents are above background, but all concentrations are below the ground-water protection standard, the owner or operator must continue assessment monitoring.

f. Plume Characterization

Under the proposed rule, § 258.56(b), the State could require an owner or operator to conduct additional monitoring in order to characterize the nature and extent of the plume. This provision implied that characterization of the plume may require the installation of several additional monitoring wells. The Agency's rationale for this provision was that the distribution of contaminants must be delineated to properly define the extent of the area to be addressed by the corrective action program.

One commenter remarked that EPA should require a thorough definition of the problem that may exist at a facility prior to the initiation of corrective measures. The commenter stated that if the site-specific hydrogeologic and ground-water quality characteristics are not understood, attempts to remediate the facility may fail. The Agency agrees that a thorough understanding of the contamination and the hydrogeology of the site is essential to creating a corrective action program. Therefore, this concept has been retained in today's final rule.

Section 258.55(g)(1)(i) of today's final rule requires the owner or operator to characterize the nature and extent of the release, once the ground-water protection standard has been exceeded, by installing additional wells, as necessary. Circumstances that may require additional monitoring include: (1) Facilities that have not determined the horizontal and vertical extent of the contaminant plume; (2) locations with heterogeneous or transient ground-water flow regimes; and (3) mounding associated with MSWLF units. In these situations, an owner or operator may be required to install additional wells. However, because the requirements for additional monitoring are site-specific, the Agency is not able to set requirements for cases where additional monitoring is required nor the number of additional wells that must be installed. The Agency maintains that characterization of the release is critical in designing and implementing corrective action programs if ground-water remediation is necessary. The purpose of these additional wells is to delineate the contaminant plume boundary and to eventually demonstrate the effectiveness of corrective action in meeting the ground-water protection standard. Additional wells installed for this purpose are not subject to the assessment monitoring requirements for Appendix II analyses.

In the subtitle C program for hazardous waste facilities, the Regional Administrator has the authority to require the installation of additional monitoring wells to characterize ground water. Due to the decision to provide a self-implementing approach to today's final rule and in response to the comment that EPA should require a thorough definition of any ground-water contamination problem prior to mandating corrective action, the Agency has also added the requirement that the owner or operator install at least one additional well at the facility boundary in the direction of contaminant migration (§ 258.55(g)(1)(ii)). This well must be sampled semiannually, or an alternative frequency determined by the

Director of an approved State, and the ground water samples analyzed for the Appendix II constituents that have been detected in the wells located at the unit or alternative boundary. The Agency added the specific requirement of a well at the facility boundary so that the owner or operator will be able to determine when contaminants have migrated past the facility boundary so that affected persons who own or reside on land overlying the plume may be notified. It should be noted that although § 258.55(d)(2) allows the Director of an approved State to determine an appropriate subset of wells to be sampled and analyzed for the detected Appendix II constituents, the Director of an approved State must always include this one additional well in the sampling and analysis program.

The Agency recognizes that it may be difficult in certain circumstances to characterize the nature and extent of the plumes that have moved off-site. In limited cases, the owner or operator may have difficulty obtaining permission from adjacent land owners to install additional wells on their property. Nevertheless, the Agency expects owners and operators to make every effort to fully characterize the nature and extent of the contamination.

Section 258.58(a)(3) of the proposed rule required the owner or operator to notify all persons who own or reside on land that directly overlies any part of the plume of contamination. This notification was to be sent if any Appendix II constituents were detected at a statistically significant level above the ground-water protection standard. Several commenters addressed the notification requirement that was proposed.

Two issues were raised by commenters: The scope of any notice and the timing of the notice. Commenters suggested expanding the scope of those receiving notice of contamination beyond that required in the proposed rule. These commenters argued that this notice should not be limited to land owners and local residents who own or reside on land that overlies a contaminated plume, but also should include owners of mineral rights and owners of permits to applicable surface and ground water, as well as to local officials such as fire, health, school and transportation officials.

The Agency agrees that it is important for those persons whose uses of the ground water may be affected, including those who own or reside on land overlying the plume and those whose drinking water may be affected, to be made aware of potential risks. However, the Agency believes it would be difficult for a MSWLF owner or operator to identify and notify all persons whose uses of ground water could be affected. Therefore, the Agency is retaining the proposed requirement that the owner or operator notify individuals owning or residing on land overlying the plume of contamination (see § 258.55(g)(1)(iii)).

The Agency does, however, agree with the commenter who suggested that the MSWLF owner or operator be required to notify local authorities of ground-water contamination resulting from a release from the MSWLF. The Agency has, therefore, broadened the scope of the proposed notification to include appropriate local government agencies or officials, as well as persons owning or residing on land overlying the plume of contamination. Section 258.55(g) of today's final rule requires that notification be sent to local government officials or agencies once it has been determined that constituents have been detected at statistically significant levels above the ground-water protection standard. The Agency understands that in the case of MSWLFs that are owned or operated by local governments, the additional reporting requirement in today's final rule will mean that one local government agency or official may be notifying another agency or official of the same municipality. The Agency still feels the expanded notification requirement is necessary to ensure that all appropriate government officials and agencies are notified.

It also was suggested by commenters that the timing and method of notification be specified in more detail than in the proposed rule. These commenters felt that the notification should be required immediately upon detection of contamination, and that the language and structure of the proposed rule does not adequately indicate this.

At the request of the commenters, the Agency evaluated the timing of the required notice, and consequently changed the timing of the notice from the proposed rule. The Agency agrees that it is important to quickly notify individuals of potential ground-water contamination. Today's final rule requires the owner or operator to notify owners or residents of land overlying the plume of contamination if sampling of the well located at the facility boundary, (required by § 258.55(g)(1)(ii)), indicates that contaminants have migrated off site. However, the earliest an owner or operator of a MSWLF that is contaminating ground water can notify residents of land overlying a plume is when the nature and extent of contamination has been identified. Nevertheless, MSWLF owners and operators can quickly notify local government officials well before the plume is fully characterized. Therefore, as discussed above, today's rule requires the owner or operator to notify appropriate local government officials within 14 days of finding a statistically significant increase over the ground-water protection standard. These officials can then work with the owner or operator in determining if certain others should be notified prior to plume characterization. Note that § 258.50(g) provides flexibility for the Director of an approved State to alter this time for notification.

In summary, if any appendix II constituent is detected at a statistically significant level above the ground-water protection standard, § 258.55(g) requires the owner or operator to: (1) Notify the State and local government officials and place a notice in the operating record within 14 days or within another timeframe specified by the Director of an approved State; (2) characterize the nature and extent of the release, which may require the installation of additional monitoring wells; (3) install at least one monitoring well at the facility boundary in the direction of contaminant migration; (4) notify all persons who own or reside on land overlying the plume if contaminants have migrated off-site. In addition, the owner or operator is given the opportunity through § 258.55(g) (2) to demonstrate that a source other than the MSWLF caused the contamination or that the statistically significant increase resulted from an error in sampling, analysis, or evaluation. This demonstration must be certified by a qualified ground-water scientist or approved by the Direction of an approved State and placed in the facility's operating record.

g. Ground-Water Protection Standard

The proposed rule required States to set ground-water protection standards (GWPS), when selecting a remedy, for each appendix II constituent detected above trigger levels. The GWPS was to represent the constituent concentrations that remedies were to achieve. The proposed rule established the State's primary consideration when setting the GWPS to be to ensure protection of human health and the environment. The proposed rule allowed the State to use promulgated health-based standards, such as Maximum Contaminant Levels (MCLs), where they are available. In cases where promulgated standards are not available, the proposed rule allowed the State to set a GWPS for carcinogens

that would achieve a level of protection within a risk range of 1×10^{-4} to 1×10^{-7}. The proposed rule allowed the State to take site-specific exposure considerations into account when establishing the GWPS and to take into account the reliability of the remedy when establishing the standard. If the MSWLF owner or operator could demonstrate to the State that a detected contaminant was already present in the ground water, then the State was not to set the GWPS above the background level unless the State determined that clean up below the background level was necessary to protect human health and the environment and the clean up was in connection with an area-wide remedial action under other authorities.

The majority of the commenters, including several States, argued that the States should not bear the responsibility of establishing the level to which ground water should be cleaned. The commenters argued that the States do not have the financial or technical resources to undertake this task and that the lack of a federal standard would result in inconsistent standards nationally. Many commenters contended that federal standards should be established to ease the rule's burden on States and to allow States to devote State resources to making decisions on appropriate remedies. Some commenters argued against allowing States to establish GWPS on a site-by-site basis due to concerns that the State would take cost considerations (that would not ensure protection of human health and the environment) into account when setting the standard. EPA also received comments supporting and rejecting the use of MCLs as the GWPS. One State commented that all GWPS should be set at background levels or below the MCL. One commenter suggested that EPA abandon the use of MCLs in setting the GWPS because in the commenter's opinion, they are overly conservative and non-health related.

The Agency agrees that in many cases States have limited resources available to establish clean-up standards for a large number of compounds. EPA has partially addressed this concern by deleting the requirement for establishing trigger levels for all appendix II constituents prior to the initiation of ground-water monitoring (§ 258.52), and instead, today's rule is requiring the establishment of clean-up standards (i.e., ground-water protection standard) only for those compounds that have been detected in assessment monitoring (see preamble discussion on § 258.52).

In determining the approach for the ground-water protection standards in the final rule, EPA also considered the decision to provide for self-implementation. Under this approach, owners and operators are able to implement the final rule without interaction with the State.

In order to respond to public comments, as well as incorporate the Agency's self-implementing approach, today's final provisions regarding the ground-water protection standard require the ground-water protection standard to be either the MCL or background, except in approved States which may set alternative levels. While the Agency prefers to use site-specific health based standards and the use of background concentrations may be overly conservative in some cases, this approach was necessary to incorporate the self-implementing approach in today's rule.

Specifically, today's final rule requires the MSWLF owner or operator, rather than the State, to set the GWPS at the MCL or background for all appendix II constituents detected at a level above background. GWPS must be set at the MCL for all appendix II constituents for which there is a promulgated level under section 1412 of the Safe Drinking Water Act. If there is no MCL promulgated for a detected constituent, then the GWPS must be set at background. In cases where the background level is higher than the promulgated MCL for a constituent, the GWPS is to be set at the background level.

Today's rule also allows approved States to establish an alternative GWPS, for constituents without an MCL, that is an appropriate health-based level based upon specific criteria. Any alternative GWPS must be set at a level derived in a manner consistent with Agency guidelines for assessing the health risks of environmental pollutants and must be based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act Good Laboratory Practice Standards or other equivalent standards. In the case of setting an alternative GWPS for carcinogens, the alternative level must be associated with a risk level within the risk range specified by today's final rule, as discussed below. In the case where an approved State decides to set an alternative GWPS for a toxic chemical that causes an effect other than cancer or mutations, the alternative level must be equal to a concentration to which the human population could be exposed on a daily basis without appreciable risk of deleterious effects during a lifetime.

In the preamble to the proposed rule, EPA specifically requested comment on the appropriateness of the 1×10^{-4} to 1×10^{-7} risk range for carcinogens. Few comments were received specifically addressing the proposed risk range. Some commenters were concerned that the range was not protective of human health and the environment, while other commenters agreed that this range was appropriate and protective. One commenter objected to the risk range proposed by the Agency because it implied that States could not choose more protective goals. In addition to these specific comments, the Agency received many comments that argued that the proposed rule in general was too stringent and burdensome.

As mentioned above, in today's final rule the Agency is allowing approved States to set an alternative ground-water protection standard, for carcinogens, within a risk range of 1×10^{-4} to 1×10^{-6}. The Agency recommends that States use 1×10^{-6} as the point of departure for establishing the GWPS. This starting point is generally consistent with historical Agency practices. However, a variety of practical, site-specific factors (e.g., the reliability of exposure data and the weight of scientific evidence) may require that the standard deviate from this risk level. These site-specific factors will enter into the determination of where within the risk range the GWPS should be established. The risks to an individual should not exceed 1×10^{-4}. Because this alternative GWPS can only be set by approved States, and must be consistent with EPA guidelines for assessing health risks, the Agency believes that this approach is protective of human health and the environment.

Although today's final rule sets a risk range of 1×10^{-4} to 1×10^{-6}, States are not precluded from setting a more stringent standard. There may be, other site-specific exposure factors that may indicate the need to establish a risk level for a particular contaminant that is more protective than 1×10^{-6}. These site-specific exposure factors may include: Human exposure from other pathways at the facility; population sensitivities; potential impacts on environmental receptors; and cross-media impacts.

The criteria and site-specific considerations for establishing alternative GWPS by approved States are essentially the same criteria and considerations established in the proposed rule to be followed by all States when establishing the GWPS. However, in response to comment (as mentioned above, commenters were concerned States would consider cost when setting the GWPS), today's final

rule does not allow the State to consider the "reliability, effectiveness, practicability, or other relevant factors of the remedy" when establishing an alternative GWPS. The Agency eliminated this consideration from the final rule for two reasons.

First, the GWPS in today's final rule is being used somewhat differently than in the proposed rule, which established both a trigger level (an environmental- or health-based goal) and a ground-water protection standard (the actual clean-up standard set after consideration of cost, technical feasibility, etc.). As discussed earlier in this preamble, in response to comments EPA is eliminating "trigger levels" and is establishing a single standard, the GWPS, in today's final rule. As used in today's final rule, the GWPS is similar to the proposed trigger level in that it is an environmental- or health-based standard that is used as the goal for clean-up. Used in this context, it is inappropriate for remedy factors, including cost, to be considered in setting the GWPS.

However, several opportunities for considering the costs and technical feasibility are provided in today's final rule. For example, today's final rule allows the owner or operator to evaluate the costs of a remedy in assessing the corrective measures (§ 258.56(c) (3)) and to evaluate their practicable capability, including a consideration of the technical and economic capability in selecting a remedy (§ 258.57(c) (4)).

In addition, as described in this appendix (under § 258.58(b)), if the owner or operator determines that the selected remedy cannot achieve the GWPS (i.e., due to technical infeasibility), the owner or operator can explore alternative remedies and receive a certification that no current technology can achieve the GWPS. The owner or operator, however, is always responsible for controlling exposures and the source of the contamination.

h. Remediation to Below Background Levels

As proposed, the GWPS would not be set below background levels unless the State determined that clean up below background levels was necessary to protect human health and the environment and the clean up was connected with an area-wide remedial action under other authorities.

EPA received several comments from parties that were concerned that the Agency would, under some circumstances, require MSWLF owners and operators to be responsible for remediation below background levels. Commenters argued that landfill owners and operators should not be responsible for contamination that may have occurred as a result of other activities or from releases at other facilities. They further remarked that requiring clean up below background levels in effect places the cost of remediation on landfill owners and operators who are not solely responsible for the contamination.

EPA also received comments suggesting that MSWLF owners and operators should be required to be responsible for remediation below background. Some commenters argued that landfill owners and operators were legally obligated to restore the aquifer to its original condition and that the GWPS should be established to ensure this outcome.

As discussed in the preamble to the proposed rule, the Agency believes that it may not be reasonable to require the owner or operator to reduce the concentrations of hazardous constituents to below background levels. Therefore, today's final rule retains this concept and requires the owner or operator to clean up only to the background concentrations established for the MSWLF. The Agency recognizes that there may be circumstances where the ground water is contaminated by other sources upgradient, resulting in elevated background levels for the MSWLF. However, if the MSWLF is contributing to the existing contamination, today's final rule does not allow the owner or operator to ignore his contributions unless a determination is made by an approved State under § 258.57(e) that remediation is not required. Moreover, today's final rule does not preclude States from requiring an owner or operator to clean up contamination below background levels where it is warranted.

In today's final rule, EPA is requiring corrective action for ground-water releases. The legislative history accompanying section 4010 provides that a principal purpose of revising the part 257 criteria is the protection of ground and surface water and drinking water supplies. To that end, Congress directed the Agency to study the adequacy of the current solid waste disposal criteria in protecting human health and the environment from ground-water contamination (section 4010(a)). Moreover, in directing EPA to revise the existing criteria, Congress provided that such criteria revisions include ground-water monitoring as necessary to detect contamination and to allow for corrective action.

In view of the existence of other regulations providing for controls of other types of releases to other environmental media, the Agency believes it is adequately protecting human health and the environment by limiting the scope of the corrective action requirements in this rule to ground water releases. The Agency also intends to further study releases to soil and surface water by municipal solid waste landfills and make future revisions to the Criteria to require corrective action for these media. In the meantime, today's final rule includes several provisions to protect surface waters. Specifically, today's final rule requires run on/run off controls and requires that any discharge of pollutants from a MSWLF into waters of the United States must comply with regulations developed under the Clean Water Act. Furthermore, today's final rule includes location standards with respect to wetlands and floodplains.

Congress also has provided authority for controlling releases to other media under a number of statutes. The Clean Water Act (CWA) and Clean Air Act (CAA) can be used to address releases into surface water and air. The Federal Water Pollution Control Act can be used to address point and nonpoint releases to "waters of the United States" because it grants authorities for addressing surface water releases. The CAA can be used to address releases of some hazardous substances and particulates to the air. While the CAA is not directed specifically at the waste management industry, its authorities can be used to address releases to the air from waste management facilities. On May 30, 1991, EPA proposed New Source Performance Standards and Emission Guidelines for MSWLFs under the CAA to control emissions of non-methane organic compounds that contribute to ambient ozone problems and are a source of air toxics. A portion of the CAA program, the National Emission Standards for Hazardous Air Pollutants (NESHAPs) program has specified maximum emission levels for a number of particularly hazardous constituents. Furthermore, the Federal CERCLA program and other similar State-authorized clean-up programs can be used to address all media, though these programs are generally not preventative or regulatory in nature, and thus these authorities are typically used when there are no responsible parties available to clean up landfills that are no longer in operation.

The following is a discussion of the corrective action program. This section reviews the requirements to assess corrective measures (§ 258.56), to select a remedy (§ 258.57), and implement corrective action (§ 258.58).

8. Section 258.56 Assessment of Corrective Measures

Under the proposed rule, assessment of corrective measures would be required when any of the constituents listed in appendix II have been detected at statistically significant levels exceeding the ground water trigger levels. These trigger levels were to be health-based or environmental-based levels established by the State. The purpose of the assessment was to study potential corrective measures. The scope of the assessment was to be set by the State and the proposed rule specified several activities that the State could include in the study. These activities included: (1) Assessment of effectiveness of the remedy; (2) an evaluation of the performance, reliability, ease of implementation and impacts associated with the potential remedy; (3) timing of the potential remedy; (4) an estimation of costs; (5) institutional requirements; and (6) an evaluation of the public acceptability of alternatives. The State could also require the owner or operator to evaluate one or more specific potential remedies because the State could have knowledge of successful technologies used at other landfills with similar contamination problems. The proposed rule required that the owner or operator submit a report to the State on the assessment so that the State could choose which remedy should be implemented. The proposal also included a provision allowing the State to require the owner or operator to initiate interim corrective measures when necessary.

Comments on the concept of ground-water trigger levels and the Phase I and II structure of the ground-water monitoring program were discussed earlier in this appendix. Other general comments on the proposed § 258.56 approach and the Agency's response are summarized in the following discussion.

Several commenters identified a need for the assessment of the risk posed to human health and the environment by the release prior to proceeding with the corrective measures step. However, in attempting to simplify and streamline the corrective action program, the Agency did not incorporate the commenters' suggestions for a risk identification program. The Agency has allowed for an evaluation of the potential threats presented by ground-water contamination prior to requiring corrective action. For example, § 258.55(j) allows an approved State to consider exposure threats to sensitive environmental receptors and other site-specific exposure of potential exposure to ground water when setting the ground-water-protection standard; which is the level the selected remedy must achieve. Additionally, the owner or operator is given the opportunity, by § 258.55(g) (2), to demonstrate that the contamination is resulting from a source other than the landfill. Furthermore, several risk factors are evaluated during the remedy selection phase, such as magnitude of reduction of existing risks and potential for exposure of humans and environmental receptors.

Other commenters expressed support for the consideration of cost as a practical remedy assessment criteria (§ 258.56(c)(4)). The Agency is finalizing this criteria unmodified as § 258.56(c)(3). The Agency believes that the practicable capability of the owner or operator, including the capability to finance and manage a corrective action program, is an appropriate consideration in selection of a remedy, and cost, therefore, is an appropriate consideration for assessing corrective measures.

Several commenters expressed concern regarding the lack of deadlines to complete the required studies, arguing that the lack of deadlines would provide an opportunity for considerable delays before corrective measures are implemented. The Agency understands the commenters' concerns, but as previously mentioned, realizes that the extent of the corrective measure study must be commensurate with the complexity of the site. Recognizing the diversity of hydrogeologic characteristics and environmental problems, the Agency structured the corrective action program to provide flexibility in conducting the corrective measure study, while still requiring under § 258.56(a) that the assessment be completed within a reasonable timeframe. States are free to establish timeframes they deem appropriate.

One commenter suggested that the regulations should contain a bias to suspend operations. The final rule does not specifically identify conditions that call for the suspension of operations (or dictate any other specific corrective measures). The Agency has attempted to construct corrective action provisions which are broad and flexible enough to address the diversity of facilities, regional and site-specific considerations, technological approaches to corrective action, and remedial challenges without limiting remedial options or dictating pragmatically impossible solutions. Further, the Agency believes that automatic suspension of operations are generally unnecessary as a response to most releases and could cause serious disruptions in the solid waste management industry due to a reduction in disposal capacity, which is contrary to Congressional directives. While it will be appropriate under certain serious release scenarios to take significant and rapid remedial actions, the Agency believes that a bias for automatic closure of the MSWLF is unwarranted in most cases.

Another commenter was concerned that, as proposed, § 258.56(c)(6) did not expressly require public participation in the evaluation of corrective measures or the remedy selection process. This provision required that the assessment of potential remedies include an evaluation of public acceptability. The Agency agrees with the commenter that the public should be actively involved in the evaluation of corrective measures. The public, particularly in the vicinity of the facility, has a vested interest in the protection and remediation of the local environment. Therefore, § 258.56(d) of today's final rule requires the owner or operator to discuss potential remedies at a public meeting prior to the selection of a remedy. This requirement is intended to promote active and effective communication between the interested public, the owner or operator, and where appropriate, the responsible State regulatory agency.

As a result of the public comments discussed above and in previous sections of today's notice, the proposed approach to the assessment of corrective measures has been modified. Today's final rule requires the owner or operator to initiate assessment of corrective measures within 90 days of detecting any of the constituents listed in appendix II at statistically significant levels exceeding the ground-water protection standards (§ 258.56(a)). The purpose of the assessment is to study potential corrective measures. Section 258.56(a), as finalized, differs from the proposed approach in that it must be initiated when the ground-water protection standard is exceeded, rather than when the proposed ground-water trigger level is exceeded. The replacement of the trigger levels with the ground-water protection standards has been discussed earlier in this appendix.

Section 258.56(c), as proposed, has been replaced with proposed § 258.56(c)(1). The effect of this change, reflecting the self-implementing approach of today's final rule, is that the scope of the assessment is no longer set by the State. The removal of required State involvement has been discussed earlier in today's notice. However, the Agency

anticipates that most States will participate in the corrective action process and will play a role in setting the scope of the assessment.

As in the proposed rule, the final version of § 258.56(c) requires the owner or operator to assess the effectiveness of potential remedies in meeting the objectives of § 258.57 by addressing at least: (1) Performance, reliability, ease of implementation, and potential impacts; (2) the time requirements; (3) costs; and (4) institutional requirements.

In evaluating the performance, reliability, ease of implementation, and potential impacts of each remedy, the owner or operator should evaluate the appropriateness of specific remedial technologies to the problem being addressed and the ability of those technologies to achieve the GWPS. Analysis of a remedy's reliability should include an assessment of the effectiveness of the remedy in controlling the source of the release and its long-term reliability. EPA believes that long-term reliability of remedies is essential in ensuring protection of human health and the environment. Construction and operation requirements also should be evaluated. Finally, the owner or operator also should assess whether the remedy will cause intermedia transfer of contaminants.

The second criteria, timing of potential remedies, should include an evaluation of construction, start-up, and completion time. Timing is particularly important if contamination has migrated off-site. Cost is the third listed factor to be evaluated and may become important in the remedy selection process when evaluating alternative remedies that will achieve the same level of protection. EPA does not believe, however, that cost should be a determinative factor in assessing alternative remedies when they do not achieve the same level of protection. Finally, institutional requirements, such as local permit or public health requirements, may affect implementation of the remedies evaluated and should be assessed by the owner or operator.

Section 258.56, as finalized, does not include proposed § 258.56(d) through (f). These proposed regulations would have provided States with the authority to direct owners or operators to include certain remedies in the corrective measures assessment, required owners and operators to submit the corrective measures assessment study and direct the State to select a remedy, and allowed the State to require owners and operators to perform interim corrective actions. These proposals have been deleted as part of the self-implementing approach of the regulations finalized today. States may, however, adopt these types of requirements as part of State regulatory programs.

9. Section 258.57 Selection of Remedy

As proposed, § 258.57 outlined the general requirements for selection of remedies for MSWLFs. As structured, it established four basic criteria (§ 258.57(b)(1–4)) that all remedies had to meet. As proposed, these criteria would have required that States choose remedies that: (1) Are protective of human health and the environment; (2) attain the ground-water protection standard; (3) control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of Appendix II constituents into the environment that may pose a threat to human health or the environment; and (4) comply with the specified standards for management of wastes. These criteria reflect the major technical components of remedies: cleanup of releases, source control, and management of wastes that are generated by remedial activities.

The proposed rule also specified decision criteria (§ 258.57(c)(1–5)) that would be considered by the State in selecting the most appropriate remedy: (1) Long and short term effectiveness, and degree of certainty of success; (2) effectiveness of remedy in controlling the source to reduce further releases; (3) ease or difficulty of implementation; (4) practicable capability of owner or operator, including technical and economic capability; and (5) community concerns. Additionally, the proposed rule outlined eight factors for setting schedules for initiating and completing remedies (§ 258.57(d)(1–6)). These factors include: (1) Extent and nature of contamination; (2) practical capabilities of remedial technologies; (3) availability of treatment or disposal capacity for wastes to be managed as part of the remedy; (4) desirability of utilizing emerging technologies not yet widely available; (5) potential risks to human health and the environment; (6) resource value of the aquifer; (7) practicable capability of the owner or operator; and (8) other relevant factors.

Proposed § 258.57 also included requirements for setting the ground-water protection standard (§ 258.57(e)), which, as discussed earlier, has been finalized as § 258.55(i) and (j). Section 258.57(f) proposed three remediation waiver options and § 258.57(g) provided States with the authority to require remediation despite a § 258.57(f) demonstration. Section 258.57(h) proposed specific requirements for achieving compliance.

Public comments were received on various aspects of the proposed remedy selection requirements: The scope of source control (§ 258.57(b)(3)); the practicable capability remedy selection factor (§ 258.57(c)(4)); the proposed approach to implementation schedules (§ 258.57(d)); the remediation waiver proposed under § 258.57(f); and the lack of public review or comment provisions on the selected corrective action remedy and schedule. Each of these areas are discussed further below.

a. Source Control

The proposed rule, § 258.57(b), required the State to select a remedy meeting four standards. One of these standards, § 258.57(b)(3), required that remedies control the source of the release so as to reduce or eliminate, to the maximum extent practicable, further releases of appendix II constituents into the environment. One commenter expressed concern that § 258.57(b)(3) does not limit the concept of source control to exclude disinterment and redisposal, despite preamble language identifying less disruptive types of source control. The commenter believes that such a limitation is necessary in light of the Agency and Congressional goal of avoiding disruption of solid waste management operations.

While the Agency agrees with the commenter that disinterment and redisposal are not the primary forms of source control envisioned in this subparagraph, there may be certain extreme cases where, due to the importance of the threatened aquifer or fragility of the underlying geology (such as Karst terranes), the most effective and expedient form of source control may be disinterment and redisposal. Thus, in keeping with the Agency's goal of providing flexible and broad criteria, today's final rule does not limit the definition of source control to exclude any specific types of remediation.

b. Practicable Capability

When selecting a remedy, § 258.57(c) of the proposed rule required the State to consider five factors. These factors were meant to aid the State in evaluating the data generated as a result of the corrective measures study. The Agency recognized that their relative importance in the decisionmaking process would vary from facility to facility.

The first two factors, long and short term effectiveness and reduction of future releases, are a measure of whether human health and the

environment will be protected while the remedy is being implemented and once it is completed. They also are a measure of whether the ground-water protection standard can be met. The third factor, implementability, is a measure of the variables affecting start-up of the remedy such as difficulty of construction, availability of equipment, and local permit requirements. The fourth factor, practicable capability, includes both the economic and technical capability of the owner or operator. The fifth factor, community concerns, requires the owner or operator to consider possible public reaction to the potential remedy selected.

One of these factors, § 258.57(c)(4), allowed the State to evaluate and consider the practicable capability of the owner or operator including a consideration of the technical and economic capability. Many comments were received on the ability of States to consider the practicable capability of MSWLF owners and operators when selecting a corrective action remedy. Half of the commenters supported consideration of practicable capability when selecting a remedy while the remainder of the commenters argued that practicable capability was not relevant in selecting a remedy. Instead they argued that selection of a remedy should be based solely on protection of human health and the environment.

The Agency believes that the practicable capabilities of the owner or operator to implement the corrective action program are vital to the overall success of the program. If the owner or operator cannot properly support and administer all phases of the corrective action program, the goals (protection of human health and the environment) may not be met, resulting in wasted expenditures of resources and continued environmental degradation. Consideration of practicable capability allows for the selection of the achievable remedy or combination of remedies that can meet the overall goal of protection of human health and the environment. Therefore, § 258.57(c)(4) of today's final rule continues to allow for the consideration of the practicable capability of owners and operators when selecting a remedy.

The Agency believes, however, that the evaluation factors provided by § 258.57(c), including practicable capability, are secondary to the standards of § 258.57(b) that require remedies to be protective of human health and the environment, attain the GWPS, control the source of the release, and comply with the § 258.58(d) standards for waste management. The evaluation factors in § 258.57(c) are to be used in evaluating one or more remedies meeting the standards of § 258.58(b) as a means to select the appropriate remedy. Therefore, the use of these factors should not compromise protection of human health and the environment.

One commenter argued that Congress did not intend that practicable capability be considered in the manner in which the Agency has incorporated it in the proposed rule. The commenter stated that the Congressional Record only referred to practicable capability in the context of how the criteria could be phased in. As discussed earlier in the preamble, the Agency believes that the legislative history underlying the subtitle D statutory amendments supports the Agency's application of "practicable capability." The Agency believes that, as discussed above, the statutory language of section 4010(c) and its legislative history indicate that congress intended that the technical and economic capability of owners or operators need to be considered to avoid serious disruptions in the disposal of solid waste. The Agency also believes that the consideration of practicable capability in selecting the remedy is not meant to reduce the level of protection of human health and the environment. This is so because despite any secondary consideration given to practicable capability in selecting a remedy under § 258.57(c)(4), the remedy must always be protective of human health and the environment under § 258.57(b)(1). Section 258.57(c) of today's final rule requires the owner or operator, rather than the State, to consider the five factors listed in the proposal when selecting a remedy. This change reflects the self-implementing approach of today's final rule. Of course, EPA expects many States, including all approved States, to be involved in the review and selection of remedies.

c. Schedule for Implementation

The proposed rule required the owner or operator to assess corrective measures and the State to select a remedy when appendix II constituents had been detected at a statistically significant level exceeding the trigger level (§§ 258.56(a) and 258.57(a)). As part of the remedy selection process, the State had to specify a schedule for initiating and completing remedial activities (§ 258.57(d)). The owner or operator would then implement the selected remedy when any appendix II constituents were detected at statistically significant levels above the ground-water protection standard (§ 258.58(a)).

Because the trigger level has been eliminated by today's final rule, § 258.56(a) and 258.57(a) require the owner or operator to assess corrective measures and select a remedy when appendix II constituents are detected at a statistically significant level above the ground-water protection standard. As part of the remedy selection process, the owner or operator is required by § 258.57(d) to specify a schedule for initiating and completing remedial activities. When setting this schedule, the owner or operator is required to consider eight factors. These factors are unchanged from the proposal. Today's final rule requires the owner or operator to set the schedule because of the need to provide for a self-implementing approach to today's final rule. However, EPA expects that most States, under State law, will establish schedules with the owner or operator for initiating and completing remedial activities.

One commenter stated that EPA should establish a time frame to prevent long administrative delays in implementing corrective action remedies. However, EPA is not setting a minimum time period in which remedial activities must be initiated because of the widely varying circumstances at facilities that require corrective action. EPA is requiring instead that activities begin within a reasonable period of time. The Agency expects that many different specific factors will influence the timing of remedies. For example, there may be a delay in acquiring the level of technical expertise required to implement a particular remedial technology. However, today's rule does require an owner or operator to take interim measures necessary to ensure the protection of human health and the environment prior to implementing the selected remedy (§ 258.58(a)(3)). If the State is an approved State, the Director will be able to establish alternative procedures.

d. Remediation Waiver

In the proposed rule, under § 258.57(i), EPA identified three situations in which the State may decide not to require cleanup of hazardous constituents released to ground water from a MSWLF. These situations were limited to cases where: (1) The ground water is contaminated by multiple sources and cleanup of the MSWLF release would provide no significant reduction of risk; (2) the contaminated ground water is not a current or potential source of drinking water and is not hydraulically connected with waters to which hazardous constituents are migrating or are likely to migrate in a concentration

that would exceed the ground-water protection standards in today's rule; or (3) remediation is not technically feasible or results in cross media impacts. In any case, however, the State could impose source control requirements (e.g., covers and/or flow control measures) to minimize or eliminate further releases (see proposed § 258.57(g)). The Agency did not attempt to define "significant reduction" in risk and requested comment on whether a specific definition was necessary.

A number of comments were received on these waivers. Some commenters strongly supported the inclusion of such waivers as means of ensuring that valuable resources are applied to corrective action measures in an appropriate and effective manner. Other commenters strongly opposed the inclusion of waivers and a number of commenters objected to § 258.57(f)(1) due to the lack of a definition of "significant reduction of risk".

After considering all the comments supporting and rejecting the waivers provided by proposed § 258.57(f), the Agency decided to allow approved States to waive the clean up requirements where the ground water is already contaminated by multiple sources and clean up of the MSWLF release would, in the approved State's opinion, provide no significant reduction of risk (§ 258.57(e)). The Agency understands and anticipates that approved States will have difficulties in defining "significant reduction of risk." For this reason, EPA believes that approved States should take a conservative approach when evaluating the relevance of such a waiver. The Agency does, however, anticipate that situations will arise where an approved State will determine that remediation of a release from a MSWLF cannot be justified based upon the presence of other sources of contamination or based on other extenuating circumstances that will result in no significant decrease in the level of risk from the contamination.

Other commenters were concerned that the proposed § 258.57(f)(2)(i–iii) waivers did not account for issues that would limit the ability of a State to predict changes in populations and future improvement in treatment technologies, and to determine hydraulic connections between aquifers. They requested that the Agency reevaluate the ability of States to issue remediation waivers under proposed § 258.57(f). The Agency considered the commenters' concerns but is continuing to allow approved States to determine that remediation of a release is not required (now § 258.57(e)).

EPA realizes that it is difficult to predict changes in populations (which determine whether ground water is reasonably expected to a source of drinking water) and future improvements in treatment technologies, or to determine hydraulic connection. However, the Agency believes, as discussed in the proposal, that certain circumstances may not merit remediation and the States should have the latitude to grant waivers in such cases and avoid unnecessary and unproductive expenditures. EPA believes that such waivers are to be granted only after an owner or operator meets the heavy burden of establishing that one or more or the criteria in § 258.57(e) have been satisfied. States are not precluded from requiring owners and operators to undertake other measures (e.g., source control) once the determination has been made that remediation is not required (§ 258.57(f)).

e. Public Participation

One commenter believes that the corrective action regulations should provide an opportunity for public review or comment on the selected remedy and proposed schedule. This commenter argued that allowing public input during the assessment study is insufficient and that additional opportunities for public involvement should be provided.

The Agency agrees that public participation is important in the selection of corrective action remedies because of the high potential for exposure to the population. As discussed earlier in the preamble, public participation requirements for approved States will be dealt with in a separate State program rulemaking. In addition, with respect to today's final rule, owners and operators of MSWLFs are required to discuss potential remedies at a public meeting prior to selection of the remedy (§ 258.56(d)).

10. Section 258.58 Implementation of the Corrective Action Program

The proposed rule required the corrective action program to be implemented when any Appendix II constituents were detected at statistically significant levels above the ground-water protection standard (proposed § 258.58(a)). To implement the corrective action program, the owner or operator had to comply with several requirements. First, the owner or operator had to establish and implement a corrective-action ground-water monitoring program that would demonstrate both the effectiveness of the remedy and compliance with the GWPS. Second, the owner or operator had to implement the remedy selected by the State under § 258.57. Third, the owner or operator had to notify all persons who own or reside on the land that overlies any part of the plume of contamination. Finally, at any time the State determined that actions were necessary to protect human health or the environment, it could require the owner or operator to conduct interim measures. The remedy would be considered complete when the GWPS had been achieved and all other actions required in the remedy had been completed (e.g., source control measures). The owner or operator would be released from the corrective action requirements after the State received a certification from an independent engineer, geologist, or other qualified person, and after the State determined that the remedy was complete. If the selected remedial technology was not capable of attaining the cleanup standard after reasonable efforts had been made by the owner or operator, the proposal allowed the State to require the owner or operator to evaluate and implement alternative technologies.

The Agency received several comments addressing the implementation of the corrective action program. One commenter indicated that the proposed rule, as implemented, would be inconsistent with CERCLA's cleanup and liability provisions. The commenter stated that the proposed rule does not provide for the participation in the investigation and cleanup by parties that might be liable under CERCLA. The commenter also indicated that the proposed rule does not allow owners or operators to challenge the assumption that contamination is from the landfill and not from the surrounding area. The commenter stated that the proposed rule effectively excludes MSWLFs from the CERCLA liability scheme and replaces it with present owner liability. Finally, the commenter asserted that under the proposed rule MSWLFs may never be listed on the National Priority List (NPL).

The Agency disagrees that the proposed rule is inconsistent with CERCLA. Today's final rule under RCRA focuses on managing solid waste correctly during the operation of the facility rather than relying on CERCLA to clean up these sites in the future. The corrective action required under this rule is not CERCLA remedial action, and therefore CERCLA standards do not apply. The Agency is well aware that where a cleanup proceeds under CERCLA authority, potentially responsible parties (PRPs) normally participate in the remedial process. Under today's final rule, however, corrective action is required under

RCRA authority, and therefore, potentially responsible parties under CERCLA are not involved in implementing corrective action.

The Agency also disagrees with the commenter's assertion that the proposed rule does not allow an owner or operator to demonstrate that contamination results from a source other than the landfill facility. Under § 258.54(d)(3) of the proposed rule and § 258.54(c)(3) of today's final rule, the owner or operator is allowed to make such a demonstration.

Similarly, the Agency does not agree that today's final rule exempts municipal solid waste landfills from the CERCLA liability scheme. These landfills are subject to CERCLA requirements to the same extent as any other facility or site. The fact that corrective action may be required under RCRA does not preclude potentially responsible parties from being liable under CERCLA. If a MSWLF warrants a CERCLA response action, all those parties liable under CERCLA section 107(a) will be subject to that action. It is the Agency's intent, however, that the corrective action required under today's rule will result in a facility not being subject to CERCLA liability because a release is prevented or remediated. RCRA provides adequate authority to require corrective action for releases and the Agency believes that these corrective action requirements provide MSWLFs with the necessary incentives to manage the waste correctly. Consistent with this, under today's rule, MSWLFs are not precluded from being listed on the NPL if they warrant being so classified.

Other commenters had concerns with the costs of corrective action. They indicated that it is important that each landfill operator be able to demonstrate the ability, both fiscally and technically, to fund and implement all foreseeable corrective measures. It was suggested that some financial security should be required to ensure this capability. Commenters expressed the view that the proposed rule does not provide for any consideration of costs in the selection of the appropriate corrective action, and that it is not reasonable to ignore the issue of economic feasibility.

The Agency agrees that it is important that owners or operators be able to demonstrate the financial ability to implement corrective action. This is why the proposed rule includes a financial assurance requirement in § 258.32. This assurance requires that landfill owners or operators who must undertake a corrective action program must establish financial assurance based on a recent estimate of the cost of the corrective action program. EPA has incorporated this financial assurance provision in today's final rule at § 258.73.

The Agency does not agree with commenters that cost consideration is not provided for in the selection of appropriate corrective action. As discussed earlier in the preamble, provisions in today's final rule also address the technical capability of the owner or operator to implement a corrective action program and provide for the consideration of costs in the selection of a remedy.

Public comments also were received on the requirements for interim measures, the period of compliance, and the alternative approach discussed in the preamble to the proposed rule. Each of these areas is discussed below.

a. Interim Measures

Section 258.58(a)(4) of the proposed rule required the owner or operator to take any interim measures deemed necessary by the State to ensure the protection of human health and the environment. In determining whether interim measures are necessary, the State was to consider seven factors including: (1) The time required to develop and implement the final remedy; (2) actual or potential exposure of nearby populations or environmental receptors to hazardous constituents; (3) actual or potential contamination of drinking water supplies or sensitive ecosystems; (4) further degradation of the ground water that may occur if remedial action is not initiated expeditiously; (5) weather conditions that may cause hazardous constituents to migrate or be released; (6) 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 (7) other situations that may pose threats to human health and the environment.

One commenter stated that proposed § 258.58(a)(4) is too vague. The commenter stated that forcing a facility that is already performing corrective action to conduct interim measures may be a waste of time and money. The commenter also suggested that such interim measures should only be required where necessary to prevent an immediate threat or endangerment to human health or the environment.

The Agency disagrees that the provision authorizing interim measures is vague. The discussion in the proposed rule adequately addresses the purpose and nature of these interim measures. As noted in that discussion, such interim measures serve to mitigate actual threats and prevent potential threats from being realized while a long term, comprehensive response is being developed. Sections 258.58(a) (3) and (4) require any interim actions to be consistent, to the greatest extent practicable, with the objectives and performance of the remedy selected, and that several factors are specified that must be considered by the owner or operator in taking these measures. These both guide the owner or operator in formulating interim measures.

Interim measures may encompass a broad range of actions. For example, an owner or operator responsible for contamination of a drinking water well may make available an alternative supply of drinking water to protect human health. This replacement action could be temporary or permanent. Other interim measures can include well relocation and treating contaminated ground water at the point of use. For further guidance, the Agency refers readers to the guidance document entitled RCRA § 3008(h) Corrective Action Interim Measures (June 10, 1987; OSWER Directive 9902.4).

Although the Agency has changed the rule language regarding interim measures, this change is a result of the decision to provide for a self-implementing approach to today's final rule. Today's final rule requires owners and operators to undertake these measures, in lieu of States, but does not alter the standard for when such measures are required. Under today's final rule, interim measures are required when necessary to protect human health and the environment.

b. Alternative Remedies

In the preamble to the proposed rule, the Agency explained that circumstances may arise which could render the chosen remedy technically impracticable. Proposed § 258.58(b) provided factors that the State should consider in making this determination. These factors included: (1) The owner or operator's efforts to achieve compliance with the requirements; and (2) whether other currently available or new and innovative methods or techniques could practicably achieve compliance with the requirements for the remedy. The proposed rule allowed the State to require the owner or operator to implement alternate measures to control exposure of humans or the environment (proposed § 258.58(c)). States also were allowed to require the owner or operator to implement alternate measures for control of the sources of contamination, or for the removal or decontamination of equipment, units, devices, or structures required to implement the remedy. The Agency stated in the preamble to the

proposed rule that the ground-water protection standard would not be changed.

The Agency did not receive comments opposing this approach so it has been retained in today's final rule. Modifications have been made, however, to allow for self-implementation of the regulations. Specifically, § 258.58(b) of today's final rule allows an owner or operator to determine that compliance with requirements of § 258.57(b) are not being achieved through the selected remedy. This situation may arise, for example, when the unexpected occurrence of an area of unstable soils may make it impossible to construct the selected remedy. If such a situation arises, the owner or operator must implement other methods or techniques that could practicably achieve compliance with the requirements for the remedy.

If compliance with the remedy requirements of § 258.57(b) cannot be achieved by currently available methods, the owner or operator is required to implement other techniques or methods that can achieve compliance with the requirements. If currently available techniques cannot practically achieve compliance, § 258.58(c) requires the owner or operator to: (1) Obtain the certification of a qualified ground-water scientist or the Approval of the Director of an approved State; (2) implement alternate measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment; and (3) implement alternate measures for control of the sources of contamination, or for removal or decontamination of equipment, units, devices, or structures that are technically practicable and consistent with the overall objective of the remedy. Prior to implementing alternate measures, the owner or operator is required to notify the State and place a report in the facility's operating record justifying the alternative measure.

c. Period of Compliance

The Agency proposed that the State specify in the remedy the requirements for achieving compliance with the ground-water protection standard (§ 258.57(h)). These requirements included: (1) The ground-water protection standard be achieved at all points within the plume of contamination that lie beyond the ground-water monitoring system; and (2) the time necessary for the owner or operator to demonstrate that concentrations of hazardous constituents have not exceeded the ground-water protection standard. In setting an appropriate length of time, the State was to consider: (1) The extent and concentration of releases; (2) behavior characteristics of the hazardous constituents in the ground water; (3) accuracy of monitoring or modeling techniques; and (4) characteristics of the ground water.

In the preamble to the proposed rule, the Agency requested comment on the appropriateness of a minimum period of compliance as is required by the subtitle C program for hazardous waste facilities (i.e., three years). Only one commenter supported setting a minimum three year period of compliance as is required under the Subtitle C program. The remaining commenters requested that the period of compliance remain site-specific.

Because of the need to provide for a self-implementing approach to today's final rule, the Agency believes it is necessary to set a minimum period of compliance. The Agency has chosen to set the minimum compliance period at three years. However, the Agency has decided to continue to allow approved States to establish an alternative compliance period based upon site-specific conditions. When establishing an alternative compliance period, an approved State must consider the following site-specific conditions under § 258.58(e): (1) The extent and the concentration of the release; (2) the behavior characteristics of the hazardous constituents in the ground water; (3) the accuracy of monitoring or modeling techniques, including any seasonal, meteorological, or other environmental variabilities that may affect the accuracy; and (4) the characteristics of the ground water.

In summary, § 258.58(e) of today's final rule requires that the ground-water protection standard be achieved for a period of three consecutive years at all points within the plume of contamination that lie beyond the ground-water monitoring system unless an alternative period of time is established by an approved State. Approved States may set an alternative period of compliance after taking site-specific conditions into consideration. In demonstrating compliance with the ground-water protection standard, the owner or operator is required to use the statistical procedures promulgated today in § 258.53.

d. Alternative Approach

In the proposal, the Agency outlined and requested comment on an alternative approach to the proposed corrective action program which would have established fewer specific federal requirements for cleanup. It involved the following steps: (1) Any concentration of hazardous constituents in the ground water above trigger levels would be reported to the State; (2) the nature and extent of the contamination would be investigated; and (3) all necessary actions to abate any immediate risks to human health and the environment would be taken. After the owner or operator submitted the results of the investigation, the State would assess, on a site-specific basis, the risks to human health and the environment posed by the ground-water contamination. Based on this assessment, the State would set site-specific requirements for clean up of the ground water (including clean up levels). Next, the owner or operator would be required to submit a plan for attaining the cleanup requirements to the State for approval. The owner or operator would then implement the approved plan. Modification to the plan would be allowed based on site-specific considerations.

Two commenters indicated that they support the alternative approach discussed above. One commenter asserted that this alternative approach would be equally protective and somewhat more cost-effective than the proposed approach. After consideration of this alternative approach, the Agency has rejected it for two reasons. First, EPA believes the proposed approach is more protective of human health and the environment than the alternative approach because it more clearly defines the clean up levels and factors to be considered in evaluating and selecting appropriate remedies. Second, because of the site-specific risk evaluations required by the alternative approach, the Agency believes that States could spend a substantial amount of time reviewing plans and risk assessments and setting site-specific clean up goals, which would result in significant expenditures of resources. Therefore, the Agency believes that today's final rule, which is self-implementing, is more cost-effective than the alternative approach outlined above. As a result, today's final rule does not incorporate the alternative approach.

Appendix G—Supplemental Information for Subpart F—Closure and Post-Closure Care

Because of the potential threats to human health and the environment posed by municipal solid waste landfills that are not adequately closed and maintained after closure, the Agency specified minimum standards for closure and post-closure care in the proposed criteria. The proposed criteria included

a closure performance standard, a cover design requirement, the requirement to prepare closure and post-closure plans, and closure and post-closure care certification requirements. Following closure of each unit, the proposed criteria would require owners or operators to conduct post-closure care comprised of two phases. All owners or operators were subject to a minimum of 30 years of post-closure care (Phase I); following the 30-year Phase I program, owners or operators were required to continue those post-closure care activities deemed necessary by the State. The duration of this second period was also to be determined by the State. Under the proposal, the States would be given the authority to specify certain closure and post-closure care requirements, such as deadlines and procedures for submitting and approving plans, and certification procedures.

The Agency received numerous comments on these proposed criteria. While commenters generally favored the Agency's proposed requirements for closure and post-closure plans and the proposed approach of deferring to the States for many of the procedural requirements (e.g., deadlines for submitting plans, procedures for reviewing and approving plans), the Agency received numerous comments on the closure performance standard, certification procedures, and the length of the post-closure care period. In response to these comments, today's final rule incorporates some revisions to the closure and post-closure care criteria which are discussed below. Consistent with other sections of today's rule, the final closure and post-closure care criteria are self-implementing (see section III of today's preamble for discussion of this issue). Finally, the final rule includes a number of other clarifying changes that do not significantly alter the intent of the proposed criteria. For example, the closure and post-closure care requirements proposed in subparts D and E have been consolidated and moved to subpart F of the final Criteria and have been renumbered accordingly.

1. Section 258.60(a) Closure Performance Standard

Proposed § 258.30(a) would provide for a two-part health-based closure performance standard applicable to all municipal solid waste landfill units, which was designed to ensure the long-term protection of human health and the environment. First, the proposal would require the owner or operator to close each unit of a municipal solid waste landfill (i.e., each discrete cell or trench) in a manner that minimized the need for further maintenance after operations cease. Second, the proposal specified that closure activities must minimize the formation and release of leachate and explosive gases to air, surface water and ground water after closure to the extent necessary to protect human health and the environment.

Owners or operators would be required to describe the methods and procedures necessary to close each unit in accordance with this performance standard in the closure plan. The proposal specified that the plan would be approved by the States. The Agency believed that this approach would allow States the flexibility to incorporate existing State closure regulations and to require more specific technical closure standards if they believed such standards were necessary.

The Agency received mixed comments on the proposed closure performance standard. Many commenters supported the flexibility in the proposed standard because it would allow States to account for site-specific conditions in incorporating standards on a case-by-case basis, and would allow owners or operators to select the most cost-effective closure alternative. Other commenters, however, expressed concern that the proposed closure performance standard was too vague to be enforceable and noted in particular the ambiguity of the phrases "minimize the formation and release of leachate and explosive gases" and "to the extent necessary to protect human health and the environment." Others noted that the vagueness of the standard would not ensure that all States would implement a program that affords an acceptable minimum level of protection. It was also suggested that the closure criteria should be self-implementing, using the subtitle C interim status program as a model.

The Agency agrees with commenters that the proposed closure performance standard was too vague to be easily implemented by owners and operators of MSWLFs or enforced by States, by EPA in States found to have inadequate programs, or through citizen suits, particularly since the final rule utilizes a self-implementing approach. Therefore, consistent with the approach in today's rule of providing for the self-implementation of the revised criteria, the Agency has decided to adopt a specific final cover design standard in lieu of a general closure performance standard. Also consistent with the approach taken under today's rule, the Agency is providing greater flexibility, in approved States, by allowing the use of an alternate cover design that is equally as protective as the design specified in today's rule and is approved by the Director of the approved State. This design standard is discussed in greater detail in the final cover section below.

2. Section 258.60 (a) and (b) Final Cover Design

a. Overview of Approach

In addition to the closure performance standard in § 258.30(a), the Agency proposed specific final cover requirements in § 258.40 (b) and (c). As proposed in § 258.40(b), new units and lateral expansions would be required to be designed with liners, leachate collection systems, and final covers, as necessary, to meet a State-specified ground-water carcinogenic risk level with an excess lifetime cancer risk level (due to continuous lifetime exposure) within the 1×10^{-4} to 1×10^{-7} range. Under this proposed approach for new units and lateral expansions, it was envisioned that liners, leachate collection systems, and final covers would work together as a system in meeting the State-specified risk level. The Agency proposed a separate final cover requirement for existing units in § 258.40(c) because EPA believed that the risk-based approach proposed for new units and lateral expansions was inappropriate for existing units for several reasons described in detail in the preamble to the proposed rule (see 53 FR 33351). Therefore, the proposal would have required existing units, to install a final cover system that prevented infiltration of liquids through the cover and into the waste.

The Agency received numerous comments on the proposed risk-based final cover standards for new units and lateral expansions. Most commenters opposed the proposed risk-based approach for final covers for many of the same reasons they opposed this approach for liners and leachate collection systems (see appendix E of today's preamble); these commenters recommended that the Agency promulgate a minimum design for the final cover. Some contended that the risk-based final cover requirement proposed for new units and lateral expansions does not establish a minimum standard and is subject to the inherent uncertainties of risk analysis and risk assessment models. Others argued that minimum standards are necessary to make the closure requirements enforceable, and that a risk range does not ensure consistent implementation among States and may result in some facilities posing higher

risks than others. Several commenters noted that the risk-based approach would be very expensive for owners or operators because of the data they would need to generate to demonstrate the adequacy of the final cover, and suggested specifying a minimum design standard to minimize the costs. Other commenters were concerned that the proposed final cover requirements could imply the need to install a Subtitle C type cover and argued that a final cover of five feet of clay would be too costly because of the added expense of trucking in additional clay. These commenters suggested that a cover with a minimum of two feet of clay would be adequate to protect human health and the environment. Commenters also argued that the cost of complying with the proposed risk-based standard would force unscheduled closure of MSWLFs.

Many commenters also opposed the final cover requirements specified for existing MSWLF units. These commenters noted that the final cover standard proposed in § 258.40 for existing units specified that the final cover must prevent the infiltration of liquid, which is a more stringent standard than the language in the proposed performance standard in § 258.30, which would require that closure minimize the formation and release of leachate. These commenters strongly recommended that the Agency require that the closure standards minimize the formation and release of leachate, contending that a prevention standard is overly stringent.

The Agency received a variety of suggestions for final cover designs. A few commenters recommended that the criteria should define a minimum infiltration rate for the final cover system, suggesting, for example, a final cover permeability which is equal to or less than the bottom liner specification in order to prevent a "bathtub effect." These commenters also suggested that, in cases where the existing unit does not have a liner, the final cover system should have either a minimum standard of six inches of clay with a permeability level of 1×10^{-8} cm/sec, or a comparable puncture resistant flexible membrane liner having the same standards as those established for bottom liner systems. Other commenters suggested a variety of other cover designs including the design described in the subtitle C guidance manual entitled "Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments," July 1989, EPA/530-SW-89-047. The final cover design described in this document requires that final covers meet a number of performance criteria including a permeability no greater than the bottom liner, and other types of composite cover designs (e.g., synthetic liners with clay and gas venting layers). Another commenter recommended that the Agency use the design in the subtitle C guidance as a model in developing cover requirements and allow variances to the uniform design only to owners or operators who can demonstrate that less stringent closure standards will adequately protect human health and the environment.

The Agency agrees with commenters who recommended that some minimum final cover design standard is necessary to ensure that a baseline, acceptable final cover is installed at all MSWLF units and to ensure enforceability of the requirements. In addition, as discussed in appendix D of today's preamble, EPA agrees that the proposed risk-based approach for facility design and closure would present significant implementation difficulties for owners or operators. Therefore, in response to these comments and consistent with the provision of self-implementing standards throughout today's rule, the Agency has replaced the proposed approaches for new units, lateral expansions, and existing units with a single final cover requirement applicable to all MSWLF units, including new MSWLF units, lateral expansions, and existing MSWLF units. This requirement is set forth in § 258.60(a) which specifies that all MSWLF units must have a final cover designed to minimize infiltration and erosion. Section 258.60(a) further specifies clear minimal design criteria for the infiltration and erosion layers, while § 258.60(b) specifies that the Director of an approved State may approve alternative final cover systems that meet certain criteria. Each of these elements of today's standard is discussed in more detail below.

The Agency selected this approach to the final cover requirement for several reasons. First, the Agency believes that the specific infiltration and erosion layer requirements (discussed below) are the minimum necessary to be protective of human health and the environment. Second, today's approach is generally consistent with State programs, thus minimizing disruption of or inconsistencies with existing State programs, while providing protection of human health and the environment.

Furthermore, EPA believes today's final approach effectively addresses many of the concerns expressed by commenters. Specifically, today's approach provides a clear, enforceable standard that will ensure baseline protection to all MSWLF units. These clear standards also will reduce the resources needed by owners and operators and States in implementing the final cover requirements. In addition, today's approach incorporates flexibility by allowing the Director of an approved State to approve alternative final covers.

b. Rationale for Specific Elements of Final Cover Standard

As indicated above, today's final cover requirements include two elements: Infiltration layer and erosion layer criteria. § 258.60(a)(1) requires that the infiltration layer be comprised of a minimum of 18 inches of earthen material that has a permeability less than or equal to the bottom liner or natural subsoils. The Agency included this permeability standard to prevent the "bathtub effect," mentioned by commenters, which would greatly increase the potential for the formation and migration of leachate. The Agency also shared the concerns expressed by commenters that this permeability standard linked to the bottom liner's permeability would allow owners or operators of existing MSWLF units with poor or nonexistent liner systems to install very permeable final covers. Therefore, the Agency also has included in today's rule the additional requirement that the cover have a permeability no greater than 1×10^{-5} cm/sec regardless of the permeability of the bottom liner.

The second element of today's final cover requirement is an erosion layer that must consist of a minimum of six inches of earthen material that is capable of sustaining native plant growth. Prevention of erosion is necessary to prevent degradation of the cover that would ultimately increase infiltration and formation of leachate. In selecting the components of the infiltration layer (i.e., 18 inches of earthen material with permeability no greater than 1×10^{-5} cm/sec) and the erosion layer (i.e., six inches of earthen material capable of sustaining native plant growth), EPA considered final cover designs suggested by commenters as well as current State standards and experiences. As mentioned earlier, while some commenters suggested final cover designs similar to those recommended for subtitle C facilities, others argued that a two foot final cover would be protective for MSWLFs. In addition, over 40 States require at least two feet of final cover material for MSWLFs and many specifically require infiltration and erosion layers. Finally, while the final cover permeability

standards vary by State, some States require a permeability of less than 1×10^{-5} cm/sec.

After review of commenters suggestions and current State approaches, EPA concluded that today's minimum infiltration and erosion layer requirements will be protective of human health and the environment, while at the same time be within the practicable capability of owners and operators of MSWLFs. EPA found that more stringent final covers, such as those recommended for subtitle C facilities, would be substantially more costly than today's final requirements. These higher costs would likely contribute significantly to making today's rule beyond the practicable capability of MSWLF owners or operators (see Regulatory Impact Analysis results in section III.B of today's preamble).

Finally, § 258.60(b) of today's rule allows the Director of an approved State to approve alternative final covers that include infiltration and erosion layers that achieve equivalent performance as the minimum designs specified in § 258.60(a). The Agency included this provision to provide an opportunity to incorporate technology improvements and to address site-specific conditions. Because the Agency believes these alternative designs must be reviewed and approved by an approved State, the opportunity for alternative designs will not be available for owners and operators of MSWLFs in States without EPA-approved permitting programs.

3. Sections 258.60(c) and 258.61(c) Closure and Post-Closure Care Plans

a. General Contents of Plans

Sections 258.30(b) and 258.31(c) of the proposal would require all owners and operators of municipal solid waste landfills to prepare written closure and post-closure plans describing how the facility would be closed in accordance with the closure performance standard, and maintained after closure. The Director of an approved State may specify alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements for these plans or any analytical data from closure and post-closure. The closure and post-closure plans would describe the activities required to meet the closure performance standard and the post-closure care requirements, and would provide a basis for establishing site-specific cost estimates used to determine the amount of financial assurance required.

The Agency specified in § 258.30(b)(1)–(5) the minimum information that must be included in a closure plan. This information included: a description of the methods, procedures, and processes necessary to close the landfill in accordance with the closure performance standard, including decontamination procedures; an estimate of the maximum extent of operation that would be open during the active life of the landfill; an estimate of the maximum inventory of wastes ever on-site over the landfill's life; a description of the final cover in accordance with the design criteria proposed in § 258.40; and a schedule for completing all of these activities.

As proposed, the post-closure plan would have to describe the monitoring and maintenance activities to be conducted during the two-phase post-closure care period, as well as the frequency with which these activities would be performed. Maintenance activities consist mainly of routine maintenance such as mowing, fertilization, and erosion and rodent control. EPA also proposed that the post-closure plan include the name, address, and telephone number of the person or office to contact about the landfill during both phases of post-closure care, and a description of the planned uses of the property after closure.

Comments on the types of information and level of detail in the plans were varied. Some commenters argued for more specificity in the closure plan requirements, including submission of detailed engineering plans. Commenters also suggested that plans be prepared by a professional engineer, and that a certified operator be responsible for the site. In contrast, other commenters contended that the proposed rule's requirements were too detailed and extensive and that EPA should allow for more flexibility in the content of the plans in order to account for site-specific considerations. Others suggested that decisions on the level of detail in the plans be left to the States.

Upon consideration of these comments, the Agency is finalizing the requirements applicable to the contents of closure and post-closure care plans in §§ 258.60(c) and 258.61(c) as proposed, with two changes discussed below in Section c on decontamination and section d on estimates of maximum extent of operation and maximum inventory. The Agency continues to believe that the level of detail required in the plans represents the minimum level necessary to ensure adequate planning by the owner or operator, to provide criteria for evaluating the adequacy of these plans, and to ensure the enforceability of closure requirements by citizen suits. The Agency disagrees that the proposed requirements would restrict the flexibility of owners or operators in preparing the plans or limit a State's discretion in evaluating the adequacy of these plans. The requirements would require an owner or operator to provide extensive detail about the types of activities that will be undertaken to meet the closure and post-closure criteria; however, most of the specific activities are left up to the owner or operator, thus allowing him to incorporate site-specific conditions. Similarly, States with approved programs will have sufficient flexibility in evaluating the adequacy of these plans.

The Agency recognizes the concerns of commenters about the need for specificity in the closure and post-closure plans, particularly since these requirements will be self-implementing. The closure and post-closure plans are critical documents for ensuring that owners or operators of municipal solid waste landfills have adequately planned for the necessary activities to ensure that all units are closed in a manner that provides adequate protection of human health and the environment. Also, closure and post-closure care plans provide the basis for cost estimates that in turn establish the amount of financial responsibility that must be demonstrated. Adequate plans therefore help to ensure that owners and operators demonstrate adequate financial responsibility.

The Agency does not agree with commenters who felt that closure plans should be certified by a professional engineer. EPA believes it will be relatively easy to verify that the plan meets the requirements because the closure performance standard has been replaced in today's rule with a final cover design standard in § 258.60(a) providing very specific directions to the owner or operator. Any variations from the final cover standards in § 258.60(a) must be approved by the Director of an approved State. Therefore, EPA believes an additional requirement that the plan be certified would place an unnecessary burden on owners and operators.

The Agency does not agree with commenters who suggested that facility operators should be required to be certified. The Agency believes that the provisions in today's rule, which include a specific closure design standard, are sufficient to ensure that landfills are closed and maintained after closure in a

manner that will protect human health and the environment, thus making any additional certification requirements unnecessary. In addition, the Agency did not receive suggestions about the kinds of additional certifications that would be appropriate for operators of municipal solid waste landfills. The absence of a certification requirement for facility operators in the final rule, however, does not preclude a State from supplementing the federal criteria with additional closure and post-closure plan requirements as deemed necessary.

b. Location of Closure and Post-Closure Plans

The proposed rule specified in §§ 258.30(c) and 258.31(d) that the closure and post-closure plans must be kept at the facility or at an alternate location designated by the owner or operator. To be consistent with other recordkeeping provisions of the final rule, §§ 258.60(d) and 258.61(d) of the final rule require the closure and post-closure plans to be included in the facility operating record.

c. Decontamination of the Facility

The proposal would require that closure plans include a description of procedures for decontaminating the landfill (§ 258.30(b)(1)). The proposal did not specify the scope of this requirement or particular activities to be undertaken. Many commenters noted that the requirement was ambiguous and requested that it be clarified. For example, one commenter noted that he assumed that decontamination applied to the equipment, structures, and soils contaminated by lubricants or other similar materials. A number of commenters were uncertain about the differences between decontamination activities and corrective action and noted that they could be inconsistent. For example, one commenter contended that planning for decontamination was not practical because such plans would need to be based on the nature of the contamination, which would not be known until the contamination occurred. Other commenters were concerned that the requirement implied that the wastes from the landfill must be removed at closure and that such measures were appropriate only if the landfill posed an imminent public endangerment *and* no other options were available. *Finally*, some commenters contended that the requirement was confusing and recommended that it be deleted altogether.

The Agency recognizes that the requirement that the closure plan describe decontamination activities has caused confusion among commenters and that the ambiguity of the requirement may result in a misunderstanding of the Agency's intent. The Agency's real concern in proposing this requirement was to ensure that hazardous waste at the site would be managed adequately. Upon reconsideration, the Agency determined that the concerns regarding the receipt or management of any hazardous waste are adequately addressed in the facility operating standards (see § 258.20) and need not be included in the closure criteria. Therefore, the final rule does not require that a description of decontamination activities be included in the closure plan.

d. Estimates of Maximum Extent of Operation and Maximum Inventory

The proposal would provide that the closure plan include an estimate of the maximum extent of operation that will be open at any time during the active life of the landfill and the maximum inventory of wastes ever on site over the active life of the landfill (§ 258.30(b)(2) and (3)). Several commenters expressed confusion concerning the definition of maximum extent of operation and maximum inventory and questioned whether the proposed requirements were necessary. For example, some commenters were concerned that the maximum extent of operation was equivalent to the maximum design capacity of the entire landfill and as a result would not account for partial closures undertaken over the life of the facility. One commenter recommended requiring the plan to address the areal extent of the facility requiring final grading rather than estimates of the "maximum extent of operation" and maximum inventory.

In the preamble to the proposed criteria, the Agency explained that the estimates of the maximum extent of operation and maximum inventory ever on site over the active life of the facility are important because they are used to estimate the cost of closure and the level of financial assurance that is required. The amount of financial assurance must account for the maximum costs of closure to ensure that adequate funds are available even if closure takes place earlier than expected.

The preamble further noted that the estimate of the maximum extent of operation of the landfill must account for the largest portion of the landfill ever open at any one time over the active life of the landfill. For example, if an owner or operator routinely capped portions of the landfill as they reached capacity and never had more than one acre open at any time, then the estimate of the maximum extent of operation would be one acre. Under the proposal, an area was considered open if it was subject to the regulations and had not been closed in accordance with the closure requirements (i.e., had not been closed with a final cover that met the technical design standards).

Likewise, the estimate of maximum inventory referred to the largest amount of waste ever on site at one time that would need to be handled if closure were to occur at any time during the active life of a municipal solid waste landfill. This estimate would include any wastes stored temporarily on site (i.e., not yet disposed) and run-off from trenches or ditches associated with the landfill. The Agency expects that at most facilities, minimal inventory will be accumulated on site.

The Agency continues to believe that estimates of the maximum area of the landfill ever requiring a final cover at one time and of the maximum inventory must be included in the closure plans to ensure that owners or operators have adequately prepared for closure, including closure that might occur unexpectedly at any time. In addition, these estimates will serve as the basis for determining the amount of financial responsibility needed in order to ensure that owners and operators have adequate funds to cover the most expensive cost of closure (i.e., when the largest area of the landfill is open). Because of the confusion over the definition of "maximum extent of operation," however, the Agency is clarifying the language in the final rule by replacing the estimate of the "maximum extent of operation" with an estimate of the largest area of the MSWLF that will ever require a final cover over the active life of the facility. If an owner or operator routinely closes landfill cells as they are filled, then the plan should indicate the greatest number of cells ever open at one time. The Agency is finalizing as proposed the requirement to include an estimate of the maximum inventory ever on site in the closure plan.

The Agency wishes to reiterate that the estimate of the maximum area of the MSWLF requiring a final cover must account for all areas of the MSWLF subject to these regulations and not already closed in accordance with the § 258.60 closure requirements. Therefore, portions of the landfill that have daily cover, but not a final cover that satisfies the cover design standard, must be included in the estimate. Similarly, the estimate of the maximum inventory *must* account for the maximum amount of wastes on site (and not yet disposed) that may need to be

removed or disposed in the landfill over the life of the site, including any wastes that may be stored prior to being disposed on or off site. The Agency, however, does not intend the estimate of maximum inventory to represent the design capacity of the landfill.

e. Post-Closure Use of Landfill Property

The proposed rule would require that the post-closure plan include a description of planned future uses of the site. Section 258.31(c)(3) proposed that the post-closure use of the property could not disturb the integrity of the final cover unless the State approved the owner's or operator's demonstration that the activities (1) would not increase the potential threat to human health and the environment or (2) were necessary to reduce a threat to human health or the environment (e.g., disturbance of the final cover as part of corrective action). In the preamble, the Agency noted that a recreational park might be an acceptable use of property if the above criteria were satisfied.

The Agency received several comments regarding the use of landfill sites during the post-closure care period. One commenter supported the future use of closed sites as long as the integrity of the final cap and liner was maintained and proper monitoring continued. A few commenters opposed the subsequent use of property, noting that post-closure recreational use (e.g., use of off-road vehicles) could disturb the final cover, expose the public to toxic materials, and promote leachate generation, thereby providing inadequate protection of human health and the environment. One commenter suggested that sites not be used for at least five years and that an evaluation of the site by an independent geotechnical engineer affirming that subsidence had not occurred be required prior to any subsequent use.

Upon consideration of the comments, the Agency is finalizing the proposal substantially as proposed with changes to allow for self-implementation and to clarify the intent of the regulatory language. To ensure that corrective action measures could not be construed as inconsistent with the post-closure use of property restrictions, the proposed rule included a provision that a closed unit could be disturbed if necessary to reduce a threat to human health and the environment. To clarify this intent, the final rule replaces this language with the provision in § 258.61(c)(3) that states the owner or operator may not disturb the integrity of the final cover unless it is necessary to comply with other requirements in part 258. This clarifies that an owner or operator in an unapproved State is not precluded from initiating corrective action if needed.

While the Agency continues to believe that under very limited circumstances it may be possible or desirable to allow certain post-closure uses of land, including some recreational uses, without posing a significant threat to human health and the environment, such situations are likely to be very limited and need to be considered carefully. To ensure that activities other than those necessary to comply with part 258 are not undertaken without prior approval, the opportunity to request permission for future use of a closed MSWLF for such activities is available only to facilities located in approved States. In an approved State, the Director may approve a request from an owner or operator to disturb the final cover, liner or other component of the containment system, including removing wastes, only if the owner or operator demonstrates that such activities will not increase the potential threat to human health or the environment.

4. Sections 258.60(d) and 258.61(d) Closure and Post-Closure Plan Deadlines and Approvals

The proposed requirements for closure and post-closure plan deadlines and approvals in §§ 258.30(c) and 258.31(d) would establish the general requirement that owners or operators must prepare closure and post-closure care plans by the effective date of the regulation or upon the initial receipt of solid waste, whichever is later. The proposal would defer to the States for establishing deadlines for submitting the plans to the States. The proposal also specified that plans and any subsequent modifications to the approved plans would be approved by the States.

The Agency received a number of comments regarding the rule's deadlines for preparing closure and post-closure plans and the requirements for States to approve these plans. Most of the commenters expressed confusion about the deadlines for preparing and submitting plans. In particular, commenters questioned whether plans must be prepared or submitted by the effective date of the regulation, at some later time, or by State-specific deadlines. Some commenters noted the possibility of inconsistencies and conflicts between the proposed deadlines and State deadlines. Other commenters expressed concern that the deadline for completing plans by the effective date of the rule would not allow adequate time for many owners or operators, especially of existing facilities and those serving smaller communities, to prepare adequate plans.

Several commenters contended that without a deadline for the submittal of plans, it would be difficult to enforce compliance and ensure the development of adequate plans. One commenter suggested that States should establish schedules for submitting plans but that they should be required no later than three years after the effective date for existing facilities.

Several States expressed concern that the proposal would require them to review and approve or disapprove all plans by the effective date of the rule, which would pose an undue administrative burden on limited resources. Finally, some commenters expressed concern that the proposal did not contain specific provisions for public participation during the plan approval process.

Based on its experience in the subtitle C program, the Agency does not believe that owners or operators will face an unreasonable burden in developing plans by the effective date of the rule. In implementing similar closure and post-closure plan requirements under subtitle C, the Agency did not encounter problems for owners or operators of hazardous waste facilities who were required to prepare plans within 12 months from the promulgation date of the rule (i.e., twelve months less time than the deadlines applicable to owners or operators of municipal solid waste landfills). As noted in the preamble to the proposed criteria, much of the information required to prepare a closure and post-closure plan should be readily available to the owner or operator based on routine operating practices.

The Agency also continues to believe that procedural requirements, such as deadlines for submitting plans to the States, should be left to the States to allow them the flexibility to establish their own priorities, particularly because many States already have solid waste management programs with such procedural requirements in place.

The Agency does not agree with those commenters who asserted that without deadlines for submitting closure and post-closure plans, adequate plans may not be prepared. The Agency believes that the final rule includes a sufficient amount of specificity to allow owners or operators to prepare adequate plans.

Because of the above reasons, the Agency is finalizing the rule substantially as proposed with some changes in order to allow for self-implementation of the rule. The final rule continues to require that owners and operators prepare their closure and post-closure plans by the effective date

of the regulations or the initial receipt of waste, whichever is later. Consistent with the other recordkeeping requirements in the final rule, the owner or operator must notify the State Director that the plans have been prepared and placed in the operating record of the facility. To allow for self-implementation, the rule no longer includes the requirement that States must approve the plans.

5. Section 258.60 (f) and (g) Deadlines for Closure

a. Deadline for Beginning Closure

The Agency proposed in § 258.30(d) that owners and operators would begin closure of each landfill unit in accordance with an approved closure plan no later than 30 days after the final receipt of wastes at that unit. The proposal did not define the "final receipt of wastes"; however, in the preamble accompanying the proposed rule, the Agency encouraged States to define the final receipt of waste to preclude landfills from remaining inactive for an indefinite period of time by claiming they had not received the final shipment of waste. The Agency suggested that States adopt a standard requiring sites to begin closure within 30 days of the final receipt of waste, or no later than one year after the most recent receipt of waste if landfill capacity was available. The proposed rule would give States the discretion to grant extensions to the deadline for beginning closure, provided that the landfill unit would not pose a threat to human health or the environment.

The Agency received numerous comments on this proposed requirement. While some commenters favored the 30-day deadline, most commenters argued that the 30-day deadline for beginning closure would not be feasible or desirable under a number of circumstances, such as adverse weather conditions or unavoidable contract delays. These commenters suggested 90 days or 180 days from the date of the final receipt of waste, with allowances for extensions, contending that these longer timeframes would reduce the number of requests for extensions and pose no unreasonable risk to human health and the environment. Finally, some commenters recommended that the Agency not specify a deadline in the regulation but delegate to the States the responsibility of establishing closure schedules.

The Agency received a number of comments supporting the inclusion of extensions to the 30-day deadline to account for circumstances such as seasonal conditions that preclude initiating earthmoving activities, or landfills that have remaining capacity but are experiencing business fluctuations. Commenters also noted the need for specific criteria for granting extensions to the deadline to begin closure. Most stated that detailed criteria for granting extensions were necessary to ensure adequate protection of human health and the environment. Suggestions included specifying a time limit for which extensions may be granted to ensure that sites were closed in a timely manner, and allowing the appropriate authority to grant extensions to the deadline for beginning closure only if the owner or operator demonstrates that the unit or facility has remaining capacity, and that the owner or operator is operating, and will continue to operate, the facility in a manner that ensures the protection of human health and the environment, including complying with all applicable regulations.

In response to public comments and to make the requirements self-implementing, the final rule in § 258.60(f) requires an owner or operator to begin closure within 30 days after the final receipt of waste, or no later than one year from the most recent receipt of waste under certain circumstances. Extensions beyond the one-year deadline are available only in approved States if certain criteria are met.

The Agency continues to believe it is important to establish deadlines for triggering closure of landfills to avoid potential threats to human health and the environment posed by inactive but unclosed landfills, particularly for facilities located in unapproved States. The Agency believes that in most cases, 30 days from the final receipt of waste will provide sufficient time to begin closure activities. The Agency wishes to reiterate that the 30-day deadline refers to the beginning of closure activities and does not require that closure be completed within 30 days, or that procedures for installing the final cap necessarily begin within this 30-day deadline. Since all owners or operators will be required to have prepared closure and post-closure plans by the effective date of the regulations, the owner or operator should be prepared to begin closure procedures of each unit within the specified time frame. As discussed below, the final rule allows owners or operators, in limited circumstances, to delay closure up to one year after the most recent receipt of waste, which should minimize any burdens on owners or operators.

The Agency agrees with commenters who argued that it may be desirable to allow a unit or facility to delay closure if the landfill unit has remaining capacity. Therefore, the final rule allows an owner or operator of a landfill to delay closure up to one year from the most recent receipt of waste if the landfill unit has remaining capacity and there is a reasonable likelihood that the unit will receive additional wastes. In addition, the Director of an approved State may grant extensions beyond this one-year deadline for beginning closure under certain circumstances.

The Agency also agrees with commenters that criteria for granting extensions to the closure deadlines are important for ensuring that units or facilities do not unnecessarily delay closure if such delays would pose threats to human health and the environment. Therefore, the final rule adds criteria to § 258.60(f) and allows the Director of an approved State to grant an extension to the maximum one-year deadline to begin closure if the owner or operator demonstrates that the unit has the capacity to receive additional wastes, and he has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed landfill.

The Agency also received comments requesting clarification of the term "final receipt of wastes." The proposal stated that closure must begin within 30 days of the "final receipt of waste." Most commenters suggested that the Agency define "final receipt of wastes," arguing that the lack of a uniform definition would threaten the protection of human health and the environment by allowing sites to remain inactive for an indefinite amount of time. Suggestions included defining "final receipt of waste" as the last expected receipt of waste to account for extended periods of inactivity in rural areas and infrequently used landfills, and linking the trigger for beginning closure to design capacity to avoid forcing a landfill to close if it still has capacity and intends to receive additional wastes. Commenters argued this approach would prevent owners or operators from receiving periodic shipments of wastes solely to avoid closure even though the unit had reached its design capacity.

The Agency agrees that it is necessary to include a more explicit definition of "final receipt of waste" to ensure that closure is not deferred indefinitely. The Agency also recognizes that in some cases, a landfill may receive wastes relatively infrequently (as may be the case with small, rural landfills) but have remaining capacity. Therefore, § 258.60(f) of the final rule requires that owners or operators begin closure of

each unit within 30 days after the known final receipt of wastes or, if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes after the 30-day period, no later than one year after the date on which the unit received the most recent volume of wastes. This definition will ensure that units are closed when they are unlikely to receive any additional wastes or have no remaining capacity and, at the same time, will provide sufficient flexibility to account for routine business cycles and other business disruptions.

b. Deadlines for Completing Closure

While the proposal did not specify deadlines for completing closure, the Agency recommended in the preamble accompanying the proposed rule that States develop specific deadlines and milestones for completing closure activities. The Agency also requested comments on whether the federal criteria should include a deadline for the completion of closure.

A number of commenters supported the proposal to leave deadlines for completing closure up to the States, thus allowing the States flexibility to account for the unique situations of sites within each State (e.g., weather conditions, availability of contractors). The majority of commenters, however, recommended that a specific deadline be set for completion of closure to ensure that closure is not unnecessarily delayed. Commenters suggested a number of different deadlines: Some commenters suggested the Subtitle C requirements of 180 days with an option for extensions, and others recommended time periods of one year to one and one half years. One commenter suggested that the Subtitle C interim milestone of 90 days for managing all inventory also be incorporated into the rule's closure deadlines.

Particularly because the final rule utilizes a self-implementing approach, the Agency agrees with the commenters' concerns that including a deadline for completing closure is necessary to ensure that the completion of closure is not delayed indefinitely. Therefore, the Agency is adding § 258.60(g) to the final rule to require that closure of each unit must be completed within 180 days of the beginning of closure activities. The Agency recognizes that in limited circumstances climatic conditions and other factors may make it difficult to complete closure within 180 days. Therefore, the final rule also allows the Director of approved States to grant extensions to the 180-day deadline if the owner or operator demonstrates that closure cannot be completed within 180 days, and he has taken all steps necessary to ensure that delaying the completion of closure will not pose a threat to human health and the environment. This 180-day deadline and the option for the Director of an approved State to grant an extension under limited circumstances are consistent with the deadlines under subtitle C in 40 CFR 264.113 and 265.113. This approach is also consistent with comments submitted by a number of parties as noted above.

The Agency does not believe that it is necessary to incorporate a 90-day interim deadline for removal of inventory into the closure deadlines. The Agency does not anticipate that municipal solid waste landfills are likely to accumulate large quantities of inventory that could pose a serious threat to human health and the environment if they were not managed quickly. Furthermore, the Agency does not want to restrict State flexibility unless it is necessary to protect human health and the environment. States may wish to incorporate interim milestones in their programs to take account of site-specific or State-specific conditions (e.g., interim deadlines for installing final covers if deemed appropriate to account for special climatic conditions).

6. Section 258.60(e) Closure Notification Requirement

The proposal did not include a requirement that owners and operators notify the States of the commencement of closure. The Agency instead recommended that States develop their own closure notification requirements to allow time for facility inspections to ensure that the approved closure plan was still applicable. (The proposal would require that all closures be in accordance with an approved closure plan but would leave to the States the responsibility of establishing review procedures.)

Several commenters disagreed with the Agency's position that closure notification requirements should be deferred to the States, arguing that specific notification requirements are necessary to allow States the time to inspect facilities and ensure that the approved closure plan was applicable. In addition, commenters noted that advance notification would help to avoid inactive but unclosed sites. Commenters suggested that the Agency incorporate the requirements of Subtitle C and require notification at least 60 days prior to closure. Commenters also recommended including provisions for public participation as part of the notification requirements.

Upon consideration of the comments, the Agency decided to add a notification requirement to the final rule in § 258.60(e). The final rule requires all owners or operators (in both approved and unapproved States) to notify the State in which the facility is located prior to beginning closure of each unit, and place a notice of impending closure in the facility operating record. The Agency believes that notifying the State of closure is important to provide States and citizens an opportunity to ensure that the activities described in the closure plan are appropriate to close the unit under current conditions. This is particularly important for today's self-implementing rule because there are no requirements to approve the closure and post-closure plans prior to closure.

7. Section 258.61(a) and (b) Length of Post-Closure Care Period

The Agency proposed under § 258.31(a) that owners and operators of MSWLFs must conduct two phases of post-closure care. During the first 30 years of the post-closure care period (Phase I), the proposal would require the owner or operator to conduct routine maintenance of the final cover, conduct ground-water monitoring, continue leachate collection and gas monitoring requirements if subject to these requirements during the facility's operating life, and maintain the integrity of these monitoring systems. Leachate collection systems would be required to be operated until leachate was no longer generated.

Following completion of the first phase of post-closure care at each landfill unit, the proposed rule would require in § 258.31(b) that owners and operators of MSWLFs conduct a second, less-intensive phase of care that included, at a minimum, groundwater monitoring and gas monitoring in order to detect any contamination that might occur beyond the first 30 years of postclosure care. The proposal would leave to the States the responsibility for specifying the duration and the specific activities to be conducted during this second phase.

In the preamble to the proposed rule, the Agency requested comments on the two-phased approach, information on the frequency and timing of releases from landfills, suggestions for criteria that could be used to evaluate the length of the post-closure care periods, appropriate demonstrations for terminating the post-closure care period, and other pertinent information based on experiences with closed landfills.

Commenters were nearly unanimously opposed to the proposed length of the

post-closure care period and suggested a variety of alternatives. Several commenters argued that the minimum 30-year Phase I post-closure care period was unnecessarily long, contending that a landfill reaches equilibrium in as few as ten or fifteen years after which significant quantities of leachate and methane gas are no longer generated. Others recommended a mandatory period of five, ten or twenty years with the option to extend the time frame only if the State determined it to be necessary. Finally, some recommended granting the States more flexibility in determining the length of post-closure care period.

Several commenters specifically opposed a mandatory second phase of post-closure care asserting that additional post-closure care beyond 30 years should only be required on a case-by-case basis if a problem exists. Other commenters noted that the proposal was more stringent than subtitle C requirements, and recommended that the final rule be consistent with subtitle C and delete the second mandatory phase and allow States the discretion to reduce or extend the 30-year Phase I requirements. Granting States the discretion to increase the length of the period if necessary to protect human health and the environment on a case-by-case basis eliminates the need for a mandatory Phase II period. Many commenters also noted the economic burden of a potentially infinite Phase II post-closure care period.

In contrast, some commenters asserted that a 30-year Phase I post-closure care period was not long enough and urged the Agency to lengthen the Phase I period because leachate and gas formation may continue beyond the first 30 years after closure and releases may occur when liners and leachate collection systems fail. One commenter contended that perpetual care would likely be required. Other commenters argued that unless owners or operators continued to maintain the cover and prevent the infiltration of liquids into the landfill after the initial 30-year period, significant amounts of water would be introduced into the landfill, leachate and methane gas would be generated, and releases would likely to occur. Finally, commenters suggested that the Agency establish criteria for determining when reductions in long-term postclosure care are warranted to avoid inconsistent implementation of the requirements and to ensure that reductions are allowed only when there is no significant threat to human health and the environment.

After carefully considering the public comments received, the Agency decided to drop the two-phased approach to post-closure care, and is requiring in § 258.61(a)(1)–(4) that owners or operators conduct post-closure care activities for a period of 30 years after the closure of each MSWLF unit. Section 258.61(b) allows the Director of an approved State to extend or reduce the 30-year period based on cause. Reductions in the length of the period will only be permitted if the owner or operator demonstrates that a shorter period is sufficient to protect human health and the environment. Increases in the post-closure care period may be made if the Director of an approved State determines that the lengthened period is necessary to protect human health and the environment.

Although commenters suggested various alternative post-closure care periods, the Agency does not have data to enable it to evaluate the alternatives suggested. While one commenter submitted some data suggesting that equilibrium would generally occur ten to fifteen years after closure, this assessment was made based only on gas generation rates. No leachate data were submitted. The Agency did not receive empirical evidence demonstrating that discontinuing post-closure care after the stabilization of an MSWLF would be adequately protective of human health and the environment. The Agency also did not receive any data supporting any of the other recommended time periods, including the need for longer time periods. Therefore, the Agency does not have data at this time to support a requirement that is either more or less stringent than subtitle C requirements.

The Agency is allowing this 30-year period to be decreased or increased by the Director of an approved State to account for situations where a 30-year post-closure care period may be inappropriate based on site-specific conditions. Providing for variances in the post-closure care period in approved States allows the flexibility to accommodate differences in geology, climate, topography, resources, demographics, etc. In all cases, however, the Agency is convinced that these decisions must be reviewed carefully and be subject to State review to ensure that units are monitored and maintained for as long as is necessary to protect human health and the environment.

8. Section 258.61(a) Post-Closure Care Activities

The Agency received varied comments on the types of activities that should be undertaken during the post-closure care period. A number of commenters supported the requirements as proposed. In contrast, some commenters asserted that the requirements should be made less stringent, arguing that municipal solid waste landfills do not pose the same risk as hazardous waste landfills (e.g., MSWLFs located in rural areas). Others contended that the very large costs associated with 30 years of ground-water monitoring would be burdensome to owners or operators. Several commenters contended that the proposed post-closure criteria did not provide sufficient guidance to the States and recommended that more specific post-closure care requirements be promulgated in order to adequately protect public health.

The Agency received extensive comments on the proposed post-closure care leachate collection requirements. Several commenters objected to the requirement that owners or operators of landfills maintain and operate the leachate collection system until leachate is no longer generated, claiming that leachate may be generated in perpetuity, especially under certain climatic conditions. One commenter stated that the proposed definition of leachate as "liquid passing through or emerging from solid waste that constrains soluble, suspended or miscible material" ensures that leachate will need to be collected in perpetuity even though it may pose limited threats. Others contended that it may be environmentally acceptable to stop pumping leachate if the contaminant concentrations reach environmentally acceptable levels as determined by the State.

After consideration of the commenters' concerns, the Agency decided to finalize the proposed post-closure care activities in § 258.61(a) with one change to the leachate collection requirements as discussed below. The Agency believes that requiring owners or operators at a minimum to maintain the cover and containment systems and to continue ground-water monitoring, gas monitoring, and leachate collection is consistent with the Agency's dual goals of preventing releases of constituents and detecting releases that occur as quickly as possible.

The Agency does not believe that more specific post-closure care requirements are necessary. Many of the post-closure care activities are extensions of activities conducted during the operating life of the facility and should not require extensive facility-specific analyses. Furthermore, the final rule does not prescribe the precise activities that must be undertaken to achieve these objectives; thus, the rule provides sufficient flexibility to account for those facilities

that pose low risks to human health and the environment.

The Agency reconsidered the proposed leachate collection requirements and acknowledges that at some landfills, leachate concentrations may eventually become low enough to pose no threat to human health and the environment. However, because of the potential threats posed by leachate, the Agency believes that the decision to stop managing leachate must be reviewed and approved by the State. Therefore, the final rule in § 258.61(a)(2) requires that owners or operators continue to collect and manage leachate in accordance with the requirements of § 258.40 for 30 years consistent with all other post-closure care requirements. In an approved State, the Director may allow an owner or operator to cease managing leachate if the owner or operator demonstrates that the leachate no longer poses a threat to human health and the environment.

A few commenters argued that post-closure care activities were overly burdensome for small landfills and that such facilities should be exempt from the revised criteria. While the Agency recognizes the wide diversity in site conditions and encourages States to be flexible in evaluating post-closure care requirements on a case-by-case basis, the Agency is unwilling to grant less stringent requirements or exemptions to small landfills that otherwise do not meet the criteria for exemptions to today's rule as discussed in Section IV.A of the preamble. Without post-closure care, the probability of future contamination greatly increases. In addition, the costs of cleaning up a release that might occur in the absence of post-closure care would likely be much greater than if the site had been properly maintained and monitored and under constant surveillance.

9. Section 258.60 (i) and (j) Notation on the Deed to Property

Proposed § 258.31(e) would require that following closure of the entire landfill, the owner or operator must record a notation on the deed or some other instrument normally examined during a title search that will notify any potential purchaser in perpetuity that: (1) The land has been used as a municipal solid waste landfill, and (2) its use is restricted under § 258.31(c)(3). The proposed rule also would allow an owner or operator to request permission from the State to remove the notation if all wastes were removed from the facility.

Some commenters argued that an owner or operator should not be allowed to remove the notation from the deed under any circumstances, asserting that potential purchasers should be made aware of the full history of the site and be alerted to potential defects or liabilities associated with the land, even when all wastes have been removed. These commenters argued that the persistence and the difficulties of detecting leachate plumes and the uncertainties of evaluating the potential for future health risks further supported their recommendation of retaining the notation on the deed.

The Agency considered the commenters' concerns but disagrees that property owners should never be allowed to remove the notation on the deed and is finalizing the rule as proposed. The Agency continues to believe that if all wastes have been removed from the facility, including any contaminated ground-water and soils, then the property poses no greater threat than one that never was used to manage municipal solid waste. This provision is consistent with subtitle C requirements for hazardous waste facilities. However, the Agency strongly believes that a decision to remove the deed notation must be considered carefully and that in practice very few owners or operators will be able to take advantage of the provision. To ensure that this option is allowed only on a very limited basis, § 258.60(j) of the final rule limits the option to remove the notation to the deed to facilities located in approved States if the owner or operator can demonstrate that all wastes have been removed from the facility. To demonstrate that all wastes have been removed from the facility, the owner or operator would not only need to remove the entire contents of the landfill and its containment structures, but also demonstrate that no contamination exists in the ground water or in the soils at the facility.

Commenters also asserted that the owner or operator should be required to provide a copy of the deed and its notation to the State in order to ensure compliance and facilitate enforcement. Consistent with the provision of self-implementing standards throughout today's final rule, the Agency is requiring in § 258.60(i) that owners or operators notify the State Director that the notation on the deed has been recorded and place a copy of the notation in the facility operating record.

One commenter recommended that the requirement to include a notation on the deed be required as part of the closure requirements rather than as a post-closure care activity. The Agency acknowledges the commenter's concern that the notation on the deed be filed in a timely manner; however, in those rare circumstances where all wastes are removed as part of closure, it will be necessary to complete closure before it can be determined if a notation on the deed needs to be recorded. The Agency has made two minor changes to today's final rule to encourage owners or operators to file the deed notation quickly. First, while the requirement itself is being finalized as proposed, it is included in § 258.60(i) of the closure criteria to encourage the owner or operator to file the notation concurrent with the closure certification. Second, as discussed in appendix H of today's preamble, § 258.71(b) of the final rule specifies that an owner or operator is not released from closure financial assurance requirements until he has filed the notation on the deed. In most instances, by tying the requirement to file a notation to the deed to the release from closure financial assurance, the owner or operator will have a financial incentive to file the deed notice quickly.

10. Sections 258.60(h) and 258.61(e) Closure and Post-Closure Care Certifications

In §§ 258.30(e) and 258.31(f), the Agency proposed that following closure of each landfill unit and following completion of the second phase of the post-closure care period for each unit, owners and operators must submit certifications that closure and post-closure care activities have been performed in accordance with the approved plans. The rule would require that a "qualified party" provide objective verification, based on a direct review of the landfill, that closure and post-closure care activities had been properly completed. Upon approval of the certification by the State, the owner or operator would be released from financial responsibility requirements under § 258.32(f). The Agency would defer to the States for establishing procedures for implementing these requirements (e.g., the types of certification that would satisfy the requirements, documentation requirements, deadlines for submissions).

The Agency received numerous comments on the certification requirements. Most of the commenters favored requiring some type of certification or notification of the completion of closure and post-closure care to ensure that owners and operators close their landfills and maintain them in accordance with their approved plans, although comments on the specific requirements (e.g., how frequently to certify post-closure care, procedural requirements) were varied.

One commenter questioned how the post-closure care requirements would be implemented in the absence of the State approving the closure certification.

Some commenters recommended that certification requirements be left to the discretion of the States. Others contended that certification by a "qualified party" would not be necessary and, in fact, could be counterproductive in States where facilities are inspected on a regular basis.

The Agency continues to believe that certifications are necessary to ensure that closure and post-closure activities are performed in accordance with the closure and post-closure plans, especially because the completion of closure and post-closure care triggers the release of the owner or operator from financial assurance requirements and other requirements. Moreover, because the final rule utilizes a self-implementing approach, the Agency remains convinced that it must require certifications in the revised criteria rather than simply providing guidance to the States. Closure and post-closure care certifications provide an objective way to verify that closure and post-closure care activities have been performed in accordance with the plans.

The Agency also agrees with those commenters who favored including a notification requirement of the completion of closure and post-closure care, particularly for facilities located in unapproved States. The Agency agrees that it is important for the States to have the opportunity to review the adequacy of closure and post-closure care activities, particularly in unapproved States, and addresses this concern in two ways in the final rule. First, §§ 258.60(h) and 258.61(e) of the final rule require all owners and operators to notify the State that closure or post-closure care has been completed and certified by an independent registered professional engineer or approved by the Director of an approved State. Second, the certification must be placed in the facility operating record and thus can be reviewed to verify that closure and post-closure care have been performed in accordance with the plans. The requirement to notify the State prior to the beginning of closure combined with this subsequent notification of the completion of closure or post-closure care should help to ensure that municipal solid waste landfills are closed properly and maintained after closure.

The Agency does not believe that the lack of approval of the closure certification, particularly in unapproved States, precludes an owner or operator from conducting post-closure care. The certification requirements in the final rule are intended to be self-implementing and as a result, the owner or operator is responsible for beginning post-closure care after closure has been completed.

The Agency also disagrees with comments that certification of closure and post-closure care may be inappropriate and counterproductive in States that inspect facilities on a regular basis. Requiring an owner or operator to submit certifications following the completion of closure and post-closure care activities will not interfere with any scheduled State inspection, and in fact could help to verify the accuracy of the owner or operator's certification. At the same time, the Agency does not wish to impose any additional burdens on States' inspection capabilities, which could result if they were required to review all closure and post-closure care activities in lieu of a certification requirement.

The Agency also received a number of suggestions regarding the specific certification requirements. Many of the commenters expressed concern that the requirements to obtain a certification by a "qualified party" was too vague to be effective and recommended that independent registered professional engineer certifications be required.

The Agency agrees with commenters that objective closure and post-closure certifications are essential for avoiding any potential conflicts of interest and ensuring protection of human health and the environment and that more specific requirements concerning the qualifications of the certifying party are necessary to ensure the adequacy of the certification. The Agency, therefore, is requiring in the final rule that certifications be obtained from independent registered professional engineers (i.e., registered professional engineers not in the employ of the owner or operator), consistent with requirements under subtitle C and other federally mandated certification programs (e.g., Clean Water Act grants).

The Agency also received comments on the proposed requirements to certify closure and post-closure care on a per-unit basis and to certify the completion of post-closure care at the end of the entire post-closure care period. Some commenters supported this approach and noted that it is consistent with subtitle C. Some commenters, however, recommended requiring certification of closure only at final closure of the entire landfill and at the end of the post-closure care period for the entire landfill to reduce costs. Others suggested requiring post-closure care certifications more frequently than proposed (e.g., at least every five years) to ensure that post-closure care activities are being conducted in accordance with the approved plan.

The Agency is finalizing as proposed the requirement that closure certifications be submitted after closure of each unit. Although certifying closure of each unit rather than closure of the entire facility may be more expensive, unless closure of each unit is certified when closure is performed, it will not be possible at the time of final closure to determine if the previous closures were performed in accordance with the approved closure plan. This approach is consistent with the subtitle C closure and post-closure care requirements applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities, which require closure and post-closure by requiring certifications on a per-unit basis.

The Agency also believes that requiring one certification to be performed at the end of the post-closure care period for each unit is sufficient and is therefore finalizing this provision as proposed. Because an owner or operator must continue to monitor ground water during the post-closure care period, the State will be notified and actions will be taken if releases are detected. It should also be noted, however, that certification at the end of the post-closure care period for each unit is the minimum required under these regulations. States have the option of requiring more frequent certifications if they determine that they are necessary.

Appendix H—Supplemental Information for Subpart G—Financial Assurance Criteria

Under the proposed rule, the owner or operator of a new or existing MSWLF would be required to demonstrate financial assurance for the costs of conducting closure, post-closure care, and, as applicable, corrective action for known releases. These requirements have been retained in today's rule. Also an owner or operator would be required to demonstrate to the State that he had planned for these future costs by preparing written cost estimates based on detailed written plans required in § 258.30(b) and 258.31(c). The final rule also requires these cost estimates. Cost estimates and financial assurance documentation are required to be kept in the facility operating record. Alternative recordkeeping locations and alternative schedules for recordkeeping and notification requirements may be

established by the Director of an approved State.

While the proposed rule would require owners and operators to demonstrate financial assurance for closure, post-closure care, and corrective action for known releases, it did not specify the types of mechanisms that could be used to demonstrate financial assurance. Instead, a performance standard was proposed that specified criteria that would have to be satisfied by any mechanism that was used. In response to comments on the proposed rule, the final rule provides greater specificity concerning acceptable financial instruments, while continuing to provide States with considerable flexibility in establishing their financial assurance programs. In addition, the Agency is intending to propose under separate rulemakings a revised corporate financial test that would apply to owners or operators of MSWLFs and a financial test specifically designed for local governments.

Numerous comments were received by the Agency on the financial assurance requirements. Major issues raised by commenters are summarized below. All comments are responded to fully in the Financial Assurance Comment Response Document.

1. Section 258.70(b) Effective Date of Financial Assurance Requirements

Under the proposed rule, the financial assurance requirements would be effective on the same day as all other requirements applicable to MSWLFs, i.e., 24 months following promulgation of the final rule.

A number of commenters objected to the proposed effective date of the financial assurance requirements and suggested that the financial assurance requirements be decoupled from the rest of the rule and that the comment period be extended. In support of this suggestion, several commenters stated that it may be impossible for some local governments to meet requirements immediately if they operate on yearly budgets. Other commenters argued that facilities closing in the near future may have difficulty accumulating sufficient funds to assure 30 years of post-closure care. Another commenter argued that it was unreasonable for EPA to expect the States to have a framework in place to approve the operating and design criteria and the financial assurance mechanisms within 18 months of the final rule.

The Agency considered the commenters' concerns and agrees that additional time will help ensure the effective implementation of the financial assurance requirements. Accordingly, EPA has decided to make the financial responsibility requirements effective 6 months later than the remainder of today's rule. The financial assurance requirements contained in today's rule will be effective 30 months following publication of today's rule. The Agency agrees that owners and operators, especially local governments, may face difficulties in obtaining financial assurance mechanisms within 24 months, particularly since the proposed rule did not include a financial test designed for local governments. The 6 additional months will allow the Agency time to finalize a financial test for local governments, thus providing an additional mechanism for compliance to those members of the regulated community. Extending the effective date will also allow the financial market sufficient time to respond to new demands for financial instruments, thereby facilitating compliance and helping to ensure effective implementation of the requirements. The Agency continues to believe that the financial assurance requirements are important to the effective implementation of the overall program for management of MSWLFs. Accordingly, the Agency does not believe it is appropriate to decouple these requirements from the rest of today's rulemaking.

2. Need for Financial Assurance

As stated in the preamble to the proposed rule, EPA believes that the financial assurance requirements will help ensure that owners and operators adequately plan for the future costs of closure, post-closure care, and corrective action for known releases, and will help ensure that adequate funds will be available when needed to cover these costs if the owner or operator is unable or unwilling to do so. These benefits are similar to those derived from the subtitle C hazardous waste and subtitle I petroleum underground storage tank financial responsibility programs.

The Agency received a number of comments addressing the benefits and costs anticipated from requiring owners or operators to demonstrate financial assurance. Commenters who supported the financial assurance requirements agreed that the requirements would foster long range financial planning by MSWLF owners and operators and further argued that the requirements are minimal requirements that are necessary to provide protection for health and the environment. These commenters argued that the requirements should not have to await the development of State regulations.

Other commenters, however, did not believe that EPA had adequately established the necessity of financial assurance requirements for protecting human health and the environment from threats posed by MSWLFs. These commenters argued that MSWLFs do not pose the same hazards as subtitle C landfills, and therefore the financial assurance requirements should be less stringent than those for subtitle C facilities. A few commenters contended that the requirements would provide little benefit, while another group of commenters argued that because financial responsibility is not required by statute, it is outside EPA's Congressional mandate and has been imposed arbitrarily by the Agency.

Several commenters raised the concern that the costs associated with obtaining financial assurance instruments would be high, and in some cases, would drive out of business owners and operators who could otherwise meet technical requirements (thereby leaving the costs of closure and post-closure care unfunded), or prevent owners and operators from starting operation of new sites. Some commenters noted in particular the high costs associated with 30 years of ground-water monitoring during the post-closure care period. A number of commenters were concerned that small private operators, small local governments, and MSWLFs operated in remote and sparsely populated areas in particular would be unduly burdened by the requirements.

EPA believes that it has ample authority to require financial assurance demonstrations under today's rule. Sections 1008(a) (3), 4004(a), and 4010 of RCRA, as amended by HSWA, direct the Agency to develop criteria to protect against potential adverse impacts to human health and the environment from solid waste disposal activities. The Agency has determined that financial responsibility is a necessary component of the regulatory program and is essential to protecting human health and the environment.

The Agency has long maintained that financial responsibility requirements are an important component of any regulatory scheme, such as today's Part 258 criteria. In establishing the regulatory framework for the management of municipal solid waste, the Agency believes that inclusion of financial responsibility requirements will promote the overall statutory and regulatory goals of RCRA by encouraging the development and implementation of sound waste management practices both during and

at the end of active facility operations. Specifically, the requirements will ensure that adequate funds are available to cover the costs of closure, post-closure care, and corrective action activities, which, if not planned for, often are left unfunded. Additional governmental expenditures would then be necessary to ensure continued protection of human health and the environment.

Technical requirements are effective in protecting human health and the environment only if funds are available in a timely manner to conduct these activities. Because the costs of closure, post-closure care, and corrective action could be substantial, advance planning and earmarking of funds is necessary. Without financial assurance, there is no guarantee that the costs of closure, post-closure care, and corrective action for known releases will be borne by the responsible owner or operator. Financial assurance demonstrations also encourage owners and operators to better internalize the future costs associated with the landfills and reinforce risk management incentives, since the costs of closure and post-closure care or the need for corrective action should be less when the landfill is operated in an environmentally protective manner.

The Agency does not agree with commenters who maintain that the risks posed by MSWLFs do not warrant financial assurance requirements. Improper closure of MSWLFs has been shown to create environmental problems. Also, potential hazards, such as methane gas generation and the potential for explosions, associated with the disposal of municipal solid waste are considerable. Currently, approximately 20 percent of sites on the National Priorities List are MSWLFs. In sum, experience suggests that the potential problem of unfunded obligations at MSWLFs is significant.

In light of the clear need for financial assurance, the Agency believes that the burden of the financial assurance requirements promulgated today is neither excessive nor beyond the practicable capability of owners and operators. The financial assurance requirements in today's rule have been structured such that the assurance is required only for costs of activities that are certain to be needed, and the amount of financial assurance is based on site-specific estimates of the costs of closure, post-closure care, and corrective action. Less stringent financial assurance requirements would not ensure that adequate funds will be available when needed to cover these costs. The Agency maintains that these costs are legitimate business expenses and should be accounted for in the operating budgets of MSWLFs in order to operate efficiently.

The Agency does not believe that owners and operators will be unreasonably burdened by the costs of obtaining financial assurance mechanisms. The cost of complying with the financial assurance requirements should not be excessive and will be a relatively small part of the total costs of complying with today's rule. The requirements do not force owners or operators to immediately provide full funding of closure, post-closure care, or corrective action costs, but rather to demonstrate future availability of those funds. For example, today's rule allows trust funds to be built up gradually (see section 7.a of this appendix). By allowing an extended "pay-in" period for trust funds, the burden of funding closure, post-closure care, and corrective action obligations will be spread out over the economic life of the facility, thereby making trust funds one of the most viable financial assurance mechanisms for many owners and operators.

In addition, the Agency is providing numerous third-party alternatives to trust funds including surety bonds, letters of credit, insurance, and a guarantee. These financial instruments do not require the owner or operator to put up full funding in advance. The cost of a guarantee will be negligible for most owners and operators who are eligible to use that mechanism. The cost of obtaining the other third-party mechanisms for use in demonstrating financial assurance for subtitle C facilities is also low, estimated to be about one and a half to two percent of the obligation annually.

Finally, as discussed further in section 7.a of this appendix, in a separate rulemaking effort, the Agency is considering revising the criteria of the corporate financial test currently available to subtitle C hazardous waste facilities. The Agency intends to propose that this revised corporate test also be available to owners or operators of MSWLFs, thus allowing financially strong firms to demonstrate that setting aside funds in a trust fund or obtaining third-party assurance of their closure, post-closure care and corrective action costs is unnecessary. The cost of such a test should be minimal, amounting only to the cost of making the required demonstrations. Furthermore, as discussed below in section 7.b of this appendix, the Agency will be proposing a financial test developed specifically for local governments. The Agency anticipates that the effective date of both of these new tests will coincide with the effective date of today's financial responsibility requirements.

The Agency analyzed the impact of all of the proposed requirements, including financial assurance requirements, on members of the regulated community and examined in particular the impact on local governments and on small private entities in the Regulatory Impact Analysis (RIA) to the final rule. As discussed in that document, the Agency has concluded that most local governments and owners of privately-owned landfills will not experience significant impacts due to the financial assurance requirements alone.

As discussed in greater detail in section IV.A of the preamble, however, the Agency recognizes that today's requirements may pose a significant burden on small landfills located in small and remote communities. Small landfills in approved States that meet certain criteria are eligible for exemption from the design, ground-water monitoring and corrective action requirements of today's rule. Therefore, while owners or operators of these landfills are subject to financial responsibility requirements for closure and post-closure care, they are eligible for exemption from the corrective action financial responsibility requirements. Owners or operators of small landfills receiving exemptions from ground-water monitoring would only be required to demonstrate financial assurance for the remaining costs of closure and post-closure care, which include final cover installation and maintenance and other routine maintenance activities during the post-closure care period. By not requiring a ground-water monitoring system to be monitored and maintained for thirty years, the burden on small and remote communities will be minimized.

The Agency does believe, however, that the costs of complying with the financial assurance requirements can be lessened if approved States adopt a broad range of financial assurance approaches. Toward that end, § 258.74(h) of today's final rule authorizes the use, in approved States, of any financial assurance mechanism that satisfies the performance standards specified in § 258.74(k) in addition to those mechanisms explicitly identified in the rule. The Agency urges approved States to consider adopting a broad range of financial assurance approaches to promote compliance by all owners and operators.

3. Section 258.70(a) Applicability

The proposal would require all owners and operators of MSWLFs, except State and Federal government agencies, to demonstrate financial responsibility for closure, post-closure care and corrective action for known releases. The proposal also requested comment concerning whether Indian tribes should be subject to the requirements.

a. Applicability to State and Federal Government Entities

The proposal would exempt from the required financial assurance demonstrations MSWLFs that are owned or operated by government entities whose debts and liabilities are the debts and liabilities of a State or the United States. The Agency recognizes that Federal and State governments have the requisite strength and stability to fulfill their financial assurance obligations for MSWLFs.

No commenters disputed the Agency's position that Federal and State governments have the financial strength and incentives to cover the costs of closure, post-closure care, and corrective action for known releases. Nevertheless, several commenters argued that State and Federal government entities should be required to demonstrate financial assurance. These commenters argued that as a matter of fairness all levels of government should be treated the same; either all government entities should be required to demonstrate financial assurance or all should be excluded from the requirements. Other commenters asserted that exempting any MSWLFs will disrupt competitive forces within the industry.

Two commenters had specific questions about how the requirement should be interpreted. One commenter urged EPA to exempt public authorities whose debts and liabilities are the debts and liabilities of a State. This commenter argued that a single-purpose authority is as fiscally sound as a State because if a State decides to dissolve the authority, the State must take over any bonded debt issued by the authority. The other commenter suggested that the Agency should clarify whether the requirements apply to landfills owned by a State or Federal government, but operated and/or leased by a local government.

After considering these comments, the Agency is promulgating the final rule as proposed. MSWLFs owned or operated by those government entities whose debts and liabilities are the debts and liabilities of a State or the United States will continue to be exempted from financial assurance requirements. In some cases, this will include single-purpose public authorities. In other cases, however, the debt of single-purpose authorities may not be supported by the full faith and credit of the State under that State's laws. In those cases, it is not appropriate to exempt the authority from financial assurance requirements.

The Agency believes that differences between Federal and State governments and other governmental entities provide sufficient rationale for treating these entities differently with regard to the financial assurance requirements. Federal and State governments are permanent and stable institutions that exist to safeguard health and welfare, and they have the requisite financial strength and incentives to cover the costs of closure, post-closure care, and corrective action for known releases. The availability of resources to Federal and State agencies differs from the availability of resources to local governments. Federal and State governments have flexibility in their annual budgets, which facilitates reallocation of funds for a specific purpose. Federal and State entities also can access sources of financing such as intergovernmental transfers relatively quickly. Further, since few MSWLFs (four percent) are owned or operated by Federal or State agencies, exempting these facilities will not significantly disrupt competition in the solid waste disposal industry.

As indicated in the preamble to the proposed rule, the financial assurance exemption extends to cases in which a MSWLF is owned by a State or Federal government entity and operated by a private party or local government (or operated by a State or Federal government entity while owned privately or by a local government). A State or Federal owner may, of course, require the private or local government operator to provide financial assurance by contractual agreement. The exemption may also extend to a single-purpose authority if the authority's debts and liabilities are the debts and liabilities of the State.

b. Applicability to Local Governments

The proposal would exempt only Federal or State governments. All other owners and operators, including local governments, would be required to provide financial assurance for closure, post-closure care and corrective action at MSWLFs that they own or operate. Local governments include both general purpose local governments (e.g., municipalities, counties, cities, townships, towns, and villages) and special purpose local governments. Special purpose local governments, generally designated as either public authorities or special districts, may perform a single function or a limited range of functions. Both general purpose local governments and special purpose entities were required to provide financial assurance under the proposed rule.

The Agency received numerous comments on its proposal to require local governments to demonstrate financial assurance. Commenters supporting the Agency's proposal argued that local governments may be unable to raise the necessary funds through their taxing powers and that local governments may not be able to make long-term advance commitments of future funds necessary to provide adequate assurance. Commenters argued further that because of these limitations on the availability of funds, all owners and operators, including local governments, need to factor the cost of closure and post-closure care into the management of an MSWLF in order to ensure that the site is not abandoned. Several commenters suggested that many MSWLFs operated by local governments could become future Superfund sites if financial assurance is not required of local governments.

Many other commenters, however, urged the Agency to exempt some or all local governments (including cities, counties, and towns) from financial assurance requirements for a variety of reasons. Some commenters asserted that local governments operating MSWLFs have a direct stake in providing for the health, welfare and protection of their communities, and should not be burdened with rules that interfere with the efficient execution of their duties. Several commenters argued that local governments should not be required to demonstrate financial responsibility because they rarely go bankrupt and in those cases when they have gone bankrupt, they have paid all of their obligations eventually. Several commenters contended that many local governments have sources of funds that would be available in an emergency to cover the costs of closure, post-closure care, and corrective action, such as unused taxing authority, user fees, bonds, and short-term notes, thus making financial responsibility requirements unnecessary.

Some commenters argued that local governments should be exempted from financial assurance requirements because of the burden such requirements would impose. Several

commenters stated that the cost of demonstrating financial assurance would cause many local governments to abandon their solid waste disposal programs. They argued that new part 258 criteria will increase the costs of operation, and that financial assurance requirements would only compound the economic burden on MSWLF owners by requiring up-front money or guarantees. Other commenters indicated that financial assurance requirements may cause solid waste management to shift from the public sector to the private sector if local governments choose to contract with private commercial MSWLF facilities rather than provide the amount of assurance required for their own landfills.

Finally, commenters suggested that States should be given flexibility in deciding whether to exempt their own local governments from the financial assurance requirements.

The Agency has carefully considered all of the comments on this issue, and, for the reasons discussed below, continues to believe it appropriate to distinguish between local governments and Federal and State governments when applying the financial assurance requirements. Under today's final rule, therefore, local governments remain subject to financial responsibility requirements.

The Agency agrees with commenters who asserted that local governments may be unable to raise sufficient funds through taxation and that local governments may not be able to make long-term commitments of future funds. While several commenters contended that local governments would have the ability to raise funds in a timely manner sufficient to cover the costs of closure, post-closure care and corrective action, these commenters did not supply the Agency with evidence that this was generally true for all local governments. While the Agency recognizes that many local governments, like Federal and State governments, are permanent entities that act to secure the well-being of their citizens, there is substantial variation among local governments in terms of size, financial capacity, and functions performed. It is therefore likely that there is substantial variation among these governments in terms of their ability to meet their closure, post-closure care and corrective action obligations in a timely manner. Exempting all local governments from the requirements would provide insufficient protection of human health and the environment.

Furthermore, although local governments are unlikely to abandon their MSWLFs even in the event of bankruptcy, studies of the probability of bankruptcy among local governments indicates that (relative to Federal and State governments) they are generally (1) more limited in terms of financial resources and less flexible in their annual budgets, thereby making reallocation of a substantial amount of funds for a specific purpose in a given year more difficult; (2) less able to obtain their traditional sources of financing (e.g., bond issues, taxes, and intergovernmental transfers) quickly enough to ensure funding in a timely manner; and (3) more prone to fiscal emergencies than Federal and State governments. Also, while localities in bankruptcy may be able to meet their obligations over the long term, obligations such as closure and corrective action may require immediate financing to ensure adequate protection of human health and the environment. In light of the need to ensure that all owners and operators meet their environmental obligations in a timely manner, combined with the variability among municipalities, the Agency believes that a uniform set of applicable requirements is necessary. Therefore, the Agency has decided against allowing States to decide whether to exempt their own local governments.

The Agency decided not to exempt any special category of local governments from today's final rule (with the exception of small landfills qualifying for an exemption in approved States as discussed above). While the Agency recognizes that local governments may vary in their ability to meet the costs of closure, post-closure care, and corrective action, the Agency is unable to support a variance for any type of local government (e.g., cities, counties). The same concerns that prompted the Agency to include local governments generally apply to these special categories as well. Requiring all local governments to demonstrate financial assurance should encourage appropriate advanced planning for the costs of closure, post-closure care, and corrective action for known releases by these entities.

The Agency does not believe that the requirements will generally be burdensome to local governments. As discussed above, the cost of the financial assurance requirements are a relatively small part of the total cost of compliance with today's rule. Because the requirements will be applied to all MSWLF owners and operators, regardless of whether they are local governments or private companies, the Agency does not believe that the requirements will cause a shift from public to private ownership of solid waste management facilities.

The Agency does recognize the potential burden that financial assurance requirements may impose on some local governments. To minimize this burden, the Agency is finalizing several alternate mechanisms that may be used to demonstrate financial assurance and encourages States to develop innovative financial responsibility mechanisms. To further reduce the potential burden of these provisions on local governments, the Agency is developing a financial test designed specifically for local governments that is expected to be proposed soon after today's rule is promulgated (see section 7.b below). The Agency currently anticipates that the effective date of the financial test for local governments will coincide with the effective date of the financial responsibility provisions of this rule (30 months following publication of today's rule). Financially strong local governments that demonstrate that they possess the necessary financial capacity and have adequately planned to meet their MSWLF obligations in a timely manner will be able to use a financial test and will not be required to acquire additional financial assurance mechanisms. The specific criteria of this financial test for local governments and projected estimates of the test's availability to local government owners and operators for use to meet today's requirements will be discussed more fully in a separate notice of proposed rulemaking.

c. Applicability to Indian Tribes

The preamble to the proposed rule requested comments on whether to exempt Indian Tribes from financial responsibility requirements, and on whether Indian Tribes have the requisite financial strength and incentives to cover the costs of closure, post-closure care, and corrective action for known releases.

In response to this request, many commenters urged the Agency to exemp. Indian Tribes from the financial responsibility requirements. Commenters argued that Indian Tribes are sovereign in their own right and, like State governments, are permanent and stable institutions that exist to safeguard health and welfare. Commenters noted that Tribal governments have the same financing options (e.g., bonding and taxation) available to them as do States and the Federal government. In addition, commenters asserted that due to the small populations of reservations, solid

waste disposal problems on reservations are likely to be of a small magnitude and to require less funding than those of other MSWLFs. Other commenters argued that with such small populations and a high unemployment rate, most Tribes would be unable to meet the financial assurance requirements.

Some commenters, however, opposed exemption of Indian Tribes from financial assurance requirements. These commenters argued that Tribal land is often leased to government and industry for use as disposal facilities. As a result, financial assurance for MSWLFs on Tribal lands is as necessary as for any other MSWLF. Another commenter noted that Indian landfills in Arizona are causing adverse impacts on the environmental quality of the State and that there is currently no mechanism to address those problems.

The Agency has carefully considered the commenters' concerns and has decided not to exempt Indian Tribes from the financial responsibility requirements of today's rule. Section 1004 of RCRA defines "municipality" to include Indian Tribes. The Agency is concerned that Indian Tribes, for reasons similar to those discussed for municipalities above, do not have the requisite financial strength to ensure funding of their closure, post-closure care and corrective action obligations. While a number of commenters suggested that Indian Tribes have the financial strength to meet these obligations, none provided data to support an exemption from the financial assurance requirements. The Agency believes, therefore, that it is in the interests of protecting human health and the environment to require Indian Tribes to comply with the financial assurance requirements of today's rule. Financially strong Indian Tribes, like financially strong municipalities, will be able to comply with the requirements using the local government financial test to be proposed in the near future.

4. Sections 258.71(b), 258.72(b), and 258.73(b) Scope of Coverage

a. Financial Assurance for Corrective Action for Other Than Known Releases

The proposal would require financial assurance for the costs of known corrective actions to be demonstrated only at the time that the costs of these activities are estimated (i.e., at the time of remedy selection). The proposal would not include coverage requirements for the potential costs of corrective action for unknown releases and requested comments on this decision. The Agency also requested information concerning appropriate methods for estimating the costs of corrective action for other than known releases.

EPA received several comments supporting its decision to require financial assurance for corrective action for known releases only and for deferring financial responsibility requirements for potential future releases. Commenters agreed that it would be difficult to set an appropriate level of coverage for corrective action for future releases because it would be difficult to predict the probability and costs associated with a release, which are highly dependent on location-specific and operation-specific factors. One commenter stated that financial assurance requirements for other than known releases are unnecessary because financial assurance will be required once the release is discovered. Another commenter suggested that additional financial responsibility requirements for corrective action would be more appropriately established by States because they have greater familiarity with the site-specific conditions within their jurisdictions.

A few commenters believed that the scope of the financial assurance requirements should be expanded to include additional assurances, declaring that EPA should prevent the possibility that unanticipated corrective action costs could be left unfunded by requiring financial assurance for these costs.

These commenters did not, however, suggest methods for establishing levels of coverage.

The Agency agrees with the majority of commenters that current data are not adequate to accurately establish national uniform levels of coverage for future corrective actions. Moreover, it believes that an approach to establishing such coverage levels which relies upon a facility risk analysis could require considerable time and expense to complete, and could thereby delay the implementation of the basic financial assurance regulations. Therefore, the Agency is not at this time promulgating financial assurance requirements for other than known releases. While the Agency recognizes that the possibility exists that unanticipated corrective action costs may go unfunded, it believes that the requirements for financial assurance for known corrective action being promulgated today will go far towards minimizing any potential unfunded obligations. The requirements promulgated today will ensure that the costs of remediation of releases are borne by the appropriate facility owner or operator.

While the promulgation of uniform national requirements for corrective action for unknown releases applicable in all States will require a substantial amount of additional analysis, States may wish to consider whether data are already available in their jurisdictions to support state-specific rulemakings. Today's rule does not preclude States from promulgating their own requirements for corrective action for other than known releases if they deem such requirements necessary and appropriate supplementals to today's requirements.

b. Financial Assurance for Third-Party Liability

In the preamble to the proposed rule, the Agency indicated that it considered, but chose to defer, adoption of financial responsibility requirements for third-party liability claims arising from off-site personal injury or property damage. The reasoning for this deferral was two-fold. First, as discussed in the preamble, the Agency had insufficient data to set appropriate levels of third-party liability coverage for MSWLFs. Second, the Agency was concerned that owners and operators of MSWLFs would encounter difficulties in obtaining financial assurance mechanisms to fulfill this requirement. The Agency requested data and other information regarding appropriate levels of third-party liability coverage.

While a few commenters recommended that the financial assurance requirements include requirements for third-party liability coverage, most of the comments supported EPA's decision to defer third-party liability financial assurance requirements. Commenters noted that both the likelihood and the size of third-party awards are variable and difficult to predict. Due to the uncertainty of the costs of liability claims, some commenters said that additional time and data would be necessary for both the insurance industry and MSWLF owners and operators to respond to the need for liability coverage. Other commenters pointed out that some MSWLFs may never face third-party liability claims, and suggested that the Agency limit itself to requiring financial assurance only for expenses that are certain to be incurred. Another commenter stated that it is more appropriate for States to establish third-party liability requirements, since third-party liability claims are defined under applicable State law.

Upon consideration of the comments regarding this issue, the Agency determined that the conditions that originally led to the decision to defer third-party liability coverage requirements continue to prevail. The Agency therefore is continuing to defer promulgation of any requirement. While the Agency received some information from one commenter related to third-party liability coverage levels, this information did not include data relevant to setting uniform national coverage levels, and the Agency has been unable to gather sufficient data from other sources.

As discussed in the preamble to the proposal, some data concerning the types of off-site property damage and bodily injury that could be associated with the operation of a MSWLF are currently available. The inherent limitations of these data, however, do not provide the Agency with an adequate basis upon which to determine appropriate coverage levels. The available data are largely concentrated on only one of the hazards posed by MSWLFs, namely, methane gas explosions. Other hazards for which fewer data are currently available (e.g., releases to ground and surface water) could also contribute significantly to potential liabilities faced by owners and operators of MSWLFs and therefore must be given consideration in the development of third-party liability coverage levels. In addition, the data on methane gas explosions did not include the costs of damages resulting from these accidents at MSWLFs. The Agency, therefore, still lacks sufficient basis to establish specific coverage levels for MSWLFs.

The Agency's second reason for deferring third-party liability also continues to prevail. Insurance coverage for MSWLFs continues to be limited. Owners and operators of MSWLFs may therefore encounter difficulties in obtaining third-party liability coverage. The Agency is currently aware of only two insurers who actively provide coverage to MSWLFs. While some other insurers are entering the market, experience in providing this type of coverage is even more limited than experience in providing coverage for hazardous waste facilities. The Agency believes, however, that such an assurance market, whether for insurance or another mechanism provided by a third party, will begin to develop following promulgation of today's final technical criteria imposing uniform design and operating standards that in turn will allow insurers to better assess the risks associated with MSWLFs. In addition, such a deferral will allow States a period during which State-sponsored mechanisms can be developed to assist owners and operators of MSWLFs in complying with financial assurance requirements. These State-sponsored mechanisms might then be adopted for coverage of third-party liability requirements.

Given that a majority of owners and operators of MSWLFs are local government entities, the Agency believes that State governments could become actively involved in the development and sponsorship of financial assurance mechanisms for third-party liability or in providing financial assurance through various funding schemes. Today's regulation allows States to explore and implement alternatives to traditional mechanisms for compliance with closure and post-closure care and corrective action financial assurance requirements. These mechanisms may then be applicable if third-party liability coverage is required in the future or if an approved State wishes to require financial responsibility for third-party liability coverage.

5. Sections 258.71(b), 258.72(b), and 258.73(b) Release From Financial Assurance Requirements

Under the proposed rule, owners and operators would be released from financial assurance requirements for closure, post-closure care, and corrective action following State approval of the certifications of completion of these activities submitted under §§ 258.30(e), 258.31(f), and 258.58 (f) and (g). Following the receipt of the certification from the owner or operator verifying that closure, post-closure care, or corrective action had been completed in accordance with the approved plans, the State would be required to notify the owner or operator in writing that he no longer was required to demonstrate financial responsibility for these activities. If the State had reason to believe that the activities had not been conducted in accordance with the approved plan, the State would notify the owner or operator and include a detailed statement of the reasons for not releasing the owner or operator from the financial assurance requirements.

While the Agency did not receive comments on the actual provisions for release from the financial assurance requirements, two commenters contended that funds should never be released because of the perpetual possibility of failure. Other commenters raised a related issue that owners or operators should be allowed to receive reimbursements for closure, post-closure care or corrective action costs as they are incurred. These commenters further argued that particularly for owners or operators using instruments that require the owner or operator to set funds aside (e.g., a trust fund), withholding the release of such funds until all activities have been completed would effectively require owners and operators to provide twice the amount of funds necessary to meet expenses.

The Agency decided to finalize the procedures for release from financial assurance requirements substantially as proposed with one change in the procedures for release for closure financial assurance and with minor changes to account for the self-implementing approach of the final rule. Owners and operators will be released from financial assurance requirements upon demonstrating compliance with the certification requirements for closure, post-closure care, or corrective action as specified in §§ 258.60(h), 258.61(e), or 258.58 (f) and (g). Consistent with the self-implementing approach of the final rule, the final rule includes the requirement that owners or operators also must notify the State that the required certifications are in the facility operating record and that financial assurance is no longer being maintained. As a condition of being released from closure financial assurance, the Agency is adding the additional requirement that owners or operators must notify the State that they have recorded the notation on the deed to property as required in § 258.60(i) and have included a copy of the notation in the facility operating record.

In general, the Agency continues to believe that owners and operators should be released from financial assurance requirements only upon certification that closure, post-closure care and/or corrective action activities have been completed. Unless the owner or operator remains subject to financial assurance requirements until closure, post-closure care and/or corrective action have been certified, the Agency cannot be assured that funds will be available if additional activities are required to comply with the technical requirements. The Agency, however, does not believe that the potential benefits (e.g., potential governmental expenditures avoided) derived from indefinite maintenance of financial assurance sufficiently outweigh the costs incurred by owner or operator in maintaining such assurances. Performance of the required activities in conformance with the plan and subsequent certification by a qualified engineer of those activities upon

completion will minimize the probability that additional financial assurance will be needed.

The Agency agrees with commenters that in cases where an owner or operator has actually set funds aside in a mechanism dedicated to the payment of such costs (e.g., in a trust fund, and in some cases, closure and post-closure insurance), it may be desirable to allow the owner or operator to be reimbursed for costs of closure, post-closure care, and corrective action activities as they are incurred prior to final certification, in order to minimize the financial burden to the owner or operator. Therefore, the rule specifically provides for reimbursement from trust funds or insurance policies in cases where sufficient funds remain to cover any remaining cost. Requests for reimbursement must be made directly to the trustee or the insurer. If sufficient funds would remain in the trust to cover remaining costs, the trustee may grant the request (see also discussion of the trust fund and insurance in section 7.a below).

The final rule also requires that the owner or operator record the notation on the deed to the property indicating that the property has been used as a MSWLF and its future use is restricted as a condition of being released from financial assurance requirements for closure. The Agency added this provision to provide a financial incentive to help ensure that the notation is properly filed.

6. Sections 258.71(a), 258.72(a), and 258.73(a) Cost Estimates

The Agency proposed in §§ 258.32 (b), (c), and (d) that the owner or operator of each MSWLF would develop written site-specific estimates of the costs of conducting closure, post-closure care, and corrective action for known releases. These cost estimates would be the basis for determining the amount of financial assurance required under §§ 258.32 (f), (g), and (h). Commenters raised a number of issues and questions concerning the preparation of cost estimates.

a. Deadlines and Procedures for Preparing Cost Estimates

The proposed rule did not include specific procedures or deadlines for preparing cost estimates. The development of such requirements was left to the States.

A number of commenters stated that EPA should develop guidance tailored specifically to estimating costs of closure and post-closure care of MSWLFs to facilitate the preparation of estimates and ensure more consistency. One commenter argued that unless the rule included more detail on preparing cost estimates, States would use the guidance document developed for subtitle C facilities, which they argued is inappropriate for MSWLFs. Two commenters stated that procedures and deadlines for preparing cost estimates are not necessary.

The Agency disagrees with commenters who felt that the subtitle C guidance would be inappropriate for MSWLFs. Cost estimating procedures for construction and engineering activities like those that would be required for closure, post-closure care, and corrective action are relatively uniform, and procedures developed for estimating costs for subtitle C facilities should be easily adopted to account for differences between hazardous and solid waste landfills. The Agency believes, therefore, that the guidance documents developed for subtitle C could provide a useful model for today's rule.

The Agency also believes that it is unnecessary to include specific deadlines for preparing cost estimates in the rule. Since cost estimates must be prepared in order to establish the amount of financial assurance required, the Agency believes that the deadline for obtaining financial assurance will ensure that cost estimates will be prepared in a timely manner. However, consistent with the self-implementing approach of the final rule, the Agency has added to the final rule a requirement that owners or operators must notify the State Director that the cost estimates have been placed in the operating record.

b. Third-Party Costs

The proposed rule would require cost estimates to account for the costs, in current dollars, of hiring a third party to conduct the activities described in the closure and post-closure plans and in the corrective action program as specified in §§ 258.30, 258.31, and 258.58.

The Agency received a number of comments on the requirement that cost estimates be based on the cost of hiring a third party to perform the required activities. While one commenter expressed support for this provision as proposed, several argued that using third-party costs for cost estimates would be burdensome and unnecessary. Some commenters stated that local governments, in particular, should be able to base cost estimates on the cost of performing the work themselves because they maintain a broad range of in-house technical and engineering capabilities, which could be used to perform closure, post-closure care, and corrective action. They also contended that unlike private operators, even if a local government were to go bankrupt, it could not escape its obligations and would eventually use its own personnel to conduct closure and post-closure care.

After considering these comments, the Agency continues to believe that it is appropriate to base cost estimates on the costs of hiring a third party to conduct closure, post-closure care and corrective action. This provision ensures that adequate funds will be available to hire a third party to carry out the necessary activities in the event that the owner or operator declares bankruptcy or does not have all of the technical expertise necessary. In addition, the Agency does not agree that local governments will always be able to use their own personnel to conduct closure and post-closure care. For example, in the event of bankruptcy or other financial hardship, a local government may be required to reduce the number of local government employees, including employees managing the local government's MSWLF and other staff who might be capable of conducting closure, post-closure care or corrective action activities. The local government would, under such circumstances, be forced to obtain the services of third-parties to carry out closure, post-closure care, and corrective action activities.

Furthermore, the requirement to base cost estimates on third-party costs will not impose a significant burden on an owner or operator. The Agency has studied the differences between first and third-party costs for closure in the context of Subtitle C and has found that the costs are not significantly different. For example, the cost of hiring a third party to close a landfill that handles 2,000 tons of waste per year is not significantly greater (less than ten percent) than the costs that would be incurred if the owner or operator of the landfill performed the closure activities. Because the activities that would be performed for closure, post-closure care and corrective action would be similar for all MSWLFs, the Agency believes that third-party costs will not be significantly higher for these units as well.

c. Sections 258.71(a)(1), 258.72(a)(1), and 258.73(a) Scope of Costs To Be Covered in Cost Estimates

The proposed rule would require closure and post-closure cost estimates to be based on the cost of closing the MSWLF at the point in the landfill's active life when the extent and manner of its operation would make closure and

post-closure care (as described in the closure and post-closure plans) the most expensive. For example, if an owner or operator operates the MSWLF on a cell-by-cell basis, the estimate should account for closing the maximum number of cells open at any one time. Several commenters objected to calculating closure and post-closure cost estimates based on the most expensive point of performing these activities, arguing that the requirement would be burdensome. One commenter noted that the requirement does not account for the fact that closure of a MSWLF is an ongoing process that is part of daily operation. This commenter argued that because the actual area of a landfill increases quickly for a short time after a landfill is opened and decreases soon afterwards as partial closure is begun, basing cost estimates on the maximum cost of closure prior to the start of any partial closure activities would result in closure cost estimates that will quickly become excessive.

The Agency considered the commenter's concerns and is clarifying in the final rule its intent regarding the scope of cost to be included in cost estimates. The Agency continues to believe that the cost estimates must be high enough to ensure that adequate funds always are available to conduct the required activities whenever they are required, including premature closures. However, the Agency agrees with commenters that the cost estimates need not include the costs of closing landfill phases that have already undergone partial closure. Therefore, the Agency is adding language to the final rule to clarify that the closure cost estimate must account for the most expensive costs of closing the maximum area of the MSWLF that would ever need to be closed at any one time.

For example, an owner or operator of a MSWLF, which is constructed using a cellular design, may choose to open only one cell of the landfill at a time, close the cell completely (i.e., with installation of a final cap) once it is filled, and only then to open a new cell. In this case, the cost estimate would include the costs of closing one cell. Therefore, owners and operators of facilities that close units as they are filled (i.e., conduct partial closures) may be allowed to demonstrate less financial assurance than those that close all units simultaneously because the maximum costs of closure at any time will be less than if the entire MSWLF was closed simultaneously.

d. Sections 258.71(a)(2), 258.72(a)(2), and 258.73(a)(1) Adjustment of Cost Estimates for Inflation

The proposed rule would require the closure, post-closure, and corrective action cost estimates to be adjusted annually for inflation until the entire landfill had been closed to ensure that over time, cost estimates would continue to reflect the actual costs of performing closure, post-closure care or corrective action. Corrective action cost estimates were to be updated for inflation until the end of the corrective action period even if the corrective action extended beyond closure of the MSWLF. The proposed rule left to the States the responsibility for establishing procedures for updating cost estimates. The proposed rule also requested comments on the desirability of requiring annual adjustments of the post-closure cost estimates during the post-closure care period.

A number of commenters supported the proposal to require annual inflation adjustments to the post-closure care cost estimate only until closure, while a few commenters supported adding a provision that would require annual inflation adjustments until the end of the post-closure care period. Some commenters suggested periodic (e. g., every three or five years) rather than annual updates to the cost estimates, arguing that the expense involved in the updating procedure and the likelihood that costs would not be substantially changed by inflation made annual updates inappropriate and unnecessary.

Upon consideration of the public comments, the Agency finalized the requirements as proposed with a change to the requirements for post-closure cost estimates discussed below. The Agency continues to believe that the uncertainties inherent in inflation and interest rates make an annual cost update highly desirable. If the added costs due to inflation are not fully accounted for in annually updated cost estimates, adequate funds may not be available when needed. Moreover, the Agency does not believe that updating cost estimates to account for inflation will be difficult or costly. The Agency suggests the use of inflation factors that are readily available to owners and operators (e. g., the Implicit Price Deflator for Gross National Product as published in the "Survey of Current Business," a Department of Commerce publication) or specify other inflation factors that must be used to adjust the estimates. Owners and operators may wish to refer to the provisions in 40 CFR 264.142 and 264.144 and the accompanying guidance materials when making the updates. The Agency has no evidence from its experience with the Subtitle C program that annual updates for inflation have been costly or burdensome, or that they have caused implementation problems.

The Agency agrees with commenters who suggested that post-closure cost estimates should be updated until the end of the post-closure care period, and consequently, the Agency has decided to impose such a requirement in today's rule. Following closure, the owner or operator must continue to update the post-closure cost estimate for inflation for the duration of the post-closure care period. While the Agency recognizes that on certain rare occasions, an owner or operator may not be available (e. g., the company operating the landfill may no longer be in business following closure) to update the estimates, thus making implementation difficult, the Agency believes that in most cases, an owner or operator will be available. The majority of MSWLFs are operated by local governments. These local governments are unlikely to disappear following closure of their landfills because they exist to perform a number of other functions. The Agency does not believe that this change will prove burdensome.

e. Sections 258.71(a)(3), 258.72(a)(3), and 258.73(a)(2) Adjustment of Cost Estimates Due to Plan or Facility Changes

The proposed rule would require the owner or operator to increase the cost estimates for closure and post-closure care whenever changes to the closure and post-closure plans or changes at the facility (e.g., increases in design capacity, increases in the maximum area open, more extensive monitoring requirements) would cause the estimated cost to increase (§§ 258.32 (b)(3), and (c)(3)). Consistent with the October 24, 1986, proposed Subtitle C rule requiring financial assurance for corrective action, the proposal specified that an owner or operator would be required to increase a corrective action cost estimate if, at any time during the corrective action period, a change in the corrective action program or in facility conditions would cause corrective action costs to exceed the cost estimate (§ 258.32(d) (2)). Whenever a cost estimate is increased, the owner or operator would increase the level of financial assurance required under sections §§ 258.32 (f), (g), and (h).

The proposed rule in §§ 258.32 (b)(4) and (c)(4) would allow the owner or operator to request a reduction in the amount of the cost estimate if the owner or operator could demonstrate that

changes in facility conditions would result in a decrease in the maximum costs of closure (e.g., partial closure of the landfill that reduces the maximum area of the landfill that ever needs to be closed), or post-closure care (e.g., less maintenance is required during the later years of the post-closure care period). Cost estimates for corrective action could be reduced if the owner or operator could demonstrate that the estimate exceeds the maximum remaining costs of corrective action (§ 258.32(d)(3)). The Agency did not propose procedures or deadlines for adjusting cost estimates, but did request comments on whether the revised criteria should include such procedures.

The Agency received no comments on the requirement that cost estimates be adjusted to account for changes in facility operation or changes in the facility closure, post-closure care or corrective action plans. Consistent with the self-implementing approach of today's rule, the Agency is finalizing the requirements for adjustments to cost estimates with certain procedural changes. If the current cost estimate exceeds the maximum remaining costs of closure, post-closure care or corrective action, whichever is applicable, the owner or operator may decrease the cost estimate if he notifies the State of the decrease in the cost estimate and places a justification for the decrease in the facility operating record.

f. Section 258.72(a) Calculation of Post-Closure Costs

The proposed rule would require post-closure care activities to be carried out over a two-phase period. Phase I would last 30 years and the length of Phase II would be established by the States. The proposed rule would require the post-closure cost estimate for each phase to be based directly on the activities described in the approved post-closure care plan required under § 258.31(c), and to account for the post-closure care costs of the entire landfill. The estimate for each phase would be derived by multiplying the annual costs (in current dollars) of post-closure care activities by the number of years of care required in that phase. Because not all post-closure care activities are conducted on an annual basis (e.g., cap replacement or monitoring well replacement may only be required periodically), the preamble to the proposal clarified that the total post-closure cost estimate should include these periodic costs as well as the annual costs.

Several commenters were concerned with the duration of the post-closure care financial assurance requirements. Some commenters believed that financial assurance for the entire 30 year Phase-I post-closure period was unnecessary. Others suggested that the cost of financial assurance for the entire 30-year period would place an excessive burden on owners and operators. Suggestions for alternative periods included five and ten years and the number of years of operating life of the facility remaining on the effective date of the regulations. Another commenter said that the costs of post-closure maintenance decline as a closed landfill stabilizes, and that the owner or operator should be allowed to take this into account when making his post-closure cost estimate.

The Agency believes that to fulfill the goals of the financial assurance requirements, the total estimated costs of post-closure care must be demonstrated. Requiring financial assurance for only five to ten years or for the number of years remaining in the facility's operating life would not ensure that funds are available to complete post-closure care in the event that the owner or operator is unable or unwilling to do so. As discussed in Appendix F of the preamble, the proposed two-phased post-closure care period has been eliminated in the final rule in favor of one 30-year period with the option available, in approved States, to reduce or increase the length of the period as necessary to protect human health and the environment. For most owners and operators, therefore, financial assurance will only be required for 30 years of post-closure care. In approved States, where State-specific or site-specific factors justify a reduction in the 30-year period, owners and operators will be required to provide financial assurance for the reduced period only. The Agency does not believe that obtaining financial responsibility for 30 years of post-closure care will impose a significant additional burden on owners and operators. Many States already require some financial assurance for post-closure care; therefore, MSWLFs in these States should already be demonstrating financial assurance for the costs of post-closure activities.

The Agency agrees with the commenter that in some cases the costs of post-closure care maintenance may decline as the closed landfill stabilizes. The Agency has always intended that the post-closure cost estimate account for changes in costs over the post-closure care period. In its guidance on preparing post-closure cost estimates for hazardous waste facilities, the Agency stated that the estimates should include costs required annually and costs that will occur less frequently during the post-closure care period (RCRA Guidance Manual for subpart G Closure and Post-Closure Care Standards and subpart H Cost Estimating Requirements, OSWER Policy Directive #9476.00-5, January 1987, pp. 4-7). Consistent with this intent, today's final rule requires that the post-closure care cost estimate account for the total costs of post-closure care, including both those costs that will be incurred annually and those that occur only periodically. This change will allow owners and operators to prepare cost estimates that reflect any costs of post-closure care that decline over time. If the owner or operator can demonstrate in the post-closure plan that the level of maintenance activities required will decline over time, then the corresponding cost estimate can reflect the costs of reduced care in later years. Similarly, if the post-closure plan is revised during the post-closure care period because less extensive maintenance is required, the cost estimate may also be revised. The cost estimate also may be revised during the post-closure care period to reflect that fewer years of post-closure care remain. However, in considering reductions to the cost estimate, it is important to consider carefully potential future costs such as ground-water monitoring well replacement costs or extensive cover repairs that would not be required on an annual basis.

g. Section 258.73(a) Corrective Action Cost Estimate

The Agency proposed that a corrective action cost estimate be prepared once a release has been detected and the owner or operator is required to undertake corrective action. This estimate would be calculated by multiplying the annual costs of corrective action by the number of years required to complete the corrective action program. The owner or operator would then demonstrate financial assurance for the amount of the corrective action cost estimate.

The Agency received a number of comments on corrective action cost estimates and financial assurance requirements. Some commenters stated that the proposed financial assurance requirements for corrective action were too stringent and that the amount of the cost estimate should be reduced by reducing the period for which financial assurance for corrective action must be demonstrated. One commenter suggested that the requirements should explicitly state that assured funds for

corrective action must be distinct from other assured funds.

One commenter argued that it would be inappropriate to estimate corrective action costs during the planning stage of a corrective action because estimating remediation costs is possible only after corrective action remedies have been specified. Another commenter noted that the proposed approach to developing the corrective action was too complicated and suggested that it would be simpler and more accurate to base cost estimates on the projected real cost of the action.

The Agency considered the commenters suggestions and is finalizing the cost estimating requirement for financial assurance for corrective action with one change discussed below. The Agency believes it is necessary that the cost estimate reflect the total costs that will be incurred for the entire corrective action period in order to adequately protect human health and the environment. Reducing the period of time over which the cost estimate is calculated would not provide adequate assurance of corrective action costs in the event that the owner or operator is unable or unwilling to continue to finance corrective action. (If a trust fund is used to demonstrate financial assurance, payments will be made into the trust over the first half of the corrective action period to cover the costs of the second half. Adequate assurance is provided because actual funds are being placed in the trust fund to ensure that future corrective action activities will be paid for. This is discussed in greater detail in section 7.a below.) The Agency does, however, agree that it is inappropriate, in most cases, to develop corrective action cost estimates prior to selection of the remedy. Section 258.74 of today's rule requires that financial assurance be established within 120 days after the remedy is selected. This should provide adequate time for owners and operators to develop a cost estimate based on the selected remedy and demonstrate financial assurance.

The Agency agrees with the comment that financial assurance for corrective action should be distinct from that for closure and post-closure care. Although owners and operators may choose to establish financial assurance using a single financial mechanism for some combination of closure, post-closure care, and corrective action, owners and operators should distinguish the amount of funds assured for each activity under a given financial assurance mechanism. While explicitly required by the rule, this is necessary to ensure that the amount of funds assured is sufficient to cover the costs of each activity when needed, in compliance with the performance criteria (§ 258.74(1)).

The Agency also agrees that the corrective action cost estimate should be based on the actual costs of the action and is finalizing the rule to require that the corrective action cost estimate account for the total costs of corrective action. The Agency wishes to clarify that the cost estimate must account for the costs of all activities required during the duration of the corrective action. In developing the estimate, the owner or operator must take into account the costs of actions required annually during the period as well as those required periodically over the period. This approach for estimating costs is consistent with the approach used for developing post-closure cost estimates discussed in more detail above. The Agency's experience with the subtitle C post-closure care program, which has similar requirements to today's rule, suggests that this method of calculating corrective action costs has not imposed unreasonable burdens on owners and operators.

h. Sections 258.71(a), 258.72(a), and 258.73(a) Cost Estimate Recordkeeping and Review

For recordkeeping purposes, the proposed rule would require the owner or operator to maintain copies of the most recent cost estimates for closure, post-closure care, and corrective action for known releases at the landfill until the owner or operator has been released from financial assurance for that activity under §§ 258.32 (f), (g), and (h).

Commenters suggested several additional requirements concerning the review of cost estimates. One commenter suggested that cost estimates should be available for public review, and that it would be difficult for the public to review cost estimates at the landfill. Another commenter suggested that States should be responsible for reviewing closure, post-closure care and corrective action cost estimates, while other commenters stated that EPA should retain that responsibility.

Consistent with the self-implementing approach of today's final rule, the Agency is finalizing a somewhat amended recordkeeping and review requirements. Under the final rule, owners and operators are required to notify the State Director that the cost estimates have been filed in the operating record of the facility. As required under § 258.29(b) of today's rule, owners or operators also must furnish these estimates upon request or make them available at all reasonable times for inspection by the State Director. Once the State is in possession of such records, the public may obtain access to these records through State Freedom of Information proceedings. The Agency believes that these provisions will provide sufficient opportunity for public review of the cost estimate. The final rule does not require State review of cost estimates consistent with the self-implementing nature of the rule.

i. Owners and Operators With Multiple Facilities

The proposed rule would require owners and operators to base the amount of financial assurance required on facility-specific cost estimates. If owners and operators own multiple facilities, the amount of financial assurance would be equal to the sum of all cost estimates at each facility.

Two commenters expressed concern about the effect of requiring cumulative coverage of multiple facilities managed by the same owner or operator. One commenter stated that the Agency should avoid making the assumption that in cases where multiple facilities are owned by one entity, all facilities will be required to close at the same time. This commenter suggested that the Agency consider an actuarial approach that would take into account the relatively small probability that all facilities will close or require corrective action at the same time, and allow for cost estimates that do not account for the total costs of closing all facilities simultaneously. Another commenter suggested that subtitle I requirements for financial responsibility for underground storage tanks would provide a model for this type of approach. (Subtitle I requires coverage of third-party liability and on-site cleanup costs resulting from potential future releases from petroleum underground storage tanks. Financial assurance levels are set for different classes of facilities based on type of operation and number of tanks owned or operated.)

The Agency considered the commenters' concerns, but is adopting the rule as proposed. If owners or operators own or operate multiple facilities, the amount of financial responsibility must be equal to the sum of all cost estimates at each facility. The Agency decided to defer action on special cost estimating requirements applicable to owners and operators of multiple facilities. The issue of whether owners and operators of facilities regulated under multiple programs

should be exempt from the general requirement to provide financial assurance for the total costs of closing all of their facilities simultaneously has implications for the financial responsibility programs under subtitles C, D, and I, and as such, goes substantially beyond the scope of today's rulemaking. Therefore, further study of the issue in the context of all applicable RCRA programs is necessary before exempting owners or operators of multiple facilities from these requirements.

The Agency believes that the subtitle I approach for setting assurance levels would be inappropriate for MSWLFs. The costs of potential future releases from tanks requiring assurance under subtitle I are costs that may or may not be incurred by the owner or operator, while the costs of closure, post-closure care, and corrective action for known releases subject to financial assurance under part 258 are certain to be incurred. The greater certainty of these costs makes them difficult to aggregate in a manner similar to the subtitle I approach while maintaining adequate protection of human health and the environment and therefore justifies the more stringent requirements. In addition, under subtitle I, the amount of financial assurance required is uniform for all tanks owned or operated by a single entity. This also serves to facilitate aggregation of costs in a manner that would be difficult and inappropriate for MSWLFs, where closure, post-closure care and corrective action costs vary among the facilities of one owner or operator.

7. Section 258.74 Performance Standard for Financial Assurance

a. Performance Standard Approach

The proposed rule would not specify the types of financial assurance mechanisms allowed. Instead, the proposal specified in § 258.32(e) a performance standard for a financial assurance program that must be satisfied to demonstrate compliance with the financial assurance requirements under §§ 258.32 (f), (g), and (h). The performance standard was designed to ensure that mechanisms allowed by the States (e.g., trust funds, letters of credit, State Funds, etc.) would satisfy the overall goals of financial assurance.

As proposed, the performance standard would permit States to authorize use of financial mechanisms that met five criteria: (1) Ensure that the amount of funds assured is sufficient to cover the costs of closure, post-closure care, and corrective action for known releases when needed; (2) ensure that funds will be available in a timely fashion when needed; (3) guarantee the availability of the required amount of coverage from the effective date of these requirements or prior to the initial receipt of solid waste, whichever is later, until the owner or operator is released from financial assurance requirements under §§ 253.32 (f), (g), (h); (4) provide flexibility to the owner or operator for demonstrating compliance with the financial assurance requirements; and (5) be legally valid, binding and enforceable under State and Federal law.

The preamble to the proposed rule noted that the financial assurance mechanisms currently authorized under subtitles C and I, if properly drafted, would satisfy these performance criteria. The Agency requested comments on the proposed financial assurance performance standard, including the use of a performance standard in lieu of specifying acceptable mechanisms.

A number of commenters agreed with EPA's decision not to specify the types of financial assurance mechanisms that would be allowed. These commenters noted that the variability in State regulation of the banking and insurance industries would make specification of financial assurance mechanisms difficult to develop at the national level. Several other commenters stated that the financial assurance performance standards, as proposed, represent the minimum standards that should be required of MSWLF owners and operators in all States.

Many other commenters expressed concern that the performance standard lacked sufficient detail to guide States in the development and implementation of the financial assurance requirements with any consistency among States. Several commenters urged the Agency to require States to allow the use of all financial assurance mechanisms authorized under subtitle C. Specifically, many commenters argued that if interpreted strictly, EPA's performance standard requiring funds to be available from the effective date of the regulations or prior to the initial receipt of solid waste, whichever is later, could be interpreted to preclude a trust fund with a pay-in period, which is allowable under subtitle C. These commenters stated that fully funded trusts are not affordable, and other mechanisms are not available to many local governments and small businesses. Therefore, they argued, if trust funds with pay-in periods are not allowed, many landfills could be forced to close.

Other commenters requested clarification of whether the subtitle C financial test "multiples" requirement—i.e., the owner or operator must demonstrate tangible net worth and working capital equal to six times the financial responsibility obligations assured—would apply to MSWLF owners and operators. EPA was urged either to eliminate the requirement or to apply it to issuers of financial instruments (e. g., banks, insurance companies) to ensure that these issuers of third-party mechanisms are judged on the same basis as owners and operators using the financial test.

The Agency also received comments expressing concern over the stability of institutions, such as banks and insurers, issuing financial assurance instruments. One commenter recommended that only cash, surety bonds, or certificates of deposit be allowed for demonstrating financial responsibility for corrective action. This commenter argued that unlike closure or post-closure care, the costs of corrective action are likely to force many owners and operators out of business, thereby necessitating the use of assurance mechanisms that are not linked to a company's future financial health.

The Agency agrees with commenters that the performance standard, as proposed, did not provide sufficient guidance to ensure that financial mechanisms obtained in compliance with the rule would be adequate. This lack of specificity in the proposed performance criteria could have resulted in significant inconsistencies among State programs. The Agency, therefore, has adopted a modified performance standard approach to financial assurance in the final rule. This approach consists of a revised set of performance standards and specified financial mechanisms that may be used to demonstrate financial assurance. The rule also specifies minimum provisions of each mechanism that must be satisfied to be considered an acceptable mechanism, including minimum qualifications for providers of assurance.

The revised performance criteria in today's rule are identical to those described in the proposed rule (renumbered in the final rule as § 258.74(1)), with the exception of the criterion in proposed § 258.32(e)(4) specifying that States consider flexibility to the owner or operator when developing financial assurance requirements. This criterion has been deleted from the final rule because it was redundant with the discussion of State approved mechanisms. While the

Agency continues to believe that a performance standard-based approach is most appropriate to allow States sufficient flexibility to select and tailor their financial assurance programs to allow as many options for compliance as possible, the performance criteria should ensure that all allowable financial mechanisms will provide for adequate financial assurance.

All of the mechanisms currently allowed under subtitle C are authorized to be used to comply with the financial assurance requirements in today's rule. In particular, the Agency specifically allows the use of gradually-funded trust funds to demonstrate financial assurance for the costs of closure, post-closure care, and corrective action. The Agency expects a majority of approved States will include these specified mechanisms, together with other mechanisms as appropriate, in their list of authorized compliance options.

In addition to the instruments specified in the performance standard, EPA is currently re-evaluating, and will consequently propose revisions to, the subtitle C corporate financial test as part of a separate rulemaking. The Agency would anticipate proposing at the same time conforming changes to the part 258 financial responsibility performance standard to allow this revised corporate test to be used as a compliance option for demonstrating financial responsibility for MSWLFs. These changes to the corporate financial test would be proposed on a timeframe similar to the local government financial test.

With respect to financial assurance for corrective action, the Agency recognizes that the cost and duration of a corrective action are likely to differ from the cost and duration of closure and post-closure care, and that allowable mechanisms for assuring closure and post-closure care may consequently differ from those appropriate for assuring corrective action. The discussion of allowable mechanisms below notes where today's rule accounts for such variations to address corrective action (e.g., the length of the trust fund pay-in period; the acceptability of insurance).

The provisions of today's rule are intended to ensure the reliability of each mechanism relative to the overall performance standard. Given the minimum requirements specified, the Agency believes that it is not necessary to limit allowable mechanisms, as some commenters suggested, to cash, surety bonds or certificates of deposit. The Agency tailored these minimum qualifications to the particular characteristics and industry practices of the providers of the financial mechanisms (e.g., sureties, banks, insurers, etc.) in order to ensure the effectiveness of the mechanism as well as the stability of the provider. The Agency believes this approach is preferable to applying the same criteria to all types of providers. In particular, the Agency believes it would be inappropriate to require all providers of financial assurance mechanisms to satisfy the subtitle C financial test, which was designed to assess a private corporation's ability to meet certain costs, not to evaluate the ability of a financial service's firm to carry out its business.

Commenters also urged the Agency to encourage the States to develop alternative financial assurance mechanisms. They argued that EPA should make the States aware of the need to be creative and expansive when devising financial responsibility mechanisms, and should provide additional guidance to the States. Several commenters urged the Agency to encourage States to establish State funds as an alternative mechanism, arguing that State funds are the only alternative available to landfill owners with limited resources.

The Agency agrees with commenters that alternative financial assurance mechanisms should be explored. To that end, today's rule permits the use, in States with approved programs, of any financial assurance mechanism that satisfies the performance standard. Subsections (7) and (8) below discuss specific alternatives that States may wish to consider.

To accommodate the self-implementing approach being taken for this rulemaking, today's rule also does not specify procedural requirements. The Agency recognizes that in order to function most effectively, many of the mechanisms specified in today's rule will require some interaction with the State regulatory agencies. To assist in uniform development of such procedural requirements in approved States, the Agency is including a brief discussion of some of these procedural requirements below. Certain of these more specific procedures and considerations are not, however, included in today's rule.

The following mechanisms are allowed in the final rule:

(1) Section 258.74(a) Trust Fund

Trust funds are sums of money set aside to cover anticipated future costs (e.g., closure, post-closure care or corrective action) and are typically overseen by a trustee (typically the trust department of a bank). The owner or operator would be the beneficiary of the trust, with the trustee responsible for making payments from the trust under certain conditions described below. The trustee is required to manage the trust according to the terms of the trust agreement and in accordance with applicable state law. A copy of the trust agreement must be placed in the facility's operating record. To ensure that the trust fund is properly managed, the final rule specifies that the trustee must have the authority to act as a trustee, and that the trustee's operations must be regulated and examined by a Federal or State agency. The governmental body with authority over the trustee's operations will depend on the type of financial institution the trustee represents. For example, a state-chartered financial institution, which might include commercial banks, savings and loans, mutual savings banks, credit unions and State-licensed foreign banks would be regulated by a State authority. Nationally-chartered commercial banks, nationally-licensed foreign banks and all Washington, DC, commercial banks are overseen by the Comptroller of the Currency in the Trust Division of the U.S. Treasury Department. Finally, nationally-chartered savings and loans and mutual savings banks are regulated by the Office of Theft Supervision, while nationally-chartered credit unions are overseen by the National Credit Union Administration. (Additional information concerning the qualifications of trustees may be found in "Financial Assurance for Closure and Post-Closure Care: A Guidance Manual, May 1982.)

While the final rule does not specify the wording of the trust agreement, an approved State implementing a part 258 MSWLF program may wish to specify wording to ensure that the trust is managed in a manner consistent with the performance criteria described in § 258.74(1). Wording of a model trust agreement could specify that the trust is irrevocable (i.e., that the owner or operator may neither alter the terms of the trust agreement nor terminate the trust except with the written consent of the trustee) and might specify the types of investment policies that the trustee must follow in managing the trust. The wording for the trust fund specified in subtitle C (40 CFR 264.151(a)) could be used as a model for trust agreement terms.

While the ultimate value of a closure or post-closure care trust fund at the time of closure must be equal to the cost estimates for closure or post-closure care (unless multiple instruments are being used for financial assurance as discussed below), the final rule allows

the trust to be gradually funded over the expected life of the facility and specifies how the value of the trust must be built up. This build-up would be accomplished through annual payments into the fund in a manner similar to that required under subtitle C. The amount of these payments, in the case of a trust fund for closure or post-closure care, is to be calculated using the following formula:

$$\frac{CE-CV}{Y}$$

where CE is the current closure or post-closure cost estimate (updated for inflation or other changes), CV is the current value of the trust fund (i.e., the value of the funds already paid into the trust), and Y is the number of years remaining in the pay-in period. The maximum pay-in period is the life of the facility permit, if applicable, or the remaining number of years of facility operating life. If the amount of the closure or post-closure cost estimate changes, the amount of the annual payments into the trust fund should be recalculated using the formula described above.

The requirements for a corrective action trust fund differ somewhat from the requirements for a closure or post-closure care trust fund for two reasons: (1) The size and duration of corrective action costs are significantly greater; and (2) corrective action financial assurance is required only upon the detection of a release while closure and post-closure financial assurance are required prior to the activities being undertaken. Thus, to be structured like the trust fund for closure and post-closure care, which ensures that the trust is fully funded by the time that the funds are needed (i.e., by the time that the facility closes), a trust fund for corrective action would need to be fully funded as soon as corrective action is triggered, which would pose an undue burden to nearly all owners or operators. To make the corrective action trust fund available to greater numbers of owners and operators while ensuring that funds are available to complete corrective action, the Agency is allowing an owner or operator to fund the trust gradually over the first half of the corrective action period in an amount that would ensure sufficient funds to cover the costs of corrective action incurred during the second half of the corrective action period.

The corrective action trust fund would therefore operate as follows. First, the maximum allowable pay-in period for a corrective action trust fund is one-half of the length of the corrective action period. Second, the required balance in a trust fund for corrective action at the end of the corrective action pay-in period must be sufficient to cover the remaining corrective action costs after the end of the pay-in period (i.e., the costs of corrective action to be incurred during the second half of the corrective action period). For example, if corrective action will take place over a ten-year period, payments into the trust fund would start at the beginning of the period and end in the fifth year. At the end of the fifth year, the amount of money in the trust fund would have to be sufficient to cover the corrective action costs estimated for the remaining five years of the corrective action period.

The trust fund for corrective action would be built up in a manner to that described for closure and post-closure care trust funds, with changes to accommodate the different pay-in period for trust funds for corrective action (as discussed above). The specific amount of the annual payments is to be calculated using the following formula:

$$\frac{RB-CV}{Y}$$

where RB is the most recent estimate of the required trust fund balance for corrective action (i.e., the total costs to be incurred during the second half of the corrective action period), CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.

In developing this pay-in formula the Agency accounted for the size and duration of corrective action costs and the resultant concern that more stringent financial assurance requirements could induce bankruptcies among facility owners and operators, thus increasing the number of unfunded corrective actions. Particularly since corrective action costs for known releases will be incurred concurrently with the costs of providing financial assurance for corrective action, the Agency is concerned that the impact of these two sets of simultaneous costs may increase the number of bankruptcies and the amount of unfunded corrective actions among small owners or operators. Such an outcome would defeat the purpose of more stringent requirements, which is to assure that all corrective action costs will be paid by owners or operators.

In addition, the financial assurance requirements for closure and post-closure care are designed to provide assurance before the beginning of closure or post-closure care; thus financial assurance is being provided for a future obligation.

Section 258.74(a)(5) of the final rule specifies that the initial payment into a closure or post-closure care trust fund must be made prior to the initial receipt of waste or the effective date of the rule, whichever is later. The initial payment into a corrective action trust fund must be made no later than 120 days after the corrective action remedy has been selected.

In order to ensure that adequate funds will be available for closure, post-closure care, and corrective action if an owner or operator switches from one of the other third-party mechanisms to a trust fund, today's final rule includes specific requirements for the initial payment into the trust in the event that an owner or operator is switching mechanisms. Today's rule requires that, if the owner or operator establishes a trust fund after having used one or more alternate mechanisms, the initial payment into the trust fund must be at least the amount that the fund would contain if the trust fund were established initially and annual payments were made according to the specifications of the rule. For example, if an owner or operator switching to a trust fund had been demonstrating financial assurance for ten years, he would need to calculate what the balance of a trust fund would have been, had he established one ten years previously.

Because the trust fund involves setting aside an owner or operator's actual funds (rather than obtaining a third-party guarantee that funds will be available when needed), the rule provides for reimbursement to the owner or operator for expenditures for closure, post-closure care, and corrective action as long as sufficient funds remain in the trust to cover the remaining costs. Under this rule, funds are released by the trustee in cases where sufficient funds remain in the trust to cover remaining closure, post-closure care and corrective action costs if the owner or operator documents and justifies the reimbursement and places this information in the facility's operating record. The owner or operator must also notify the State Director that the documentation of the justification for reimbursement has been placed in the operating record and that he has received reimbursement. The Agency notes that such a reimbursement system is suitable only for mechanisms such as trust funds, into which actual funds have been set aside. Because other

mechanisms that provide for third-party guarantees of payment (e.g., letters of credit) do not involve setting funds aside, owners and operators would not have to provide funds twice to meet the requirements. However, the owner or operator could be permitted to reduce the level of coverage of the other mechanisms provided that coverage remains sufficient to cover all remaining costs.

The Agency wishes to make clear that reimbursement of incurred expenses from a trust fund would not in any way release an owner or operator from the financial assurance requirements. All owners and operators would remain subject to the requirements until completion of closure, post-closure care and/or corrective action is certified and the State is notified in accordance with §§ 258.71(a), 258.72(a), and 258.73(a).

Under today's rule, trust funds may be terminated by the owner or operator only upon release from the financial assurance requirements, or if an alternate financial assurance mechanism is substituted.

(2) Section 258.74(b) Surety Bond Guaranteeing Payment or Performance

A surety bond guarantees payment for, or performance of, closure, post-closure care, or corrective action if the holder of the bond (the facility owner or operator) fails to fulfill these obligations. Surety bonds are generally issued by a surety company. Under the terms of a payment bond, the surety company issuing the bond promises to pay the costs of closure of post-closure care activities if the owner or operator is unable or unwilling to carry out those activities. With a performance bond, the surety company promises to either pay the required activities or to perform the required activities on behalf of the owner or operator. The Agency is allowing only performance bonds to be used to demonstrate financial assurance for corrective action. Because financial assurance for corrective action is not required until a release has occurred, a payment bond would have to guarantee that the owner or operator would fully fund a standby trust fund at the time a release was detected. This is a highly unlikely scenario because an owner or operator would most likely opt to use a trust fund with a pay-in period. If the owner or operator is using a payment bond to satisfy the requirements, he must establish a standby trust fund at the same time that the assurance mechanism is established. (A more detailed discussion of standby trusts is provided below.) A copy of the bond must be placed in the facility's operating record

To ensure that the surety bond provides an adequate guarantee of funds, the final rule requires that the surety company issuing the bond must be listed in Circular 570 of the U.S. Department of the Treasury. Circular 570 is a list of surety companies which have been approved for writing construction bonds and other surety bonds for federal projects. The rule also requires that the bond must be issued in an amount equal to the cost estimates for closure, post-closure care or corrective action (unless multiple instruments are used as described below) and must be effective prior to the initial receipt of waste or by the effective date of the rule, whichever is later (in the case of closure and post-closure care), or, in the case of corrective action, within 120 days of the selection of the corrective action remedy. The rule also requires surety bonds to contain provisions preventing cancellation of the bond either by the surety, except with 120 days advance notification of cancellation to the owner or operator and to the State, or by the owner or operator unless an alternate mechanism has been obtained. Without such cancellation provisions, a third-party provider of assurance might cancel a mechanism immediately prior to closure or during the post-closure care or corrective action period in order to avoid payment of those costs.

While not required in today's rule, States implementing a part 258 MSWLF program may wish to specify the wording of surety bonds used to demonstrate financial assurance to help ensure that the bonds meet the performance standard and to minimize State review burden. States can use the surety bond language specified in subtitle C requirements as a model (40 CFR 264.151 (b) and (c)).

Section 258.74(b)(4) of today's rule requires the establishment of a standby trust fund to accompany a surety bond. A standby trust fund serves as a depository for funds collected from the providers of financial assurance. Standby trust funds are only necessary when an independent depository is required. For example, under Federal law, all payments to a Federal agency or official must be deposited with the U.S. Treasury and cannot be earmarked for a specific use without reallocation (31 U.S.C. 3302). Therefore, to guarantee that the funds assured for a specific facility are directed to the costs of closure, post-closure care or corrective action for that site, a standby trust fund may be necessary. The standby trust should be structured in a manner substantially similar to the trust fund described above.

In States implementing today's revised criteria, it may be necessary to require owners and operators using other third-party mechanisms to establish a standby trust for those mechanisms if State law would otherwise prevent the State regulatory authority from accessing the funds provided by the mechanism. If a State determines that an account can be established within its treasury into which funds drawn on the financial assurance mechanisms can be deposited and withdrawn without special action to pay the site-related costs, then such a State may use its treasury as the depository mechanism and no standby trust would be required. Each State should examine its State law on the issue of earmarking funds in and appropriating funds from its general treasury.

(3) Section 258.74(c) Letter of Credit

A standby letter of credit is an instrument issued by a bank or other financial institution that guarantees payment to the beneficiary (the State regulatory agency) if the holder of the letter (the owner or operator) fails to perform certain obligations. Standby letters of credit differ from traditional commercial letters of credit in that standby letters of credit cannot be drawn upon unless a specified event occurs. To ensure that the letter of credit provides secure funds for closure, post-closure care and corrective action for known releases, the final rule requires that the financial institution issuing the letter of credit must be an institution with the authority to issue such a letter and whose letter-of- credit operations are regulated and examined by a Federal or State agency. These agencies would be the same agencies discussed above as having authority to regulate trustees, and would similarly differ depending on the type of bank issuing the letter of credit. (Additional information is available in "Financial Assurance for Closure and Post-Closure Care: A Guidance Manual," May 1982.) The letter of credit, like the surety bond described above, must be issued in an amount equal to the closure, post-closure care, or corrective action cost estimates (unless multiple instruments are being used for financial assurance) and must be effective prior to initial receipt of waste or the effective date of the rule, whichever is later (in the case of closure and post-closure care), or, in the case of corrective action, within 120 days of the selection of the corrective action remedy. The letter of credit must

also contain provisions limiting cancellation similar to those described above for surety bonds. A copy of the letter of credit must be placed in the facility's operating record.

While not required in today's final rule, States implementing part 258 MSWLF programs may wish to consider requiring specific wording for letters of credit to ensure consistency among instruments and minimize the burdens of State reviews. States may wish to refer to the specified language in the subtitle C requirements as guidance (40 CFR 264.151(d)).

(4) Section 258.74(d) Insurance

Insurance is a contractual arrangement, called the policy, under which the insurer agrees to compensate the policyholder for losses. The purchase of insurance transfers the financial risk from the policyholder to the insurer. While insurance is generally considered most appropriate for coverage of contingent or unknown events, such as accidents or natural disasters, insurance is an allowable mechanism for assuring closure and post-closure care. Insurance is not an allowable mechanism for demonstrating financial assurance for corrective action under the requirements promulgated today for MSWLFs because insurance is inappropriate coverage for known corrective action. Financial assurance for corrective action is not required until a release has been detected and insurers will not issue policies to cover the cost of damages that have already occurred (analogous to issuing fire insurance for a burning building).

The final rule requires that the insurance policy must be written to cover the full amount of the closure or post-closure care cost estimates (unless multiple instruments are being used). An insurance policy for closure or post-closure care must be in effect prior to the initial receipt of waste or the effective date of the rule, whichever is later, and a copy of the insurance policy must be placed in the facility's operating record. To ensure that the insurer is a reliable source of financial assurance, the final rule requires that insurers issuing policies used to demonstrate financial assurance for closure and post-closure care must, at a minimum, be licensed or eligible to provide insurance as an excess or surplus lines insurer, in one or more States. In addition, today's rule specifies that insurance policies may be canceled by the insurer only for non-payment of premium and only 120 days after notice is sent to the owner or operator and to the State. Owners and operators may cancel the policy if they have obtained a replacement mechanism or if they have been released from financial assurance requirements.

(5) Section 258.74 (e) and (g) Corporate Financial Test and Guarantee

Section 258.74 (f) and (h) Local Government Test and Guarantee

While no specific financial tests or guarantee requirements are being finalized in today's rule, the Agency plans to propose part 258 requirements that include these requirements in 1992. The Agency anticipates that these four requirements would take effect concurrently.

(6) Section 258.74(i) State-Approved Mechanisms

Today's rule authorizes the use, only in approved States, of any mechanism that is approved by the State. State-approved mechanisms include any financial mechanisms, in addition to those described above, approved by a State for use in demonstrating financial assurance. Any State-approved mechanism must meet the performance criteria specified in § 258.74(1). A State may approve a mechanism for use generally or it may choose to approve individual mechanisms submitted by owners and operators on a case-by-case basis. In either case, a State should develop a process for approval to ensure that mechanisms meet the performance standard. In addition, States may wish to specify mechanism language and include provisions regarding qualifications of providers and limiting cancellation.

Given this framework, the Agency encourages States to consider developing innovative approaches to fulfilling the financial assurance requirements. The Agency expects a mix of instruments provided by third parties and State-sponsored mechanisms to be developed under this section. States may wish to take into account a variety of factors, such as the financial capability of local owners and operators, when developing new mechanisms. Depending on the State's financial resources and on the population of owners and operators, a State may wish to institute and subsidize a loan or grant program to assure that closure, post-closure care, and corrective action obligations will be met. Other mechanisms might include certificates of deposit, escrow accounts, enterprise funds, and enforced local government planning requirements. As a further example, the establishment of a financial assurance fund organized by the State and paid for by participating MSWLFs may prove to be an attractive alternative in many cases. The Agency intends to prepare guidance that will aid the State in establishing State-sponsored financing programs.

(7) Section 258.74(j) State Assumption of Responsibility

State assumption of responsibility involves the direct participation of the State in assuring that funds will be available to cover the costs of closure, post-closure care, or corrective action. An owner or operator will be in compliance if a State either assumes legal responsibility for the owner or operator's compliance with the closure, post-closure care and/or corrective action obligations, or if it assures that funds will be available from State sources to cover the obligations. State assumption of responsibility can take many forms, including purchase of another financial mechanism on behalf of the owner or operator, and the issuance of a State guarantee. A State could choose to assume responsibility only under certain specified conditions (e.g., where no responsible owner or operator can be found or in emergencies where the owner or operator is unable to respond effectively). Options for States to generate funds to cover the costs associated with State assumption of responsibility include funding through general revenue, a special tax, contributions from the MSWLFs receiving assurance, or tipping fees charged by participating MSWLFs. States may also wish to consider including provisions enabling the State to obtain reimbursement from owners and operators benefiting from State assumption. As with State-approved mechanisms, any mechanism for State assumption of financial responsibility must meet the performance criteria specified in § 258.74(1).

(8) Section 258.74(k) Use of Multiple Financial Mechanisms

Owners and operators may use more than one mechanism to cover their closure, post-closure care, or corrective action costs. The total amount of assurance provided by the mechanisms together must equal the cost estimates for closure, post-closure care, or corrective action. The final rule requires that, if a financial test mechanism is to be combined with a guarantee provided by a corporate relative, then the financial statements of the two firms may not be consolidated. Such a limitation is necessary because if consolidated financial statements are

used, then assets of the two firms may be double-counted for the purpose of determining whether each firm meets the requirements. This double counting may prevent the financial test from accurately measuring the financial strength of the two firms involved.

[FR Doc. 91-22963 Filed 10-8-91; 8:45 am]
BILLING CODE 6560-50-M