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Air

Municipal Solid Waste Landfills, Volume 1:

Summary of the Requirements for the New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills

FINAL

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ABSTRACT

This volume is one of several documents designed to assist States, EPA regional offices, and municipal solid waste (MSW) landfill owners and operators in implementing the New Source Performance Standards (NSPS) and Emission Guidelines (EG) for MSW landfills. Full references to all related documents are provided. Landfills that commenced construction, modification, or reconstruction after May 30, 1991 are subject to the Federal NSPS (40 CFR 60 Subpart WWW). The EG (40 CFR Part 60 Subpart Cc) apply to existing landfills that commenced construction, modification, or reconstruction before May 30, 1991, and that have accepted waste at any time since November 8, 1987, or have additional capacity for future waste deposition. The requirements of the NSPS and EG are similar. Enclosed is a summary of the NSPS and EG and the control, monitoring, recordkeeping and reporting requirements. Explanations are included to help implementing agencies determine applicability, ensure compliance, collect and review reports, and conduct inspections. The appendices include tools for ensuring compliance, such as test methods, checklists, and calculation procedures.

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Municipal Solid Waste Landfills, Volume 1
Summary of the Requirements for the New
Source Performance Standards and Emission Guidelines
for Municipal Solid Waste Landfills
(EPA-453R/96-004)

Available at:

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Docket Number: A-88-09
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The file is located under:

Actions Sorted by CAA Title
Title III

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LIST OF ACRONYMS AND ABBREVIATIONS

Act	Clean Air Act (of 1990)
AFS	Aerometric Emissions Information Retrieval System Facility Subsystem
BDT	Best Demonstrated Technology
BID	Background Information Document
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FID	Flame Ionization Detector
LFG	Landfill Gas
m^3	Cubic meters
Mg	Megagram (2204 lb)
MSW	Municipal Solid Waste
MWC	Municipal Waste Combustor
NAAQS	National Ambient Air Quality Standards
NMOC	Non-methane Organic Compounds
NSPS	New Source Performance Standard
NSR	New Source Review
OVA	Organic vapor analyzer
PCP	Pollution Control Project
RCRA	Resource Conservation and Recovery Act
SIP	State Implementation Plan
TTN Web	EPA Technology Transfer Network Website

1.0 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide guidance to the implementing agency on the steps necessary to implement the Emission Guidelines (EG) and New Source Performance Standards (NSPS) for municipal solid waste landfills. This is the first of two guidance documents designed to assist States, EPA regional offices, and Municipal Solid Waste (MSW) landfill owners and operators in implementing the EG and NSPS. The NSPS regulate emissions from new landfills and the EG regulate emissions from existing landfills. This enabling document supplements the EG and NSPS, explains landfills control, monitoring, recordkeeping and reporting requirements, and assists States in determining compliance. Included are discussions on activities to implement the NSPS and EG, how to identify new landfills, ensure compliance, and collect and review reports. This document also includes a discussion on the procedures to prepare for and conduct on-site inspections to ensure compliance. The appendices contain tools for determining compliance with the rules.

States must develop State Plans as part of the implementation process for the EG. The required content of State Plans and the adoption and submittal schedule are discussed in detail in "Municipal Solid Waste Landfills, Volume 2: Summary of the Requirements for Section 111(d) State Plans for Implementing the Municipal Solid Waste Landfill Emission Guidelines," (EPA-456/R-96-005) (MSW Landfills, Volume 2). The description and location of MSW Landfills, Volume 2 and other helpful documents is provided in Section 1.4, Related Documents.

1.2 REGULATORY BACKGROUND

The NSPS implement section 111(b) of the Clean Air Act (Act) is the basis for regulations issued for categories of new emission sources which "... cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." The responsibility of implementing the NSPS lies with the U.S. Environmental Protection Agency (EPA). However, the EPA has the ability to delegate authority to the State. The EG implement section 111(d) of the Act. The EG require a State to submit a plan that establishes emission standards for existing sources when NSPS have been promulgated for a designated pollutant, such as landfill gas (LFG). The EPA publishes EG to establish minimum requirements that States can use in establishing their emission standards. States have responsibility for implementing the EG and are required to submit an implementation plan to the EPA.

The NSPS and EG were proposed in the Federal Register on May 30, 1991 (58 FR 24468). On June 21, 1993, EPA published a notice in the Federal Register (58 FR 33791) providing information on additional data used in developing the final NSPS and EG for MSW landfills. The final standards and guidelines were published in the Federal Register on March 12, 1996 (61 FR 9905). Amendments to the final standards and guidelines appeared as a direct final notice in the Federal Register on June 16, 1998, (63 FR 32743). The final rule, including the direct final amendments, is contained in Appendix A. The amendments correct errors and clarify regulatory text regarding primarily applicability and design capacity. The direct final is effective as of August 17, 1998.

1.3 BACKGROUND ON LANDFILL GAS

How Is Landfill Gas Formed?

Landfill gas is generated by bacterial decomposition of organic materials in solid waste. General practice for landfills is to provide a daily cover of soil over the refuse. Therefore, refuse is insulated from the atmosphere and decomposition occurs anaerobically (without oxygen). However, air is always present initially and, in some circumstances, may never be fully expelled by anaerobic gases.

What Is Contained in Landfill Gas and How Does it Affect the Public?

The composition of LFG is approximately 50 percent methane, 50 percent carbon dioxide, and less than 1 percent of many different "nonmethane" organic gases, described as NMOC. The NMOC originate from organic chemicals present in municipal waste that has been placed in a landfill and from products of refuse decomposition. Municipal wastes may include waste items such as paints, solvents, pesticides, and adhesives which contain numerous organic compounds. These organic compounds are stripped from the refuse by the generation of methane and carbon dioxide from decomposing refuse.

Evidence from EPA and State studies indicates that LFG has adverse effects on both public health and welfare. These adverse effects include:

(1) groundlevel ozone formation,
(2) cancer and noncancer health effects,
(3) odor nuisance,
(4) methane migration (fire hazard) potential, and
(5) global warming from methane emissions.

How Are Landfills Different From Other Stationary Sources?

The primary difference between an MSW landfill and a typical stationary source is that a landfill may continue to generate and emit a significant quantity of emissions for more than 10 years after the facility has closed or has ceased to accept waste. A typical stationary source (e.g., a utility boiler) generates emissions only while it is in operation.

What Are Current Methods for Controlling Landfill Gas?

Control of LFG emissions requires both an effective gas collection system and a control device. Landfill gas collection systems can be categorized as one of two basic types: active and passive gas collection systems. Active systems use mechanical blowers or compressors to create a vacuum that draws LFG through deposited refuse and into gas collection wells. Passive systems rely on the natural LFG pressure within the landfill that creates a positive pressure gradient so LFG flows from the landfill into the gas collection wells. The rule provides minimum criteria for an active gas collection system. The rule includes provisions for using

alternative designs for a gas collection system (active or passive), as long as the alternative designs are demonstrated to be equivalent.

Once LFG enters a collection well, via either an active or passive collection system, the gas is directed to a control device through a network of piping. Landfill gas may be controlled by recovering the gas as a fuel source or by destroying the organic content of the gas. Since methane comprises nearly 50 percent of LFG, the gas can be processed and sold as a fuel. Generally, the goal is to process LFG to a purity level equivalent to that of pipeline natural gas.

Control methods that destroy the organic content of LFG include flares, gas turbines, internal combustion engines, and boilers. The rule requires injecting LFG into the combustion zone of these combustion devices to ensure the complete destruction of the organic content. Gas turbines, internal combustion engines, and boilers provide the opportunity for energy recovery, while flares do not. Energy recovery often provides an economic incentive since steam or power generated by these devices can be used on site or sold.

1.4 RELATED DOCUMENTS

A number of related documents and resources are available that may prove useful to States, EPA regional offices, and landfill owners and operators. Documents posted on the TTN Web may be accessed by computer as described on page iv. The user can download an electronic copy from the EPA Technology Transfer Network Website (TTN Web). Otherwise, printed copies of the documents are available as indicated.

- "Municipal Solid Waste Landfills, Volume 2: Summary of the Requirements for Section 111(d) State Plans for Implementing the Municipal Solid Waste Landfill Emission Guidelines," EPA-456R/96-005 (MSW Landfills, Volume 2) has been posted on the TTN Web, and explains the State Plan development and approval process. MSW Landfills, Volume 2 outlines and explains the required content of State Plans, outlines the timeline and responsibilities for developing and submitting State Plans, and answers general questions about how to prepare State Plans. The document is also available in the docket (see address on page iv).

- "Municipal Solid Waste Landfill New Source Performance Standards and Emission Guidelines—Issues and Answers," is posted on the TTN Web

and contains a periodically updated summary of answers to questions EPA has recently been asked about the MSW Landfills NSPS and Emission Guidelines.

- "Air Emissions from Municipal Solid Waste Landfills — Background Information for Final Standards and Guidelines," EPA-453/R-94-021 contains summaries of public comments received on the landfills NSPS and Emission Guidelines, EPA's responses, and the estimated impacts of these regulations. This document may be obtained from the TTN Web, the U.S. EPA Library (MD-33), Research Triangle Park, NC 27711, telephone (919) 541-2777, or from the docket (see addresses on page iv).

- EPA's Landfill Methane Outreach Program (LMOP). To cost-effectively reduce methane emissions from landfills, the EPA encourages the development of environmentally and economically beneficial landfill gas-to-energy projects through the LMOP. The LMOP works with States, utilities, and the landfill gas-to-energy industry to facilitate the development of successful projects. One of the key ways the LMOP does this is by publishing technical information on how to develop a gas-to-energy project including current technology, cost, and financing options, and regulatory considerations. Appendix D includes information on how to contact LMOP.

- "Landfill Gas Emissions Model" Version 2.0 , and User's Manual, February 1998. The computer model can be used to calculate annual emission rates as to determine applicability of the NSPS or Emission Guidelines or for State emission inventory or other purposes. The user's guide and electronic files can be purchased from the National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161, telephone: (703) 487-4650, or accessed on the TTN Web at http://www.epa.gov/ttn/catc/products.html#software.

1.5 ORGANIZATION OF THIS DOCUMENT

This document is organized into four sections and eleven appendices. Section 2 presents a brief overview of the regulations to provide the implementing agency with a basic understanding of the requirements of the EG and NSPS. Section 3 provides guidance on activities to implement and ensure compliance with the EG and NSPS. Section 4 provides a discussion on procedures to prepare for and conduct on-site inspections to ensure compliance. The appendices include copies of the applicable regulations and tools for determining compliance. Table 1-1 summarizes the contents of these appendices.

TABLE 1-1. CONTENTS OF THE APPENDICES

Appendix	Contents
A	Subparts Cc, WWW, and amendments, and accompanying reference methods promulgated with the rule
B	One additional test method referred to by the regulations
C	40 CFR Part 60, Subpart A (General Provisions), which applies to all NSPS
D	MSW Landfill Contacts
E	Collection system design plans
F	Reporting checklists for use by the implementing agency to determine whether all applicable data is reported by the landfill
G	On-site inspection checklist for use by the implementing agency to determine compliance
H	Blank reporting forms that fulfill the reporting requirements and that can be submitted by the landfills
I	Tiered NMOC emission calculation procedures
J	Information on an EPA computer model that can be used to estimate landfill emissions
K	Spreadsheet to track reports from landfills

2.0 OVERVIEW OF THE STANDARDS AND GUIDELINES

This section provides an overview of requirements for the NSPS and EG for MSW landfills. Requirements for the NSPS are discussed in section 2.1. Requirements for the EG are discussed in section 2.2. The requirements of these two standards are parallel so the majority of items discussed for the NSPS are generally applicable to the EG, except where noted.

2.1 NEW SOURCE PERFORMANCE STANDARDS (40 CFR 60, SUBPART WWW)

The requirements for these NSPS are summarized under a series of topics as shown in Table 2-1. These topics organize the requirements in a linear and progressive order, thereby providing more clarity and reduced repetition. The summary also includes references for locating each requirement in the published rule. The published rule is organized by headings similar to those shown in Table 2-2.

2.1.1 Applicability Determinations

How Is a "New" Landfill Defined?

The NSPS applies to "new" landfills. A "new" landfill is defined as a landfill that commenced construction, modification, or reconstruction on or after May 30, 1991. The implementing agency will determine whether changes to a landfill's design or operation meet the definitions of modification or reconstruction discussed below. The EG applies to "existing" landfills. An "existing" landfill is a landfill that is not a “new” landfill.

TABLE 2-1. OVERVIEW TOPICS FOR THE MSW LANDFILL NSPS

2.1.1 APPLICABILITY DETERMINATIONS

How Is a "New" Landfill Defined?

What Is Landfill Size Exemption?

How Is the Design Capacity Determined?

What Portions of a Landfill Are Subject to the Rule?

Will Remedial Actions Affect Applicability?

How Does New Source Review Affect Landfills?

2.1.2 REGULATORY STANDARDS

How Is the Need to Control Landfills Determined?

How Are NMOC Emissions Calculated?

What Is the Required Gas Collection Technology?

What Are the Operational Requirements for the Gas Collection System?

What Is the Required Gas Control Technology?

What Is the Compliance Schedule for Installing Controls?

When Can Gas Collection and Control Systems Be Removed?

2.1.3 DEMONSTRATING COMPLIANCE

What Must Be Monitored?

What Recordkeeping Must Be Kept?

What Must Be Reported?

TABLE 2-2. ORGANIZATION OF THE NSPS, EG, AND TEST METHODS

Part 60, Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills	
§ 60.750	Applicability, Designation of Affected Facility, and Delegation of Authority
§ 60.751	Definitions
§ 60.752	Standards for Air Emissions from Municipal Solid Waste Landfills
§ 60.753	Operational Standards for Collection and Control Systems
§ 60.754	Test Methods and Procedures
§ 60.755	Compliance Provisions
§ 60.756	Monitoring of Operations
§ 60.757	Reporting Requirements
§ 60.758	Recordkeeping Requirements
§ 60.759	Specifications for Active Collection Systems
Part 60, Subpart Cc - Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills	
§ 60.30c	Scope
§ 60.31c	Definitions
§ 60.32c	Designated Facilities
§ 60.33c	Emission Guidelines for Municipal Solid Waste Landfill Emissions
§ 60.34c	Test Methods and Procedures
§ 60.35c	Reporting and Recordkeeping Guidelines
§ 60.36c	Compliance Times
Part 60, Appendix A - Reference Methods (the following methods have been added)	
Method 2E	Determination of Landfill Gas Production Flow Rate
Method 3C	Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources
Method 25C	Determination of Nonmethane Organic Compounds (NMOC) in Landfill Gases

An existing landfill that commenced construction before May 30, 1991, but began accepting waste after May 1991 would be subject to the EG rather than the NSPS. Figure 2-1 illustrates whether a landfill is subject to the EG or NSPS based on its construction and modification history.

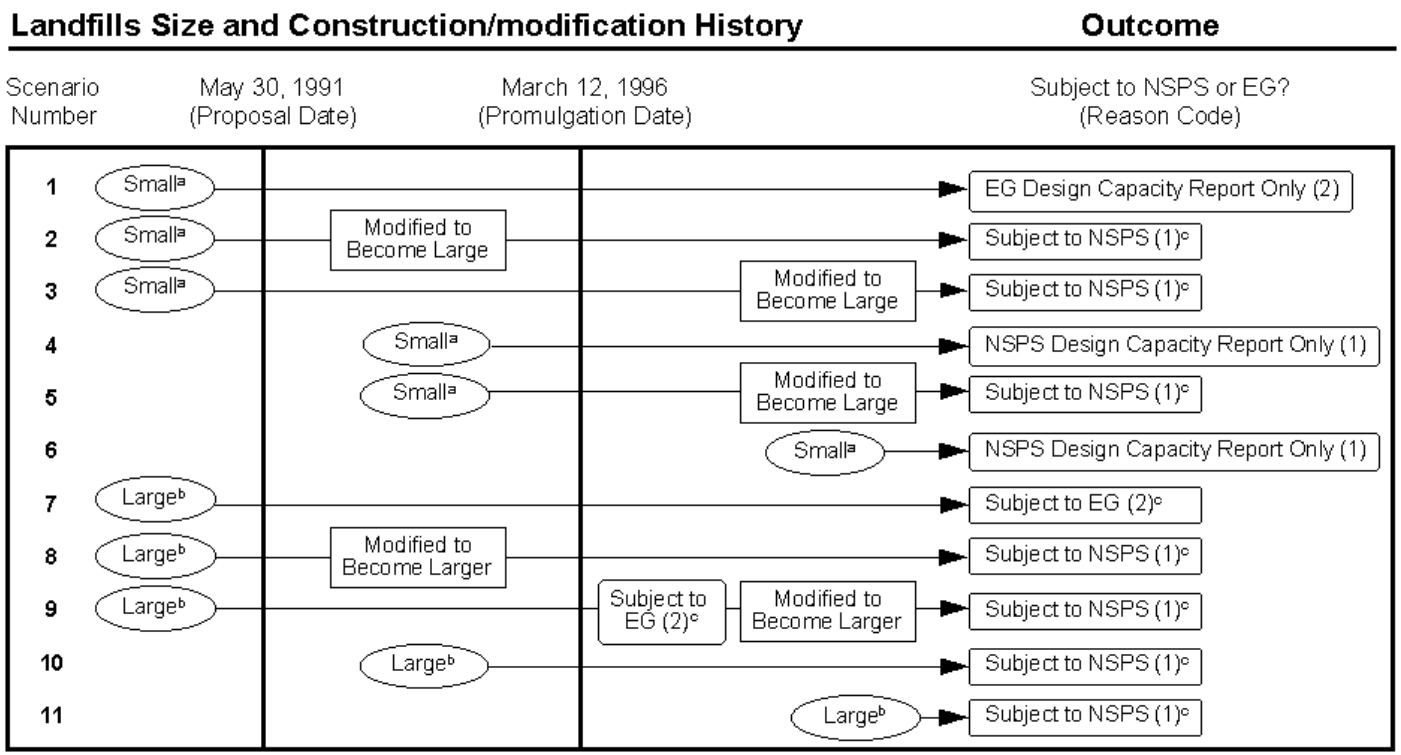
If an existing landfill has been or is "modified" on or after May 30, 1991, it will be subject to the provisions of the NSPS. The definition of "modification" specific to landfills is included in the landfill NSPS (§ 60.751) and is based on the landfill's design capacity. A modification is an increase in the permitted design capacity caused by an increase in the horizontal or vertical dimensions of the landfill. Such a modification makes the landfill subject to the NSPS. Modification does not occur until the owner or operator commences construction on the horizontal or vertical expansion. Existing landfills that make an operational change (for example, increasing the moisture content of the waste, increasing the physical compaction on the surface, changing the cover material or thickness of daily cover, and changing bailing or compaction practices), but do not increase the horizontal or vertical dimensions of the landfill continue to be subject to the EG rather than the NSPS.

Reconstructions are unlikely for landfills. As specified in the NSPS General Provisions (§ 60.15), reconstructions are "the replacement of components of an existing facility [landfill] to such and extent that: the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost of a comparable entirely new facility [landfill]..." The Agency knows of no situation where this would occur at a landfill.

What Is the Landfill Size Exemption?

Each new landfill with a design capacity below 2.5 million megagrams (Mg) or 2.5 million cubic meters (m^3) is exempt from most of the requirements in this rule. A small landfill with a capacity below the exemption level is required only to submit an Initial Design Capacity Report to the implementing agency [§ 60.752(a)]. The report documents the current design capacity of the landfill (see section 2.1.3 Demonstrating Compliance, Initial Design Capacity Report).

If the design capacity of a small landfill is ever increased to a revised capacity equal to or greater than 2.5 million Mg and 2.5 million m^3, the landfill is no longer exempt from the compliance requirements of the rule. The EG and the NSPS require the landfill to report



Code for Reason Landfill is Subject to NSPS:
(1) Commenced construction, modification, or reconstruction on or after May 30, 1991.

Code for Reason Landfill is Subject to Emission Guidelines:
(2) Landfills that commenced construction, modification, or reconstruction before May 30, 1991, are subject to the EG.

[a]Small means design capacity < 2.5 million Mg or 2.5 million m^3.
[b]Large means design capacity ≥ 2.5 million Mg and 2.5 million m^3.
[c]"Subject to" means the landfill must submit annual emission reports and must install controls if emissions are ≥ 50 Mg/yr.

Figure 2-1. Landfill NSPS or EG Applicability Based on Size and Construction and Modification History

any increase in design capacity that results in a capacity above the design capacity cutoff (see section 2.1.3 Demonstrating Compliance, amended Design Capacity Report).

How Is the Design Capacity Determined?

The Initial Design Capacity Report is used to determine the design capacity of the landfill. Most landfills have permits from a State, local, or tribal agency that indicate the design capacity of the landfill. If there are multiple permits, the most recent permit is used to determine design capacity. A permit may express design capacity on a volumetric basis or a mass basis. The owner or operator may choose to convert the design capacity from volume to mass or from mass to volume, using a site-specific density, in order to demonstrate that the design capacity is less than the 2.5 million Mg or 2.5 million m^3 design capacity cutoff level. If the density changes, the design capacity changes. Therefore, the site-specific density must be recalculated annually. If a landfill does not have a permit specifying design capacity, the design capacity must be calculated. The various calculations and the contents of an Initial Design Capacity Report are discussed in section 2.1.3 Demonstrating Compliance.

What Portions of a Landfill Are Subject to the Rule?

When the rule applies to a landfill, it applies to the "entire landfill." An entire landfill is defined as the total landfill property designated for solid waste disposal irrespective of subdividing geographical landmarks such as access roads or disposal cell boundaries, and under common ownership or control. The total landfill property includes all areas actively receiving refuse, all closed disposal cells, and all areas that may be designated to receive refuse in the future.

Will Remedial Actions Affect Applicability?

Remedial actions generally will not trigger NSPS for a landfill. Specifically, CERCLA remedial actions, RCRA correction actions, and State remedial actions are not considered construction, modification, or reconstruction and would not subject a landfill to the NSPS.

How Does New Source Review Affect Landfills?

In addition to the NSPS, landfills may be subject to the New Source Review (NSR) requirements of the Act. The NSR program requires the preconstruction review of major new sources and major modifications. The review includes a control technology review and an analysis of the air quality impacts of the new or modified source. New landfills that are major sources and existing landfills that make modifications that result in significant emissions increases are subject to major NSR requirements. For example, a landfill may install a combustion device to control NMOC, but simultaneously increase secondary emissions. However, there is an exemption of NSR that may be available to an existing landfill that would otherwise trigger NSR. This Pollution Control Project (PCP) exclusion was established to allow States to exempt from major NSR PCPs that are, on balance, "environmentally beneficial." Landfills that apply controls to comply with the EG may qualify for the PCP exclusion. EPA has issued guidance on whether such projects as adding combustion controls at a landfill qualify for the PCP exclusion. On a case-by-case basis, States may use the EPA guidance to determine whether projects such as the addition of combustion controls at landfills qualify for the PCP exemption. NSR and the PCP exclusion are discussed in detail in MSW Landfills, Volume 2.

2.1.2 Regulatory Standards

The provisions of the NSPS apply to all "new" landfills with a maximum design capacity equal to or greater than 2.5 million Mg and 2.5 million m^3. The provisions include criteria for determining landfill control requirements, design and operating specifications for control equipment, compliance schedules, and criteria for removal of controls. The provisions also include a series of monitoring, recordkeeping, and reporting requirements, which are discussed in section 2.1.3.

How Is the Need to Control Landfills Determined?

Control requirements for a landfill are determined by calculating the NMOC emission rate from the landfill. The NMOC emission rate has been selected as a surrogate for LFG emissions. Each landfill that is at least 2.5 million Mg and 2.5 million m^3 in design

capacity must perform an initial NMOC emissions rate calculation until the landfill has installed a gas collection and control system according to specifications in the rule.

If the landfill NMOC emission rate is determined to be equal to or greater than 50 Mg/yr, the landfill owner or operator is required to install a gas collection and control device to reduce the landfill NMOC emissions [§ 60.752(b)(2)]. If the landfill NMOC emission rate is determined to be less than 50 Mg/yr, then the landfill only needs to calculate and report its NMOC emission rate periodically. An NMOC Emission Rate Report is submitted each year until such time as the recalculated NMOC emission rate is equal to or greater than 50 Mg/yr or the landfill ceases to accept waste [§ 60.752(b)(1)].

The NMOC emission rate is calculated periodically because landfill emissions change over time. These factors are described in greater detail in the background information document (BID) published at proposal and entitled "Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines" (EPA-450/3-90-011a).

How Are NMOC Emissions Calculated?

The rule includes detailed procedures for calculating NMOC emissions from landfills (§ 60.754). The procedure consists of a three-tiered approach, with Tier 1 being the simplest. All "tier" calculations provide an estimate of NMOC emissions, as a function of site-specific information such as age of landfill and waste acceptance rate and three variables:

- Methane generation rate constant, (k);
- Refuse methane generation potential, (L_o); and
- NMOC concentration in LFG (C_{NMOC}).

Tier 1 calculations use default values for k, L_o, and C_{NMOC}, and they tend to overstate NMOC emission rates. An alternative default methane generation rate constant (k) of 0.02 per year is provided for Tier 1 calculations for landfills in geographical areas with an annual average precipitation of less than 25 inches. The average annual precipitation must be measured by the nearest representative meteorological site. (Landfills located in geographical areas with low precipitation experience slower decomposition of their waste than landfills located in

geographical areas with moderate to high rainfall.) For details on tier equations and calculation procedures, see appendix I.

If Tier 1 calculations indicate emissions equal to or greater than 50 Mg/yr, a landfill owner or operator has two compliance options. The first option requires the landfill owner or operator to initiate control of NMOC emissions from the landfill by submitting a design plan for a gas collection and control system. The second option requires the landfill owner or operator to recalculate the NMOC emission rate using Tier 2 or Tier 3 procedures. These additional tier procedures determine site-specific data through testing. However, a landfill owner or operator may elect to skip any or all of the additional tier procedures and install landfill controls at any time after the NMOC emission rate has been calculated to exceed the emission limit.

Tier 2 calculations are based on site-specific measured NMOC concentrations and yield a more accurate estimate of the NMOC emission rate. The NMOC concentrations are determined by performing EPA Method 25C or Method 18. Tier 2 measurements require the waste to be 2 years old. If the first waste deposited is not 2 years old at the time Tier 2 calculations are required to be done, the landfill owner or operator may wait until the waste is 2 years old. If Tier 2 calculations result in NMOC emissions equal to or greater than 50 Mg/yr, then Tier 3 calculations may be performed.

Tier 3 calculations are based on both site-specific NMOC concentrations and a site-specific methane generation rate constant (k). Tier 3 calculations yield the most accurate determination of NMOC emission rate. The NMOC concentrations are determined by following the Tier 2 procedures. The methane generation rate (k) is determined by performing EPA Method 2E.

It is unlikely that a site-specific Tier 3 evaluation will lower the annual NMOC emission estimate below the 50 Mg/yr threshold unless the Tier 2 calculation is only slightly higher than the threshold. Dry, arid regions may show a more significant lowering of emissions at Tier 3 than wet regions.

Figure 2-2 presents a flow chart showing the steps for determining NMOC emissions from a landfill, and for determining whether the landfill must be controlled. Additional information on tier equations and calculation procedures is included in appendix I.

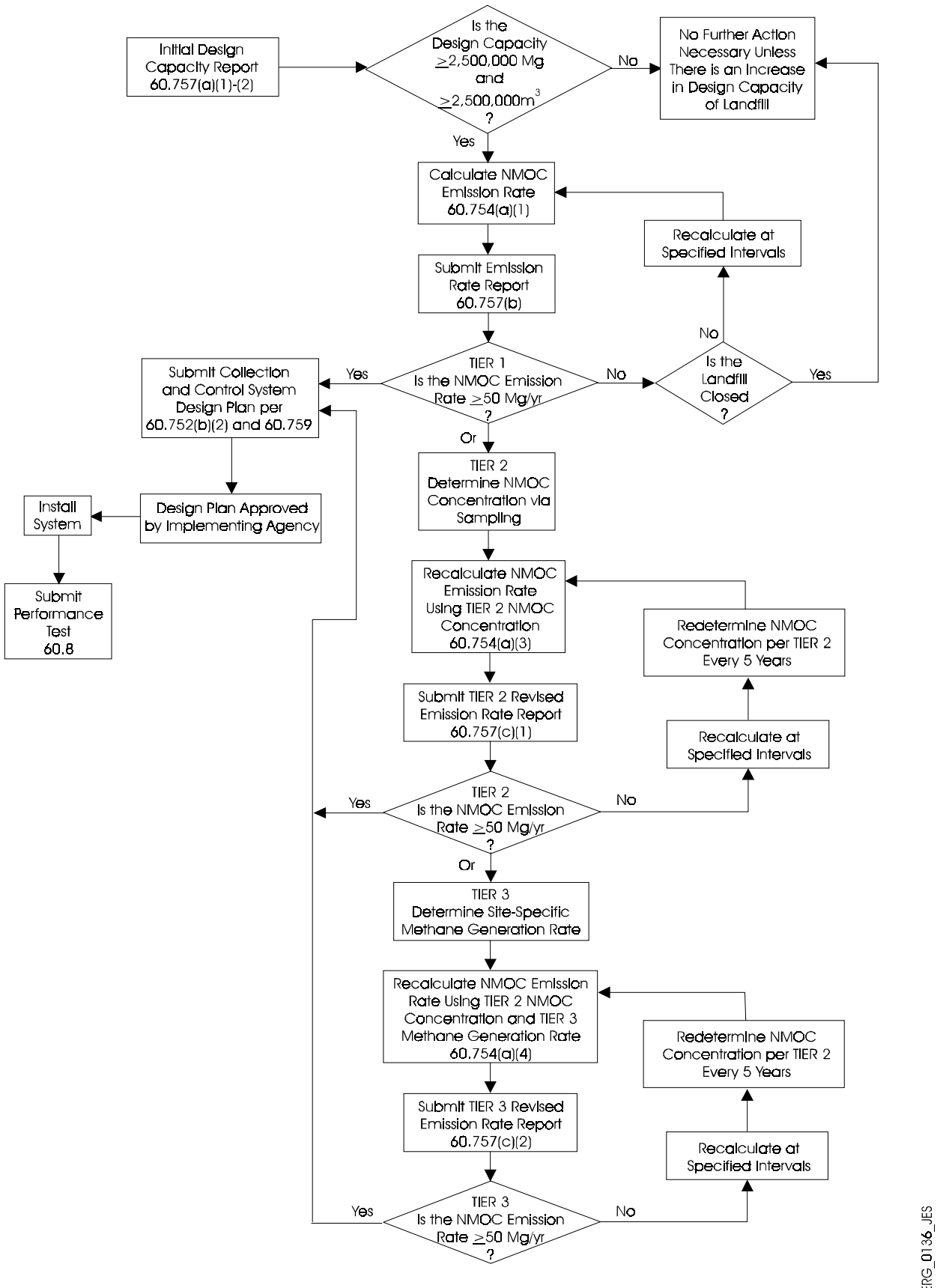


Figure 2-2. Flow Chart for Determining Control Requirements

What Is the Required Gas Collection Technology?

The rule requires collection and control of landfill emissions to the level deemed "best demonstrated technology" (BDT). The BDT for collecting landfill emissions consists of a well-designed and well-operated gas collection system to be installed in a landfill to collect LFG effectively from all disposal areas requiring control. The disposal areas requiring control can be active, closed, or at final grade with no further waste to be deposited. Active areas requiring control are areas where the first refuse deposited is five years or older. These areas must be controlled with the installation of a gas collection system, even though waste is still being actively deposited. After the initial installation of the collection system, owners and operators may need to expand the collection system as active areas in which the first waste deposited reaches the age of five years. Closed areas or areas that are at final grade must be controlled with the installation of a gas collection system if the first refuse deposited there is two years old or older [60.752(b)(2)(ii)(A)(2)].

Gas collection systems may rely on active or passive techniques for extracting LFG from landfill areas requiring control [§ 60.752(b)(2)(ii)(A) or (B)]. Active gas collectors (e.g., active extraction wells) depend on mechanical blowers or compressors to create a negative pressure gradient in the landfill. The negative pressure causes LFG to be drawn into the gas collection system. Passive gas collectors rely on the natural LFG pressure within the landfill which creates a positive pressure gradient so LFG flows from the landfill into the gas collection system.

The regulation allows use of a wide variety of collection systems. Because of the many site-specific factors involved with landfill gas system design, alternative systems may be necessary. System designs could include vertical wells, combination horizontal and vertical collection systems, or horizontal trenches only; leachate collection systems; and passive systems.

The rule requires a site-specific Collection and Control System Design Plan to be prepared by a professional engineer and submitted to the regulatory agency for approval. For an active system, the plan must show that the collection system is designed to:

(1) Handle the maximum expected gas flow rate over the expected lifespan of collection system equipment,

(2) Collect gas from each area or cell in which solid waste has been placed for 5 years if the cell is active and 2 years if it is closed or at final grade,

(3) Collect gas at a sufficient extraction rate (A sufficient extraction rate is a rate adequate to maintain a negative pressure at all wellheads in the collection system without causing air infiltration.), and

(4) Minimize off-site migration of subsurface gas.

Passive systems must satisfy criteria (1), (2), and (4) above and must have liners on the bottom and all sides of the areas in which gas is collected [§ 60.752(b)(2)(ii)(B)(2)]. Gas collected by either an active or a passive system must be routed to a control device.

To aid in selecting a design that will meet the above BDT control requirements, the rule provides design criteria for installing active collection systems (§ 60.759). These design criteria are presented in appendix E. The design plan must either show that the collection system conforms to the design criteria in § 60.759 or include a demonstration that an alternative design is sufficient.

Alternative designs could include alternative vertical collection systems, horizontal trench active collection systems, or passive collection systems. Section 4.1 of the proposal BID (EPA-450/3-90-011a) provides a discussion on collection systems including active vertical and horizontal collection systems and passive collection systems. Appendix E also provides examples of alternative collection system designs that were installed and operating prior to the regulations.

States reviewing design plans may approve or disapprove the plans, or ask the landfill owner or operator to provide additional information.

What Are the Operational Requirements for the Gas Collection System?

The rule provides operational standards for collection and control systems; test procedures; compliance provisions; and monitoring, recordkeeping, and reporting provisions for landfill gas collection and control systems in § 60.753 through § 60.758. However, the design plan required in § 60.752(b)(2) may include alternatives to any of these provisions. In cases where an alternative design is used in place of the active collection system specifications in

§ 60.759, it may be appropriate to use alternative operating and compliance provisions that are consistent with the site-specific design.

This section briefly describes the operational requirements that are used to ensure that the collection system is performing in accordance with its design and that the four design criteria listed in the previous section are met on a continuing basis. Additional details on monitoring and compliance determination provisions are provided in section 2.1.3.

To ensure that the collection system is designed to handle the maximum expected gas generation rate, § 60.755(a) provides procedures for calculating the gas generation flow rate.

Landfill gas is effectively collected from the landfill when gas collectors are operated at a sufficient gas extraction rate. To demonstrate that the gas extraction rate for an active gas collection system is sufficient, a negative pressure must be maintained at each wellhead [§ 60.753(b) and § 60.755(a)(3)] except as noted in § 60.753(b). Gas collection systems that operate at a sufficient gas extraction rate minimize the potential of off-site, migration of subsurface LFG [§ 60.752(b)(2)(ii)].

An excessive gas extraction rate may cause air infiltration into the landfill through its surface and sides. Under the rule, the nitrogen gas concentration in the collected LFG must be maintained below 20 percent (or the oxygen concentration maintained below 5 percent) and the temperature of the collected LFG must be below 55 ^{o}C (131 ^{o}F) to prevent excess air infiltration [§ 60.753(c) and § 60.755(a)(5)]. For a specific site, the owner or operator may establish a higher temperature, or a higher nitrogen or oxygen level for particular wells, with approval from the State.

An inadequate gas extraction rate may cause LFG to escape through the landfill surface. Under the rule, the gas extraction rate is considered adequate when the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, surface testing is conducted around the perimeter of the collection area, along a pattern that traverses the landfill at 30 meter intervals, and where visual observations indicate elevated concentrations of landfill gas (e.g., distressed vegetation, cracks or seeps in the cover). The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage [§ 60.753(d) and § 60.755(c)].

Collection system parameters (pressure, nitrogen concentration, oxygen concentration, temperature, surface methane concentration) must be monitored periodically to

ensure that the system is effectively extracting LFG from the landfill. If the monitoring results indicate problems, the gas collection system must be adjusted, as necessary, to maintain peak performance [§ 60.755(a)(3), (a)(5), and (d)(4)]. In some cases, upgrades to the collection system or installation of additional collection devices may be required to correct the problem.

Again, it should be noted that a Collection and Control System Design Plan can request alternatives to the pressure, temperature, nitrogen concentration, oxygen concentration, or surface methane monitoring and compliance provisions for landfill gas collection systems. The plan must provide a justification for the alternatives, and the State agency may approve or disapprove the proposed alternatives.

Collected LFG is vented through a network of piping to a BDT control device [§ 60.752(b)(2)(iii)]. The control device is operated at all times when collected LFG is routed into the control system [§ 60.753(f)] except during times of startup, shut down, or malfunction. This exception is allowed as long as the operational disruption for the collection system is 5 days or less [§ 60.755(e)]. In the event the collection system or control device becomes inoperable, the gas mover system must be shut down. All valves leading to atmospheric venting of LFG in the gas collection and control system must also be closed [§ 60.753(e)].

What Is the Required Gas Control Technology?

The BDT for controlling landfill emissions is routing collected LFG to a control device capable of reducing NMOC emissions by 98 weight-percent or reducing emissions to 20 parts per million by volume dry (ppmvd) as hexane. The efficiency or emission reduction achieved by the control technology must be demonstrated. Acceptable control devices for landfill emissions are open flares and enclosed combustion devices.

The emission reduction performance of an open flare can be demonstrated by using a flare that meets certain design and operating parameters [§ 60.752(b)(2)(iii)(A)]. These design and operating parameters have been specified in 40 CFR § 60.18 to ensure open flares achieve at least 98 percent destruction efficiency. Measurement of percent reduction or outlet concentration is not feasible for open flares. Flares meeting the specifications in § 60.18 are presumed to achieve 98 percent control, and a performance test is not required. However, § 60.18 does require a visible emission determination.

For enclosed combustion devices or other control devices, the landfill owner or operator must demonstrate either the 98 weight-percent reduction or reduction of the outlet NMOC concentration to 20 ppmvd as hexane at 3 percent oxygen by performance testing [§ 60.752(b)(2)(iii)(B)]. The performance test must be in accordance with Method 25C or Method 18 of appendix A [§ 60.754(d)]. Examples of enclosed combustion devices that have the potential to meet the 98 percent destruction efficiency or 20 ppmvd level include energy recovery systems (internal combustion [IC] engines, gas turbines, steam generating boilers), enclosed flares, and thermal incinerators.

Enclosed combustion devices, including IC engines, gas turbines, and steam generating boilers, provide the opportunity for energy recovery. Therefore, these enclosed combustion devices may offer economic incentives since the energy or power generated by these devices may be used on-site or sold.

Another control option is to collect and process LFG for subsequent sale or use as a fuel source [§ 60.752(b)(2)(iii)(C)]. Generally, contaminates such as carbon dioxide and water are removed from LFG in sufficient quantities to achieve a purity level equal to that of pipeline gas. However, any emissions occurring from atmospheric vents on a gas collection and processing system must be routed to a BDT control device.

The control device is operated at all times when collected LFG is routed into the control system [§ 60.753(f)] except during times of startup, shut down, or malfunction. This exception is allowed as long as the operational disruption for the control device is 1 hour or less [§ 60.755(e)]. In the event that the collection or control system becomes inoperable, the gas mover system is shut down. All valves leading to atmospheric venting of LFG in the gas collection and control system must also be closed [§ 60.753(e)].

The rule [§ 60.752(b)(2)] includes provisions that allow an owner or operator to use alternative designs for a gas control system. However, the owner or operator must be able to demonstrate that an alternative system is able to achieve an equivalent level of control and emission reduction. The owner or operator may also request approval to use alternatives to the control system monitoring, test methods and procedures, and compliance provisions in §§ 60.753, 60.754, and 60.755, respectively.

What Is the Compliance Schedule for Installing Controls?

Within 30 months after a landfill's NMOC emission rate is first reported to be equal to or greater than 50 Mg/yr, the provisions of this rule require installation and startup of a gas collection and control system at the landfill. This interval allows sufficient time for a landfill owner or operator to submit plans for a control system design and install the control system. Within 180 days after startup of a gas collection and control system, the landfill owner or operator must conduct performance testing on the control system to document compliance with the rule. General milestones for the compliance schedule are presented in Figure 2-3 for an example landfill. Construction of this example landfill commenced on March 12, 1993. Therefore, it is defined as a new landfill since construction commenced after the proposal date. Also, it is assumed that the example landfill capacity is greater than the minimum size limit and that the emission rate is greater than the emission rate cutoff.

Within 1 year after a landfill's NMOC emission rate is calculated to be equal to or greater than 50 Mg/yr, the landfill owner or operator must submit a Collection and Control System Design Plan prepared by a professional engineer. This design plan must meet the design requirements specified in § 60.752(b)(2)(ii) and include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring provisions, or recordkeeping and reporting provisions. The landfill may install an active collection and control system design as specified by the rule (§ 60.759) or elect to install a collection and control system of alternative but equivalent design.

Within 30 months after submitting an NMOC emission rate report showing that emissions equal or exceed 50 Mg/yr NMOC, the gas collection and control system must be ready for start-up operations. If a design plan is submitted by 1 year after the annual report showing emissions greater than or equal to 50 Mg/yr, this leaves 18 months for approval of the design plan and installation of collection and control systems. The implementing agency is responsible for approving design plans. Approval time for a system design plan is estimated at 6 months. For example, the implementing agency conducts a preliminary review of the system design and submits its comments to the landfill in approximately 2 months. The landfill owner or operator responds to the comments from the preliminary review within 2 months. The implementing agency completes its final review of landfill responses to the agency's preliminary review

Milestone	Example Achievement Date	Compliance Schedule[a]
Design Capacity Report	June 10, 1996[b]	Within 90 days after promulgation[b]
↓		
NMOC Emission Rate Report	June 10, 1996[b]	Within 90 days after promulgation[b], and then annually
↓		
Collection and Control System Design Plan	June 10, 1997	Within 1 year after reporting NMOC emissions ≥ 50 Mg/yr
↓		
Installation of Collection and Control System Completed (up and running, i.e., on-line)	December 10, 1998	Within 30 months after reporting NMOC emissions ≥ 50 Mg/yr
↓		
Initial Performance Test of Collection and Control System to Document Compliance	June 28, 1999	Within 180 days after the initial startup of the control system

[a]Promulgation date is March 12, 1996. The time frames specified in this example are based on the dates in § 60.757 of Subpart WWW.

[b] Ninety (90) days after promulgation is the due date for landfills constructed, reconstructed, or modified on or after May 30, 1991, but before March 12, 1996. For landfills constructed on or after March 12, 1996, the due date is 90 days after construction, reconstruction, or modification.

Figure 2-3. General Milestones for the NSPS Compliance Schedule for an Example Landfill

comments within another 2 months. Therefore, approximately 12 months remain for installing the control system at the landfill.

Within 180 days of the gas collection and control system start-up, the initial performance test of the control system must be conducted and the results must be submitted to the implementing agency. The performance test results document the control system's compliance with the rule.

When Can Gas Collection and Control Systems Be Removed?

The standards allow capping or removal of gas collection and control devices only when all of the following conditions are satisfied:

(1) The landfill is closed as defined in § 60.751.

(2) The landfill owner or operator notifies the implementing agency by submitting a Landfill Closure Report [§ 60.752(b)(2)(v)(A)]. A Landfill Closure Report is described later in section 2.1.3.

(3) The gas collection and control system has been operating continuously for at least 15 years [§ 60.752(b)(2)(v)(B)].

(4) The landfill NMOC emission rate has been calculated to be less than 50 Mg/yr on three successive test dates. The test dates should be no closer than 90 days apart and no farther than 180 days apart [§ 60.752(b)(2)(v)(C)].

2.1.3 Demonstrating Compliance

What Must Be Monitored?

Several operating parameters of a controlled landfill must be monitored to ensure compliance with the standards. These monitoring parameters verify the performance status of the gas collection system and control device or gas treatment system. Table 2-3 presents a summary of monitoring requirements for the gas collection and control system. As previously noted, the owner or operator can request approval, in the Collection and Control System Design Plan, to monitor alternative parameters.

Monitoring Gas Collection Systems

For an active gas collection system that meets design criteria published in § 60.759, the gauge pressure, nitrogen or oxygen concentration, and temperature of LFG within each extraction wellhead must be monitored once a month. Methane concentrations at the landfill surface must be monitored quarterly. These parameters indicate whether the gas extraction rates for the extraction wells are adequate. When the methane surface concentration monitoring for a closed landfill shows no exceedances for three consecutive quarters, then the landfill owner or operator may "skip" to annual monitoring. If an exceedance is detected, monitoring resumes on a quarterly schedule until no exceedances are observed for three consecutive quarters. Also, surface methane monitoring must be performed during typical meteorological conditions, so monitoring may need to be postponed to allow for typical conditions to be present. Figure 2-4 provides a flow chart of the surface monitoring requirements.

If an exceedance is detected, corrective action must be taken by performing cover maintenance or adjusting the collection system operating parameters. The location of the exceedance(s) must be rechecked for surface methane concentration within 10 days. If there are three exceedances at a location within a quarterly period then a new well or collection device must be installed within 120 days of the initial exceedance. An alternate remedy and timeline may be proposed to the Administrator. It should be noted that an exceedance of the 500 ppm surface methane concentration level is not a violation of the rule as long as the proper correction procedures, as depicted in Figure 2-4, are carried out.

Each extraction well installed in an active collection system must include a sampling port and a temperature measuring device or access port for temperature measurements. The sampling port allows easy access for gauge pressure and nitrogen concentration measurements. An extraction well with an adequate gas extraction rate will maintain a negative gauge pressure in the wellhead. A negative pressure indicates that a negative pressure gradient exists within the landfill and LFG is being extracted.

TABLE 2-3. SUMMARY OF MONITORING REQUIREMENTS FOR MSW LANDFILLS

Equipment	Monitoring Action	Schedule	Reference
Gas Collection System	Monitor gauge pressure within each gas extraction well. A negative value indicates a well is operating with a sufficient gas extraction rate.	Monthly	§60.756(a)(1)
	Monitor nitrogen concentration using Method 3C or oxygen concentration using Method 3A. Nitrogen concentration values <20 percent or oxygen concentration values < 5 percent indicate well extraction rates are not causing excessive air infiltration into the landfill.	Monthly	§60.756(a)(2)
	Monitor LFG temperature in extraction well; should be <55°C (131°F), unless otherwise demonstrated that a higher temperature is appropriate. An elevated LFG temperature is an indicator of subsurface fires and aerobic conditions within the landfill.	Monthly	§60.756(a)(3)
	Monitor methane concentration at the landfill surface. Values <500 ppm above background indicate well extraction rates are sufficient to minimize the amount of LFG seeping out of the landfill.	Quarterly OR Skip Method[a]	§60.755(c) and §60.756(f)
	For an alternative gas collection system design, the owner or operator must submit appropriate monitoring requirements to the implementing agency for approval.	To Be Determined	§60.756(e)
Gas Control System	Record gas flow from collection system to the enclosed combustion device (unless bypass line valves are secured in a closed position with car-seal or lock-and-key type configuration). This requirement identifies periods when gas flow has been diverted from the control device.	At least once every 15 minutes OR Monthly inspections of bypass line seals	§60.756(b)(2)

TABLE 2-3. SUMMARY OF MONITORING REQUIREMENTS FOR MSW LANDFILLS (CONTINUED)

Equipment	Monitoring Action	Schedule	Reference
Gas Control System (Continued)	Record gas flow from collection system to open flare (unless bypass line valves are secured in a closed position with car-seal or lock-and-key type configuration). This requirement identifies periods when gas flow has been diverted from the control device.	At least once every 15 minutes OR Monthly inspections of bypass line seals	§60.756(c)(2)
	Monitor combustion temperature of the enclosed combustion device with a temperature monitoring device equipped with a continuous recorder. (Temperature monitoring is not required for a boiler or process heater >44 megawatts) This requirement identifies operational and performance status of control device.	Continuous	§60.756(b)(1)
	Monitor the continuous presence of a pilot flame or the flare flame for an open flare. This requirement confirms operational status of control device.	Continuous	§60.756(c)(1)
	For an alternative control device, the owner or operator must submit appropriate monitoring requirements to the implementing agency for approval.	To Be Determined	§60.756(d)

[a]When monitoring of methane concentration for a closed landfill shows no exceedances for three consecutive quarterly monitoring periods, then monitoring can be "skipped" to annual monitoring. Any exceedance of the 500 ppm methane level returns the landfill to quarterly monitoring.

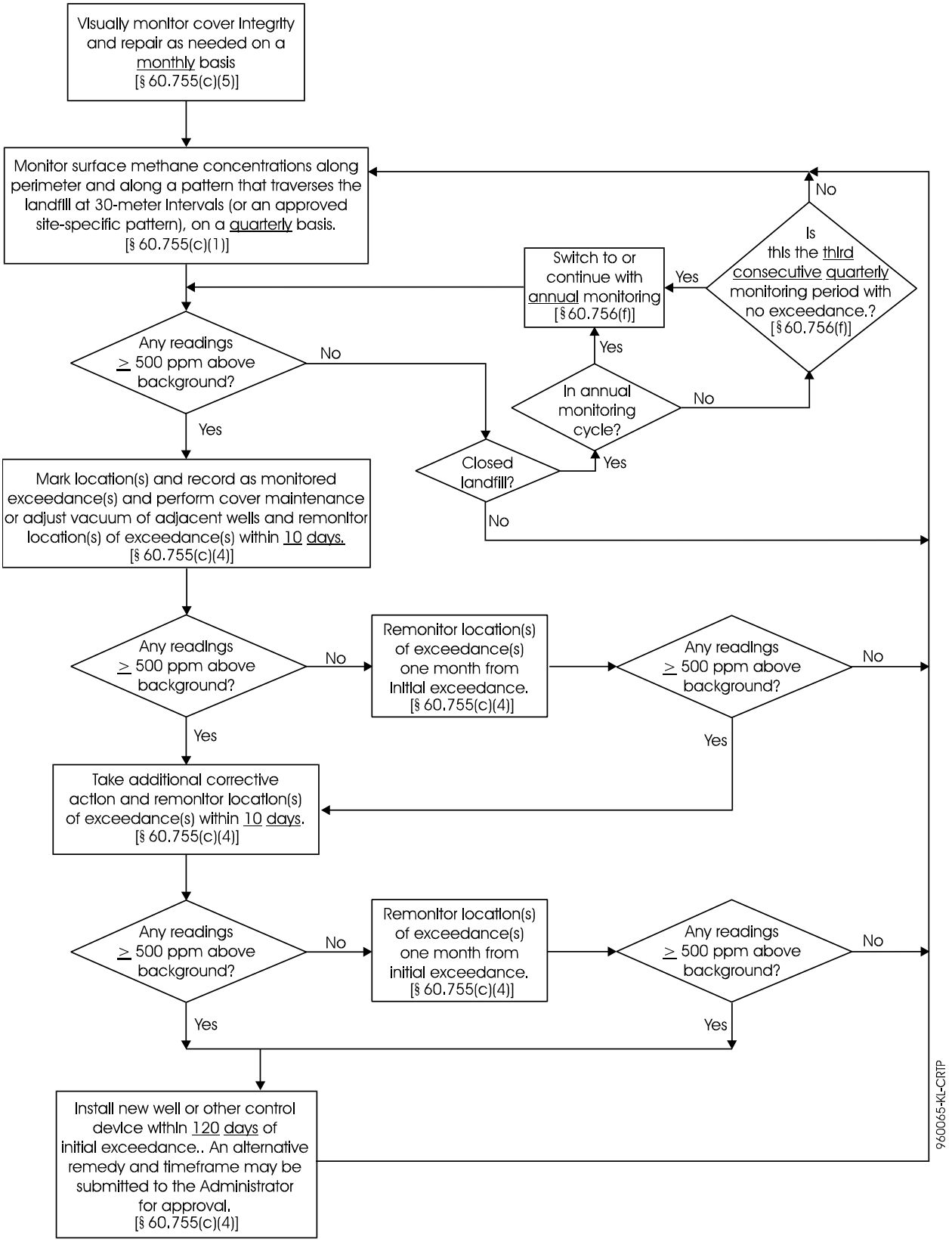


Figure 2-4. Flow Chart of Surface Monitoring Requirements [§60.755(c) and §60.756(f)]

If a positive pressure is measured, the owner or operator must initiate corrective action within 5 calendar days. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection must be expanded to correct the exceedance within 120 days. An alternative timeline for correcting the exceedance may be submitted to the Administrator for approval. Exceptions to the negative pressure requirement are listed in § 60.753(b).

Collected LFG must have a nitrogen concentration less than 20 percent or an oxygen level less than 5 percent, and a maximum temperature of 55°C (131°F). Nitrogen concentration levels are measured following the procedures in EPA Method 3C. Oxygen concentration levels are measured following the procedures in EPA Method 3A. Nitrogen concentration rates < 20 percent or oxygen concentration values < 5 percent indicate well extraction rates are not causing ambient air infiltration into a landfill through its surface and sides. Increased LFG temperatures indicate that subsurface fires or aerobic conditions exist within the landfill. The maximum allowable LFG temperature is 55°C (131°F), unless a landfill owner or operator can demonstrate adequately that a higher temperature is appropriate and does not hinder the anaerobic decomposition process. If a well exceeds the temperature, nitrogen concentration, or oxygen concentration, the owner or operator must initiate corrective action within 5 calendar days. If the exceedance cannot be corrected within 15 calendar days of the first measurement, the gas collection system must be expanded to correct the exceedance within 120 calendar days. An alternative timeline for correcting the exceedance may be submitted to the Administrator for approval.

After the installation of extraction wells, the landfill surface must be monitored for methane concentrations less than 500 ppm above background levels. Methane concentrations are measured within 5 to 10 cm (2 to 4 in) of the landfill surface using a portable organic vapor analyzer (OVA), flame ionization detector (FID), or other similar monitoring device [§ 60.755(d)]. Methane concentrations are measured following the procedures in EPA Method 21, except that "methane" replaces all references to "volatile organic compounds" (VOC) and the calibration gas is 500 ppm methane in air [§ 60.755(d)]. Methane surface concentrations are monitored around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals (see Figure 2-5) and where visual observations indicate elevated concentrations of landfill gas (e.g., distressed vegetation, cracks or seeps in the cover). The

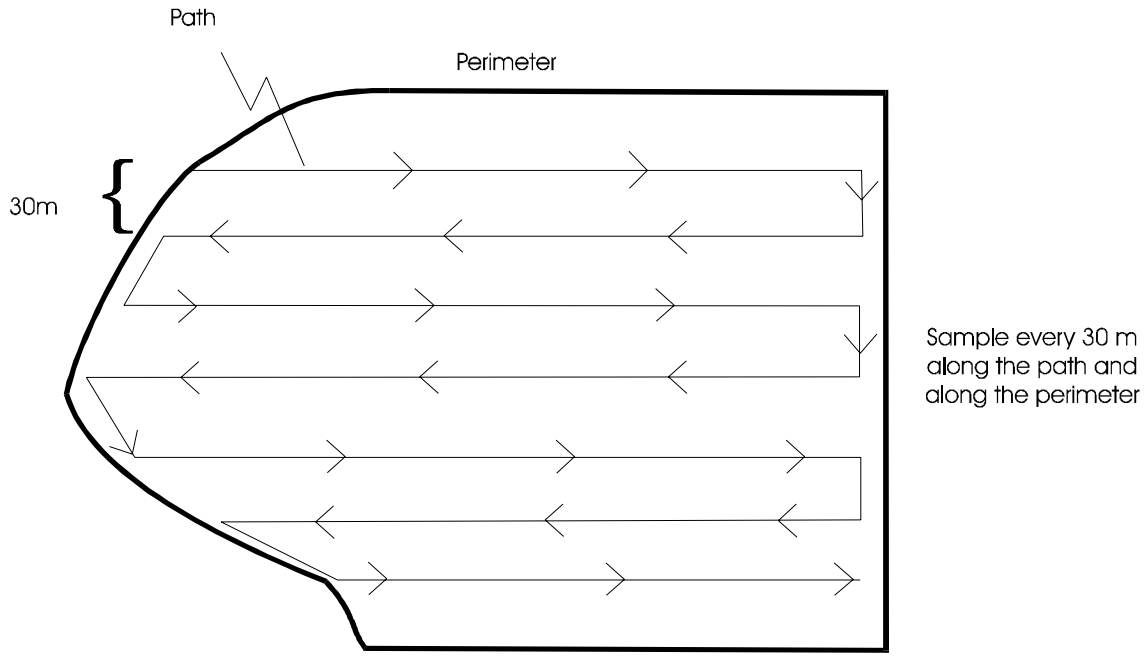


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Figure 2-5. Example Traverses for Monitoring Methane Concentrations

owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. Methane surface concentrations indicate whether gas extraction rates are sufficient to minimize the amount of LFG escaping through the landfill cover.

Monitoring Gas Control Systems

For gas control systems using an open flare or an enclosed combustion device, a device that records flow to or bypass of the control device is required. The presence of gas flow to the control device from the collection system is recorded at least once every 15 minutes or the bypass lines must be secured in the closed position using a car-seal or lock-and-key type configuration. This recording frequency is needed to identify periods when the gas flow has been diverted from the control device or periods of no flow from the collection system [§ 60.756(b)(2) and § 60.756(c)(2)].

Combustion device operating parameters must be monitored continuously. For open flares, a heat sensing device such as an ultraviolet beam sensor or thermocouple, located at the flare pilot light or flare flame, is used to indicate the continuous presence of a flame [§ 60.756(c)(1)]. For enclosed combustion devices, a temperature measuring device equipped with a continuous recorder is used to monitor the combustion temperature so that an adequate temperature is maintained [§ 60.756(b)(1)]. Note that § 60.756(b)(1) excludes boilers $\geq$ 44 Megawatts from being required to install a temperature monitor and recorder.

Gas collection and control systems based on design criteria other than those specified in the rule are allowed. For alternative systems, the landfill owner or operator must provide information describing the system design, the operation of the system, operating parameters that would indicate proper performance, and appropriate monitoring procedures [§ 60.756(d) and (e)]. The implementing agency will review the submitted information and decide whether to approve it, request additional information, or specify additional monitoring procedures [§ 60.756(d) and (e)].

What Recordkeeping Must Be Kept?

The landfill owner or operator must keep up-to-date, readily accessible records to document that controlled landfill operations comply with the requirements of this standard. These records must be maintained in electronic or hard-copy format for at least 5 years, unless otherwise specified. This subsection describes the recordkeeping requirements of this rule. Table 2-4 is a summary of these requirements.

Records must be maintained to document three major operations at a controlled landfill. These operations include:

(1) Design of the landfill and control system;

(2) Gas collection and control system monitoring data; and

(3) Performance test data of the gas collection and control system.

A discussion of the recordkeeping requirements for each of these operations is provided below. As previously noted, a Collection and Control System Design Plan may request alternatives to the recordkeeping and reporting requirements. If alternative collection system designs are used, it may be necessary to specify alternative monitoring, recordkeeping, and reporting procedures that are more appropriate for the site-specific design.

A landfill owner or operator has the option of calculating design capacity on either a mass or volume basis. If the design capacity is converted from mass to volume or from volume to mass to demonstrate that design capacity is < 2.5 million Mg or 2.5 million m^3, then the landfill owner or operator must keep readily accessible records of the annual recalculation on site. The records must include the annual recalculation of site-specific density, design capacity, and the supporting documentation.

<u>Landfill and Control System Design Records</u>

A number of records must be kept to document the general design and operation of the landfill. These records include current landfill design capacity, current amount of refuse-in-place, and year-by-year waste acceptance rates [§ 60.758(a)]. Records must be available to

TABLE 2-4. SUMMARY OF RECORDKEEPING REQUIREMENTS FOR MSW LANDFILLS

Operation	Recordkeeping Item	Reference
Landfill Design Capacity	If design capacity was converted from mass to volume or volume to mass to demonstrate that design capacity is < 2.5 million Mg or 2.5 million m^3, records of annual recalculation of site-specific density, design capacity, and supporting documentation	§60.758(f)
Landfill and Control System Design	If ≥ 2.5 million Mg and 2.5 million m^3, current maximum design capacity, current amount of refuse-in-place, and year-by-year refuse accumulation rates.	§60.758(a)
	Plot map showing each existing and planned well in the gas collection system. Provide unique identifying labels for each well.	§60.758(d)
	Installation date and location of all newly installed wells per §60.755(b).	§60.758(d)(1)
	Description, location, amount, and placement date of all nondegradable refuse including asbestos and demolition refuse placed in landfill areas which are excluded from LFG collection and control.	§60.758(d)(2)
Monitored Operating Parameters for Gas Collection and Control Systems	(1) Gauge pressure in each extraction well.	§60.756(a)(1)
	(2) Nitrogen or oxygen concentration in extracted LFG.	§60.756(a)(2)
	(3) Temperature of extracted LFG.	§60.756(a)(3)
	(4) Methane concentrations along landfill surface.	§60.756(f)
	(5) Gas flow from collection system to the BDT control device (or seal bypass lines and inspect seals).	§60.756(b)(2)(i) and (ii)
	(6) Combustion temperature of an enclosed combustion device or the continuous presence of a pilot flame for an open flare.	§60.756(c)
	(7) Operating parameters for alternative collection and control system designs, which are specified by the landfill and approved by the implementing agency.	§60.756(e)

TABLE 2-4. SUMMARY OF RECORDKEEPING REQUIREMENTS FOR MSW LANDFILLS (CONTINUED)

Operation	Recordkeeping Item	Reference
Collection and Control System Design and Measurements From Initial Performance Test	Maximum expected gas generation flow rate	§60.758(b)(1)(i)
	Density of wells, horizontal collectors, surface collectors, or other gas extraction devices.	§60.758(b)(1)(ii)
	For enclosed combustion devices (except for boilers or process heaters with a heat input ≥44 Megawatts [150 million British thermal units per hour]):	
	(1) Average combustion temperature measured at least every 15 minutes and averaged over the performance test duration.	§60.758(b)(2)(i)
	(2) Percent reduction of NMOCs by the control device.	§60.758(b)(2)(ii)
	For boilers/process heaters (of any size):	
	Describe location where LFG is introduced into the boiler flame zone.	§60.758(b)(3)
	For open flares:	§60.758(b)(4)
	(1) Type of flare (steam-, air-, or non-assisted), (2) All visible emission readings, (3) Heat content determination, (4) Gas flow rate or bypass measurements, (5) Exit velocity determinations, (6) Continuous pilot flame or flare flame monitoring, and (7) All periods when pilot flame or flare flame is absent.	

TABLE 2-4. SUMMARY OF RECORDKEEPING REQUIREMENTS FOR MSW LANDFILLS (CONTINUED)

Operation	Recordkeeping Item	Reference
Gas Control System: Periods When Operating Parameters Exceeded Limits Set by Most Recent Performance Test	For enclosed combustion devices (except for boilers/process heaters with a heat input ≥44 Megawatts [150 million British themal units per hour]): Records of all 3-hour periods in which the average combustion temperature was more than 28°C (50°F) below the average combustion temperature measured during the most recent performance test.	§60.758(c)(1)(i)
	For boilers/process heaters with a heat input ≥44 Megawatts (150 million British themal units per): Document all periods of operation by recording parameters, such as steam use, fuel use, or other specified parameters required by other regulatory agencies.	§60.758(c)(3)
	For boilers/process heaters: Document any changes to the location where collected LFG is introduced in the boiler flame zone.	§60.758(c)(1)(ii)
	For an open flare: Record all pilot flame or flare flame monitoring data and all periods when pilot flame or flare flame was absent.	§60.758(c)(4)
Gas Control System: Periods When Operating Parameters Exceeded Limits Set by Most Recent Performance Test (Continued)	Records of continuous flow to the control device or the indication of bypass flow or records of monthly inspections of car-seals or lock-and-key configurations used to seal bypass lines.	§60.758(c)(2)

TABLE 2-4. SUMMARY OF RECORDKEEPING REQUIREMENTS FOR MSW LANDFILLS (CONTINUED)

Operation	Recordkeeping Item	Reference
Gas Collection and Control System: Exceedances of operational standards	Record all values which exceed the operational standards specified in §60.753. Also include the operating value from the next monitoring period and the location of each exceedance: (1) New well installation, (2) Pressure in each extraction well, (3) Nitrogen concentration or oxygen concentration in extracted LFG, (4) Temperature of extracted LFG, (5) Methane concentrations along landfill surface, (6) Collected LFG is routed to control device at all times, note periods when the collection system and/or control device were not operational. Keep up-to-date, readily accessible records of these exceedences for at least 5 years.	§60.758(e)

support any area exclusions. All areas storing nondegradable refuse such as asbestos and demolition refuse that are excluded from collection must be identified on a location map [§ 60.758(d)(2)]. In addition, a description of the nondegradable refuse must be recorded along with the amount and date of placement in the landfill [§ 60.758(d)(2)].

A landfill owner or operator has the option of calculating design capacity on either a mass or volume basis. If the design capacity is converted from mass to volume or from volume to mass to demonstrate that design capacity is < 2.5 million Mg or 2.5 million m^3, the landfill owner or operator must keep readily accessible records of the annual recalculation on site. The records must include the annual recalculation of site-specific density, design capacity, and the supporting documentation [§ 60.758(f)].

A plot map is needed to document that LFG is being collected from all gas-producing areas in a landfill. This map must show each existing and planned extraction well in the gas collection system and must provide a unique identifying label for each well [§ 60.758(d)]. In addition, the installation date and location of all newly installed wells per § 60.755(b) must be indicated and documented [§ 60.758(d)(1)].

Gas Collection and Control System Monitoring Data Records

All monitoring data gathered during the operation of a gas collection and control system, as per § 60.756, must be recorded [§ 60.758(c)]. These data include:

(1) Gauge pressure, nitrogen concentration or oxygen concentration, and temperature of LFG within each wellhead;

(2) Methane surface concentrations;

(3) Gas flow to or bypass of the control device (or monthly inspections of seals on bypass lines);

(4) Adequate combustion conditions (e.g., combustion temperature, presence of flare flame or pilot flame) for the control device; and

(5) Any other data specified by the implementing agency.

Records must also be kept of periods when the monitored control device operating parameter (e.g., temperature) exceeds the established boundaries (see Table 2-4 for details).

If any of the monitored readings for gauge pressure, nitrogen or oxygen concentration, temperature of LFG in wellheads, or methane concentration exceed the operational standards established in § 60.753, then the location and value of the reading must be documented as such an occurrence [§ 60.758(e)]. For each exceedance, the reading from the subsequent monitoring period must also be recorded regardless of whether the subsequent value is an exceedance [§ 60.758(e)].

Initial Performance Test Records

Measurements gathered during the initial performance test of the gas collection and control system must be maintained by the landfill owner or operator for the life of the control equipment [§ 60.758(b)]. Further, measurements gathered during tests or monitoring must be kept for a minimum of 5 years. Measurements recorded from the gas collection system during the initial performance test include the maximum expected gas generation flow rate and the density of wells, horizontal collectors, surface collectors, or other gas extraction devices [§ 60.758(b)(1)].

Measurements recorded from the gas control system during the initial performance test depend on the type of control device used. For enclosed combustion devices, the average combustion temperature must be recorded at least every 15 minutes and averaged over the performance test duration [§ 60.758(b)(2)(i)]. The percent reduction of NMOC's achieved by the control device must also be recorded [§ 60.758(b)(2)(ii)]. Temperature monitoring is not required for boilers and process heaters with design heat input capacities greater than 44 Megawatts (150 million British thermal units per hour). For boilers and process heaters (of any size), a description of the location where LFG is introduced into the boiler flame zone must be recorded [§ 60.758(b)(3)]. For open flares, operating parameters that must be recorded are listed in Table 2-4 [§ 60.758(b)(4)]. If any of the monitored control device readings exceed limits set by the most recent performance test, then the period when these readings were observed must be documented. These periods are described in Table 2-4.

What Must Be Reported?

The landfill owner or operator must submit a series of reports to the implementing agency to demonstrate compliance with this standard. These reports are based on information maintained by the landfill's recordkeeping efforts. The reporting sequence begins with the Initial Design Capacity Report and concludes with the Landfill Closure and Control Equipment Removal Reports. This subsection identifies and describes each report that is required by this rule and the schedule for each report submittal. The required reports and submittal schedules are listed in Table 2-5.

Initial Design Capacity Report

Each landfill owner or operator must submit a report that documents the landfill maximum design capacity. This report establishes whether a landfill is subject to the control requirements of this standard or is excluded because of the landfill design capacity exemption. The Initial Design Capacity Report will also fulfill the requirements of the notification of the date construction is commenced as required by the NSPS General Provisions [§ 60.7(a)(1)]. The report must be submitted no later than:

(1) June 10, 1996, for landfills that commenced construction, modification, or reconstruction on or after May 30, 1991 but before March 12, 1996, or

(2) 90 days after the date of commenced construction, modification, or reconstruction for landfills that commence construction, modification, or reconstruction on or after March 12, 1996.

An Initial Design Capacity Report must include:

(1) A map or plot of the landfill that provides the location and size of the landfill, and identifies all areas where solid waste may be landfilled according to the permit issued by the State, local, or Tribal agency responsible for regulating the landfill; and

(2) The maximum design capacity of the landfill.

TABLE 2-5. SUMMARY OF COMPLIANCE REPORTING REQUIREMENTS FOR MSW LANDFILLS

Report or Action	Schedule	Reference
Initial Design Capacity Report	Submit report no later than: (1) June 10, 1996 for landfills that commenced construction, modification, or reconstruction on or after May 30, 1991, but before March 12, 1996 or (2) 90 days after the date the landfill commenced construction, modification, or reconstruction for landfills that commence construction, modification, or reconstruction on or after March 12, 1996.	§60.757(a)(1) §60.757(a)(2)
Amended Design Capacity Report	If design capacity is increased to a value that equals or exceeds 2.5 million Mg, the landfill must submit an Amended Design Capacity Report. Submit report within 90 days of an increase in the maximum design capacity of the landfill to or above the 2.5 million Mg and 2.5 million m^3 size exemption.	§60.757(a)(3)
Annual OR Five-Year[a] NMOC Emission Rate Report (Tier 1)	Submit initial report no later than: (1) June 10, 1996 for landfills that commenced construction, modification, or reconstruction on or after May 30, 1991, but before March 12, 1996 or (2) 90 days after the date the landfill commenced construction, modification, or reconstruction for landfills that commence construction, modification, or reconstruction on or after March 12, 1996. May submit with Initial Design Capacity Report. Repeat either once a year OR once every 5 years.	§60.757(b)
Revised NMOC Emission Rate Report (Tier 2)	If Tier 1 analysis results in NMOC emissions ≥50 Mg/yr, a revised NMOC emission rate report using data gathered from Tier 2 analysis can be submitted within 180 days of the initial calculated exceedance.	§60.757(c)(1)

TABLE 2-5. SUMMARY OF COMPLIANCE REPORTING REQUIREMENTS FOR MSW LANDFILLS (CONTINUED)

Report or Action	Schedule	Reference
Revised NMOC Emission Rate Report (Tier 3)	If Tier 2 analysis results in NMOC emissions ≥50 Mg/yr, a revised NMOC Emission Rate Report using data gathered from Tier 3 analysis can be submitted within 1 year of the initial calculated exceedance.	§60.757(c)(2)
Collection and Control System Design Plan	Within 1 year after submitting NMOC Emission Rate Report with a value ≥50 Mg/yr. Plans must gain Agency approval prior to installation.	§60.757(c)
Emission Control System Start-up	Control system based on approved design will startup within 30 months after submitting NMOC Emission Rate Report with a value ≥50 Mg/yr.	§60.752(b)(2)(ii)
Initial Control System Performance Test Report	Submit report within 180 days of emission collection and control system start-up per §60.8. Results can be included in the initial Annual Report.	§60.757(g)
Annual Compliance Report	Submit initial report within 180 days of emission collection and control system start-up. Report once every 12 months.	§60.757(f)
Landfill Closure Report	When landfill is no longer accepting refuse and the landfill is considered closed. Submit report within 30 days of refuse acceptance cessation.	§60.757(d)
Control Equipment Removal Report	Submit report within 30 days prior to removal or cessation of control system operations. Controls can be removed after meeting all of these criteria: (1) Landfill Closure Report has been submitted, (2) Control system was operated for at least 15 years, and (3) Three consecutive NMOC Emission Rate Reports with values <50 Mg/yr achieved.	§60.757(e)

[a] The owner or operator may elect to submit an estimate of the NMOC emission rate for the next 5 years in lieu of the annual report if the estimated NMOC emission rate is <50 Mg/yr in each of the 5 years.

If the maximum design capacity of the landfill is documented in a State or local construction or RCRA permit, a copy of the permit specifying the maximum design capacity may be submitted as part of this report [§ 60.757(a)(2)(ii)]. The design capacity is determined by the most recent permit issued by the State, local, or tribal agency responsible for regulating the landfill, plus any in-place waste not accounted for in the most recent permit. If the landfill design capacity is not specified in a permit, then the capacity must be calculated using good engineering practices. All calculations, assumptions, and relevant parameters used in estimating the landfill design capacity must be included in the report for review by the implementing agency. The maximum design capacity of a landfill can be determined from the total area available for refuse disposal. Alternative information that could be used to determine design capacity includes operating parameters such as depth of refuse placement, refuse acceptance rates, and refuse compaction practices.

In order to demonstrate that the landfill design capacity is less than the 2.5 million Mg or 2.5 million m^3 design capacity cutoff, a landfill with a volumetric permit may choose to calculate design capacity on a mass basis (or vise versa) based on a site-specific density. The initial design capacity report must provide supporting documentation. If such a conversion is made, records must also be kept of the annual recalculation of the site-specific density and design capacity with supporting documentation.

For example, a landfill may have a permitted design capacity greater than 2.5 million m^3 by volume; but the landfill may have documented calculations showing that, based on the actual waste density, the design capacity is less than 2.5 million Mg by weight. Because the design capacity is less than 2.5 million Mg, the landfill is below the design capacity cutoff. If such a landfill changes it compaction practices such that the density of the waste placed in the landfill increases, the design capacity could become greater than 2.5 million Mg, and the landfill would then need to submit an Amended Design Capacity Report.

Amended Design Capacity

The NSPS requires the landfill to report any increase in design capacity that results in a capacity above the design capacity cutoff [§ 60.757(a)(3)]. For example, if a landfill changes its compaction practices such that the density of the waste placed in the landfill increases, the design capacity could become equal to or greater than 2.5 million Mg, and the

landfill would then need to submit an Amended Design Capacity Report. As another example, if the permitted volume (vertical and/or horizontal dimensions of the landfill) increased such that the design capacity becomes ≥ 2.5 million Mg, an Amended Design Capacity Report would be needed.

The Amended Design Capacity Report must adequately describe the nature of the landfill design capacity increase. The Amended Design Capacity Report must be submitted to the implementing agency within 90 days of an increase in the maximum design capacity of the landfill equal to or above the size exemption of 2.5 million Mg and 2.5 million m^3. If the revised design capacity is equal to or over the size exemption, the landfill must estimate emissions and must install controls if emissions are greater than or equal to 50 Mg/yr.

NMOC Emission Rate Report

Landfills with a maximum design capacity equal to or greater than 2.5 million Mg and 2.5 million m^3 of refuse must submit annual calculations of the NMOC emission rate [§ 60.757(b)]. The report must include an annual estimate of NMOC emissions from the landfill using the tier equations and calculation procedures from § 60.754. These equations and calculation procedures are included in appendix I. An example NMOC Emission Rate Report is included in appendix H.

If the estimated NMOC emissions from a landfill are less than 50 Mg/yr (55 tons/yr) in each of 5 consecutive years, the landfill owner or operator may elect to submit a 5-year estimate of NMOC emissions from the landfill instead of an Annual Report [§ 60.757(b)(1)(ii)]. For each of the next 5 years, the landfill NMOC emission rate is estimated following the same procedures used for the annual estimates. A 5-year NMOC Emission Rate Report is based on the current amount of refuse in the landfill and the estimated waste acceptance rate for each of the 5 years covered by the report. If an actual waste acceptance rate exceeds the estimated waste acceptance rate used in a 5-year report, a revised 5-year report must be submitted to the implementing agency. The revised 5-year estimate must begin with the year in which the actual waste acceptance rate exceeded the estimated waste acceptance rate. All data, calculations, and measurements used to prepare the 5-year report must be submitted for review by the implementing agency.

The initial Annual NMOC Emission Rate Report must be submitted: (1) by June 10, 1996 for landfills that commenced construction, modification, or reconstruction on or after May 30, 1991, but before March 12, 1996; or (2) within 90 days after the date the landfill commenced construction, modification, or reconstruction for landfills that commence these activities on or after March 12, 1996. Subsequent NMOC Emission Rate Reports must be submitted annually or until criteria are met to allow a 5-year NMOC Emission Rate Report. The Initial NMOC Emission Rate Report may be submitted with the Initial Design Capacity Report.

Collection and Control System Design Plan

Each landfill owner or operator that reports an NMOC emission rate equal to or greater than 50 Mg/yr must take one of the following actions:

(1) Submit a design plan for a gas collection and control system; or

(2) Recalculate the NMOC emission rate estimate using Tier 2 and Tier 3 calculating procedures.

If a landfill owner or operator elects to submit a design plan, the plan must be submitted to the implementing agency within 1 year after a landfill first reports an NMOC emission rate equal to or greater than 50 Mg/yr (55 tons/yr). A landfill owner or operator can install either a gas collection and control system that meets the design criteria in § 60.759 of the standard, or an alternative design.

Each landfill owner or operator is required to submit design plans to the implementing agency for approval. The gas collection and control system must be installed and ready for startup within 30 months after a landfill's NMOC emission rate is first reported to be equal or greater than 50 Mg/yr.

The implementing agency must approve the design of a gas collection and control system prior to installation. The review and comment interval for approving a design plan is expected to take approximately 6 months from the date the plan is submitted, leaving approximately 12 months for installing the alternative gas collection and control system.

The second option for a landfill with a Tier 1 NMOC emission rate equal to or greater than 50 Mg/yr (55 tons/yr) is to recalculate the NMOC emission rate. This calculation is

made after determining site-specific landfill characteristics through Tier 2 and Tier 3 sampling and analysis. If a landfill owner or operator recalculates an NMOC emission rate less than 50 Mg/yr (55 tons/yr) using a site-specific NMOC concentration determined from the Tier 2 procedures, the annual reporting of the NMOC emission rate resumes using the site-specific NMOC concentrations. The recalculated Tier 2 NMOC Emission Rate Report must be submitted to the implementing agency within 180 days after calculating the initial NMOC emission rate exceedance [§ 60.757(c)(1)]. Subsequent annual reports must be submitted on the anniversary of the original Tier 1 Annual NMOC Emission Rate Report. The site-specific NMOC concentration is reverified through testing once every 5 years. Subsequent reports using the site-specific NMOC concentration continue until the NMOC emission rate cut-off is exceeded.

A landfill owner or operator may also elect to recalculate the NMOC emission rate after determining a site-specific methane gas generation rate through Tier 3 sampling and analysis. If a landfill owner or operator recalculates an NMOC emission rate less than 50 Mg/yr (55 tons/yr) using a methane gas generation rate determined from Tier 3 procedures, then the annual reporting of the NMOC emission rate resumes using the site-specific value. The recalculated NMOC Emission Rate Report, based on the Tier 3 sampling and analysis, must be submitted to the implementing agency within 1 year after calculating the initial NMOC emission rate exceedance [§ 60.757(c)(2)]. Subsequent reports using the site-specific NMOC concentration continue until the NMOC emission rate cut-off is exceeded. If using site-specific factors results in a landfill recalculating its NMOC emission rate as being equal to or greater than 50 Mg/yr, a notification of intent to install a collection system and control device or a Collection and Control System Design Plan Report must be submitted to the implementing agency within 1 year after first reporting an NMOC emission rate exceeding the cut-off.

Closure Report

The owner or operator of a controlled landfill that is preparing to permanently close the landfill must submit a closure report to the implementing agency within 30 days of waste acceptance cessation [§ 60.757(d)]. The report acknowledges that the landfill will no longer accept or dispose of refuse in the landfill unless a notification of modification is filed according to the procedures in § 60.7(a)(4). The implementing agency may request additional

information to verify permanent closure of the landfill has taken place. An example of a Closure Report is included in appendix H.

Equipment Removal Report

An equipment removal report must be submitted to the implementing agency within 30 days prior to the removal or cessation of operation of a gas collection and control system [(§ 60.757(e)]. The report must include the following:

(1) A copy of the Landfill Closure Report;

(2) A copy of the Initial Performance Test Report, to demonstrate that the gas collection and control system has controlled emissions from the landfill for at least 15 years; and

(3) Copies of three successive NMOC Emission Rate Reports which document the NMOC emission rate (prior to the control device) as less than 50 Mg/yr. The test dates should be no closer than 90 days apart and no farther than 180 days apart.

Annual Compliance Report

The initial Annual Report for a gas collection and control system must be submitted to the implementing agency within 180 days after installation and start-up of the system [§ 60.757(f) and (g)]. The initial report is required to include the Initial Performance Test Report for the gas control system and the following information:

(1) Value and length of time for exceedances of monitored parameters under § 60.756. This would include reporting of monthly measurements of nitrogen or oxygen concentration and temperature within a well that exceed 20 percent nitrogen or 5 percent oxygen or 55 ^{o}C (131 ^{o}F), and methane concentrations in excess of 500 ppm above background. Reportable exceedances for control device operating parameters include 3-hour periods when combustor temperatures are outside the ranges established in the most recent performance tests, and periods when the pilot flame to a flare or the flare flame is absent;

(2) Description and duration of all periods when the gas stream from the collection system was diverted from the control device through a bypass line or had no flow;

(3) Description and duration of all periods when the gas control device was not operational for more than 1 hour and length of time the control device was not operational;

(4) All periods when the gas collection system was not operational in excess of 5 days;

(5) Each location where the landfill surface exceeded a methane concentration of 500 ppm, and the methane concentration measured at each location for which an exceedance was recorded in the previous month; and

(6) Date and location of all newly installed wells or collection system expansions.

Initial Performance Test Report

The landfill owner or operator is required to submit a performance test report (as specified in § 60.8) for the gas collection and control system. This report must be submitted to the implementing agency within 180 days after installation and start-up of the control system. The report must include the following information:

(1) A diagram of gas collection system showing collection system positioning including all wells, horizontal collectors, surface collectors, or other gas extraction devices; landfill areas excluded from control; and proposed sites for future collection system expansion.

(2) Data upon which the sufficient density of gas extraction devices and gas mover sizing are based.

(3) Documentation on the presence of asbestos or nondegradable material in areas where extraction wells have been excluded.

(4) Calculations and the sum of LFG gas generation rates for areas where extraction wells have been excluded.

(5) Provisions for increasing gas mover capacity if future gas generation rates exceed current equipment limits.

(6) Documentation to demonstrate the control of off-site gas migration.

2.2 EMISSION GUIDELINES (40 CFR PART 60, SUBPART Cc)

This section summarizes the EG applicability, regulatory requirements, and compliance schedule. The requirements of the EG parallel the requirements of the NSPS. The similarities between the EG and the NSPS are as follows:

(1) The same design capacity ($\geq$ 2.5 million Mg and 2.5 million m^3) and NMOC emission rate ($\geq$ 50 Mg/yr) levels are used to determine control requirements.

(2) The same emission controls (installing a gas collection and control system that achieves a 98 percent reduction of NMOC emissions) are required.

(3) The same operating limits exist for the landfill and emission control system.

(4) The same monitoring, recordkeeping, and reporting requirements exist.

(5) The same time intervals are allowed for completing compliance requirements.

(6) The same testing and calculating procedures (tier calculating procedures, Method 2E, Method 3C or 3A, and Method 25C or 18) are used.

Since the majority of requirements specified in the EG are identical to those requirements specified by the NSPS, only the differences in EG requirements are discussed in this section. The main differences between the EG and the NSPS are as follows:

(1) Applicability criteria are for "existing" landfills;

(2) There is flexibility in establishing the control requirements for a State-implemented emission standard;

(3) States need to develop a plan to implement the requirements of the EG; and

(4) There are different landfill compliance schedules for a State-implemented emission standard.

Each of these differences are discussed below.

2.2.1 Applicability Criteria for "Existing" Landfills

The EG apply to all MSW landfills that satisfy the two conditions listed below:

(1) The construction, modification, or reconstruction of the landfill began before the proposal date of May 30, 1991, and

(2) The landfill received waste on or after November 8, 1987 or has additional design capacity that may be filled in the future.

These landfills are defined as existing landfills. The EG do not apply to landfills that closed prior to November 8, 1987. (See Section 2.1.1 for a discussion of modification and Figure 2-1 for an illustration of whether a landfill is subject to the NSPS or EG based on its construction and modification history.)

2.2.2 Flexibility in Establishing Control Requirements for State-Implemented Emission Standards

State emission standards and compliance times must generally be as stringent as the EG. However, the EG offer some flexibility in that States may develop more stringent standards to address State and local concerns. In certain case-by-case situations, less stringent control is allowed. Flexibility in establishing a State emission standard is discussed further in MSW Landfills, Volume 2.

2.2.3 State Plan Development for Implementing the Requirements of the EG

State agencies must develop a plan for implementing the EG. The procedure for developing and submitting implementation plans for EG was established in 40 CFR Subpart B, Adoption and Submittal of State Plans for Designated Facilities.

The State Plan for controlling landfill emissions must be submitted to the EPA Administrator for review within 9 months after the promulgation date of the EG for MSW landfills [§ 60.23(a)]. The Administrator will approve or disapprove each State Plan (or portion thereof) within 4 months after the receipt date of the plan. If an adequate State Plan has not been

submitted or approved by the Administrator within 6 months after the receipt date of the plan, the Administrator is authorized to promulgate a Federal Plan for the State [§ 60.27(d)]. The requirements for developing a State Plan to implement EG are discussed in detail in MSW Landfills, Volume 2.

2.2.4 Compliance Schedule for a State-Implemented Emission Standard

The compliance schedule and reporting requirements for the EG are similar to the NSPS except for the date to begin reporting. The State Plan will specify the date rather than beginning 90 days from the EG promulgation date. State Plans are required to include the same types of reporting and compliance steps as the NSPS. For example, a State Plan will include a specific date for the Initial Design Capacity Report and the NMOC Emission Rate Report. To be consistent with the EG, the date for the Design Capacity Report and the initial Annual NMOC Emission Rate Report should be within 90 days after the effective date of State Plan approval. If the report shows $\geq$ 50 Mg/yr NMOC, the landfill must comply within 30 months, the same interval as the NSPS. See section 3.2 of this document and MSW Landfills, Volume 2.

3.0 IMPLEMENTATION AND COMPLIANCE

Three required actions will be triggered by promulgation of the MSW landfill rule:

(1) Delegated authorities, which in most cases are the States, must implement and ensure compliance with the NSPS;

(2) States must develop a plan for implementing requirements of the EG; and

(3) States must implement and ensure compliance with requirements of the EG.

This section provides a discussion of these actions.

3.1 IMPLEMENTATION OF THE NEW SOURCE PERFORMANCE STANDARDS

New landfills are subject to the NSPS proposed under the authority of section 111(b) of the Act. The responsibility for implementing the NSPS lies with the EPA, but States may become the delegated authority. Under section 111(c)(1) of the Act, States may develop and submit to the Administrator a procedure for implementing and enforcing standards of performance for new sources. If the Administrator finds the State procedure to be adequate, the State is delegated the authority to implement and enforce the standards.

Implementing the NSPS

States can obtain the authority to implement NSPS by requesting delegation from the Administrator and writing an implementation and enforcement plan per section 111(c) of the Act. States that have been delegated authority are listed in 40 CFR § 60.4. As of 1995,

49 States, the District of Columbia, and three territories have received delegated authority to implement some or all NSPS.

The first activity for States with delegated authority is submission of an implementation and enforcement plan. Guidance on preparing NSPS implementation and enforcement plans is not provided in this document since this procedure is a familiar process for States.

How to Identify New MSW Landfills

A new landfill is a landfill that commenced construction, reconstruction, or modification on or after May 30, 1991 (see section 2.1.1 for how to make applicability determinations). States will need to develop and implement a strategy for identifying new landfills. Since State air agencies typically do not have an inventory of MSW landfills, it will be important to communicate with the State agency responsible for solid waste regulation.

States should have information on landfills located in their jurisdiction due to requirements of two federal statutes. States were required to develop solid waste management implementation plans under 40 CFR 256. Also, MSW landfill criteria were established under RCRA in 40 CFR 258. These criteria are applicable to all landfills that have received waste since October 9, 1991, except for those landfills that stopped receiving waste before October 9, 1993. In addition, solid waste agencies are required by RCRA to collect landfill design and construction information. Arrangements should be made to review State RCRA files on MSW landfills. From a review of these files, it should be possible to identify all of the new landfills.

The State air agency also needs to institute a mechanism for being notified when a new landfill is being planned. Since the need for a solid waste disposal permit is more obvious to landfill owners or operators, coordination with State personnel responsible for RCRA permitting of MSW landfills may be the most effective mechanism.

NSPS Title V Permitting

Title V of the Act requires sources affected by NSPS and/or EG to obtain a Title V operating permit under Part 70 and 71, unless the Administrator exempts a source category or part of a source category from permit requirements. (In States with approved Part 70

operating permit programs, sources will apply to the State for Part 70 permits; in States without Part 70 operating permit programs, EPA will implement the Federal operating permits program under Part 71.) Landfills that have design capacities greater than the design capacity cutoff ($\geq$ 2.5 million Mg and 2.5 million m^3) are required to obtain Title V permits.

Landfills below the design capacity cutoff are not subject to the requirement to obtain a Part 70 or 71 (Title V) operating permit, unless the landfill is a major source or is subject for some other reason. "Major source" is defined in Part 70 and is based on emissions. In general, if a landfill emits more than 100 tons per year of any regulated criteria pollutant (e.g., VOC, NO_X) or more than 25 tons per year total hazardous air pollutants, it is a major source. If a landfill is located in a nonattainment area, the major source thresholds for criteria pollutants (e.g., VOC, NO_X) are lower. Landfills would also be subject to operating permit requirements if they are subject to another NSPS or NESHAP. If landfills below the design capacity cutoff are major sources or are subject for some other reason, they must obtain a permit under the same deadlines and requirements that apply to any other major source. If a landfill's design capacity is modified to be equal to or greater than the design capacity cutoff, the landfill will become subject to Title V, regardless of whether the landfill is a major source or not.

Landfills must apply for a Title V permit within 1 year of becoming subject to Title V. If a landfill was already subject to Title V prior to the NSPS or EG (e.g., because it was a major source), an application would already have been submitted. For landfills with design capacities $\geq$ 2.5 million Mg and 2.5 million m^3 that become subject to Title V permitting as a result of the NSPS or EG, the direct-final amendment notice (63 FR 32743, June 16, 1998) clarifies the date they become subject. Existing landfills become subject 90 days after the effective date of EPA's approval of the State plan. New landfills become subject 90 days after promulgation of the NSPS or 90 days after the date they commenced construction, modification, or reconstruction. By these dates the Design Capacity Report would be submitted and it would be clear whether or not the landfill exceeds the design capacity criteria. The permit application would be due within 1 year of these dates.

When a landfill is closed, and either never needed a control system to comply with the NSPS or EG, or meets the conditions for control system removal specified in the NSPS, a Part 70 or 71 operating permit is no longer required by the NSPS or EG if the landfill is not otherwise subject to the requirements of either Part 70 or 71. However, the landfill may still be

subject to Part 70 or 71 for some other reason and, thereby, be required to have an operating permit.

Ensuring Compliance with the NSPS

Reports are the primary method for ensuring compliance with the NSPS. These reports begin with the Initial Design Capacity Report and conclude with the Landfill Closure and Control Equipment Removal Reports. This section provides a discussion on techniques States can use to do the following:

(1) ensure the proper reports are received;

(2) track receipt of the incoming reports; and

(3) ensure that each report includes accurate and complete information.

The reporting requirements and submittal schedules are detailed in section 2. Figure 3-1 illustrates the reporting sequence for an example landfill. This example landfill is defined as "new" because construction commenced on March 12, 1993. Landfills constructed or modified on or after the proposal date (May 30, 1991) and prior to March 12, 1996 must submit a Design Capacity Report by June 10, 1996. In this example, the design capacity is greater than the minimum size exemption limit of 2.5 million Mg and 2.5 million m^3 and the NMOC emission rate is equal to or greater than the emission rate cutoff of 50 Mg/yr. The example landfill stopped accepting waste on December 1, 2005.

Collecting Reports

The State may want to consider establishing an outreach program to facilitate receipt of the Initial Design Capacity Reports from each landfill. One objective of the outreach program would be to send example report forms for the landfills to complete and return. This

Report	Latest Submittal Date	Compliance Schedule
Design Capacity Report	June 10, 1996	Within 90 days after promulgation[a]
NMOC Emission Rate Report Based on TIER 1 Estimate (NMOC = 50 Mg/yr)	June 10, 1996	Within 90 days after promulgation[a]
Revised Emission Rate Report Based on TIER 2 Estimate (NMOC = 50 Mg/yr)	December 7, 1996	Within 180 days year after landfill estimates of NMOC emissions ≥ 50 Mg/yr
Design Plan for Collection and Control System	June 10, 1997	Within 1 year after estimating NMOC emissions ≥ 50 Mg/yr
Installation of Collection and Control System Completed	December 10, 1998	Within 30 months after reporting NMOC emissions ≥ 50 Mg/yr
Annual Report (and Control System Initial Performance Test Report)	June 8, 1999	Within every 180 days after installing control system
Landfill Closure Report	December 31, 2005	Within 30 days after the landfill stops accepting MSW
Control Equipment Removal Report	December 10, 2013	30 days prior to shutting down and removing; and at least 15 years after installing controls

[a]Promulgation date is March 12, 1996.

Figure 3-1. NSPS Reporting Sequence for an Example Landfill

would facilitate receiving the required information in a standard format. Example forms that could be used are included in appendix H.

The first report required by the NSPS is the Design Capacity Report. All landfills subject to the NSPS are required to submit this report. An example Design Capacity Report which includes all of these requirements is included in appendix H. Landfills with a design capacity below the minimum size exemption of 2.5 million Mg or 2.5 million m^3 are not subject to any other requirements of the regulations. (Except, if the landfill converted design capacity from mass to volume or from volume to mass to demonstrate that capacity is below 2.5 million Mg or 2.5 million m^3, they are required to recalculate site-specific density and design capacity annually, as explained in section 2.1.3.) Also, if the design capacity is changed such that it is $\geq$ 2.5 million Mg and 2.5 million m^3 (e.g., resulting from an increase in volume or a change in density), an Amended Design Capacity Report must be filed. Landfills with design capacities equal to or greater than 2.5 million Mg and 2.5 million m^3 must comply with the requirements of the NSPS. Table 3-1 shows the applicability of the NSPS and EG to MSW landfills. Figure 2-1 also illustrates applicability.

TABLE 3-1. APPLICABILITY OF THE NSPS AND EG TO MSW LANDFILLS

Landfill Maximum Design Capacity	Constructed, reconstructed, or modified after 5/30/91	Constructed, reconstructed, or modified before 5/30/91. Accepted waste after 11/8/87 or has additional capacity
< 2.5 million Mg or <2.5 million m^3	Must report design capacity. No further requirements.*	Must report design capacity. No further requirements.*
≥ 2.5 million Mg and ≥ 2.5 million m^3	Must comply with the requirements of the NSPS.	Must comply with the requirements of the EG.

*Except, if the landfill converted design capacity from mass to volume or from volume to mass to demonstrate that capacity is below 2.5 million Mg or 2.5 million m^3, they are required to recalculate site-specific density and design capacity annually, as explained in section 2.1.3.

The NMOC Emission Rate Report is due within the same time period as the Initial Design Capacity Report. An example letter that could serve as an Initial NMOC Emission Rate Report is shown in Figure 3-2. Landfills must estimate annual emissions according to the Tier method discussed in section 2. After submitting the initial NMOC Emission Rate Report, annual reporting is generally required. However, the NMOC emission rate may be reported on a 5-year basis if the estimated NMOC emissions are less than 50 Mg/yr in each of five consecutive years.

If the landfill's NMOC emission rate is 50 Mg/yr or more, the landfill must submit a Collection and Control System Design Plan prepared by a professional engineer. The design plan should either: (1) show that the planned collection and control system conforms to the criteria in § 60.759 for active collection systems, or (2) demonstrate that an alternative design is sufficient and addresses the criteria in § 60.752(b)(2). Appendix E provides guidance in reviewing both Collection and Control System Design Plans that conform to § 60.759 and alternative design plans. Also included are several case studies of collection systems.

State Air Agency Director
State Air Agency
Air Agency Address
Air Agency's Town, State, and Zip Code

RE: Initial NMOC Emission Rate Report as required by the MSW Landfill NSPS

Dear State Air Agency Director:

Facility A is currently regulated according to the MSW Landfill NSPS. Under the requirements of the regulations, Landfill A must submit an estimate of the NMOC emissions. The estimated NMOC emission rate is ___ Mg/yr. This estimate was calculated based on the Tier 1 procedures in the regulations. A copy of the calculations is enclosed.

Sincerely,

Landfill A Owner or operator
enclosure

Figure 3-2. Example Initial NMOC Emission Rate Report

One of the last reports a landfill is required to submit is the Landfill Closure Report. The purpose of this report is to inform the State that the landfill has stopped accepting MSW. Figure 3-3 shows a sample letter that could serve as a Landfill Closure Report. The most important element of the letter is a statement that the landfill stopped accepting MSW on a certain day. Other information that may be helpful to the State is a reiteration of the design capacity, the initial date of waste acceptance, and the mass or volume of MSW in the landfill. The landfill should note whether there is remaining capacity. A sample Control Equipment Removal Report is provided in Figure 3-4. This report applies only to controlled landfills and will be the last report the State receives from a controlled landfill. This sample report form includes a statement that the landfill intends to remove, or cease operation of, the collection and control system. The regulations list three criteria that must be met before the landfill may stop operating the controls and remove them. Submittal of the Closure Report satisfies the first criteria. The letter should include statements certifying that the remaining criteria have been met. These criteria include:

(1) the control system has been in operation for at least 15 years; and

(2) three consecutive NMOC Emission Rate Test Reports with values less than 50 Mg/yr (prior to the control device) have been submitted.

As discussed in section 2, Annual Reports are also required for controlled landfills. Because the context of these reports will vary depending on the type of control and whether there have been monitoring parameter exceedances during the time period, a sample report form has not been provided.

Tracking Reports

As discussed above, providing standard report forms to landfill owners/operators can facilitate receiving the proper information in a consistent format. Another responsibility of the State is tracking receipt of reports so the status of each landfill can be readily determined. The State needs to be able to determine which reports have been received and what reports are expected.

State Air Agency Director
State Air Agency
Air Agency Address
Air Agency's Town, State, and Zip Code

RE: Landfill Closure Report as required by the MSW Landfill NSPS

Dear State Air Agency Director:

Facility A is currently regulated according to the MSW Landfill NSPS. Under the requirements of the regulations, Landfill A must submit a Landfill Closure Report within 30 days of ceasing to accept MSW. The last day of waste acceptance was March 20, 2009 and the landfill was closed on April 5, 2009. The closure is intended to be permanent.

The design capacity of the landfill is 2,750,000 Mg. The estimated quantity of refuse-in-place is 2,750,000 Mg. Therefore, there is no additional capacity.

Also note that Landfill A is not being controlled.

Sincerely,

Landfill A Owner or operator

Figure 3-3. Sample Letter to Report Landfill Closure

State Air Agency Director
State Air Agency
Air Agency Address
Air Agency's Town, State, and Zip Code

RE: Control Equipment Removal Report as required by the MSW Landfill NSPS

Dear State Air Agency Director:

Facility A is currently regulated according to the MSW Landfill NSPS. Under the requirements of the regulations, Landfill A must submit a Control Equipment Removal Report 30 days prior to ceasing to operate and removal of landfill gas collection and control equipment. Operation of the collection and control system is scheduled to cease on November 30, 2015.

The control system has been in operation since August 12, 1999. Therefore the minimum 15 year operating requirement has been fulfilled. As required by 60.757(e), a dated copy of the initial performance test report is enclosed to document the date of initial installation of the system. Also enclosed per 60.757(e), are dated copies of the three most recent NMOC Emission Rate Reports demonstrating that the landfill is no longer emitting more than 50 Mg/yr of NMOC.

Note that a Landfill Closure Report was submitted on August 20, 2013. The last day of waste acceptance was July 20, 2013 and the landfill was closed July 21, 2013.

Sincerely,

Landfill A Owner or operator
enclosures

Figure 3-4. Sample Letter to Report Control Equipment Removal

Numerous reports may be required from each landfill. Therefore, it would be convenient to create separate files for each landfill. A suggested tool for tracking the incoming reports is to maintain a landfill report tracking log in each landfill's file. As reports are received, they could be noted in this log. This log would provide a summary of the reports received from each landfill. Therefore, any authorized person could immediately determine the status of a landfill by reviewing the log instead of searching through the entire file. For example, an inspector could prepare for a site visit using the log. This would eliminate the need for time-consuming file searches.

An example log is included in appendix K. An illustration of this log is also provided in Figure 3-5. This log provides a means of tracking incoming reports from landfills and indicating the next report expected from the landfill.

One of the first steps in using this log is to indicate the date the landfill becomes affected by the NSPS. This date should be indicated in the space noted as the "Trigger-Date." Once the trigger date has been established, the regulator can compute the due date for the next required reports. The log in appendix K provides a summary of the specified submittal times. When a report is received, the regulator should note the postmark date since it is the recognized date of receipt in the rule. In the example log, the "Due Date" and "Date Postmarked" are side-by-side so that it is clearly evident whether the report was received on time.

The example log also includes a column to note whether the report is acceptable. The report must include all of the information required by the NSPS. If the report is not acceptable, the regulator needs to inform the landfill of the inadequate report and make arrangements for the report to be resubmitted.

The last column in the example log provides space to indicate the next report expected from the landfill. This column provides the criteria for determining the nature of the next report. This allows the regulator to enter the due date for the next expected report. In some cases, the landfill may have an option, such as whether to install controls or refine the emission estimate. In such a case, the regulator may "pencil-in" the due date for possible reports.

Figure 3-5 does not include all possible reports since some reports must be submitted annually. The complete example report log included in appendix K has two attachments. Attachment A is used for tracking the NMOC Emission Rate Reports. These reports must be submitted annually, except when projected emissions are less than 50 Mg in each

of five consecutive years. In this case, the Emission Rate Report may be submitted once every 5 years. Attachment B is used for tracking the Annual Reports. These reports must be submitted every 12 months after a collection and control system is installed. All landfills with capacities greater than 2.5 million Mg and 2.5 million m^3 must submit either the NMOC Emission Rate Reports or the Annual Reports.

The State should also consider maintaining a report tracking database or spreadsheet to track all of the incoming reports. There may be as many as 100 or more landfills in any State. All of the landfills that are subject to either the NSPS or the EG must submit an Initial Design Capacity Report. However, a relatively small percentage of these landfills will have design capacities of 2.5 million Mg and 2.5 million m^3 or more and will therefore be required to submit additional reports. Depending on the number of landfills in a State and the size of the landfills, the State may incur a significant administrative burden in processing the numerous reports from these landfills.

A suggested method of tracking the reports received from all landfills is to create a database or spreadsheet containing all the affected landfills and the due dates of expected reports. This would provide a summary of the reports expected from all of the landfills in the State's jurisdiction. An illustrative example of such a tracking spreadsheet is shown in Figure 3-6.

The first priority in tracking reports is to determine if all reports due by a certain date have been submitted. Therefore, the first column of the tracking spreadsheet is the report due date. The other columns include the date postmarked, report name, facility name, contact person, and contact phone number. Using a database or spreadsheet format allows the information to be sorted by any of the column headings, such as the report due date, report name, or facility.

The first step in creating such a spreadsheet is to enter the facility name, contact person, and contact phone number in the appropriate columns for all of the new landfills. This information could be obtained from the individual landfill files. Therefore, the first step is to enter "Initial Design Capacity Report" in the "Report" column, since all landfills must submit this report.

LANDFILL REPORT LOG

Trigger Date

___/___/____

FACILITY NAME: _____

CONTACT PERSON: _____

TELEPHONE NUMBER: _____

#	Report	Due Date	Date Postmarked	Acceptable (yes or no)	Comments	Actions if Report is Acceptable
1	Initial Design Capacity Report					If capacity is ≥ 2.5 million Mg and 2.5 million m^3, go to #2. If capacity is < 2.5 million Mg or 2.5 million m^3, no further action is required unless capacity is increased.
2	Initial NMOC Emission Rate Report					If NMOC emission rate is ≥ 50 Mg, go to #3 or #4. If NMOC emission rate is < 50 Mg, go to Attachment A (NMOC Emission Rate Report tracking form).
3	Collection and Control System Design Plan					Go to Attachment B (Annual Report tracking form).
4	Revised NMOC Emission Rate Report (Tier 2)					If NMOC emission rate is ≥ 50 Mg, go to #3 or #5. If NMOC emission rate is < 50 Mg, go to Attachment A (NMOC Emission Rate Report tracking form).
5	Revised NMOC Emission Rate Report (Tier 3)					If NMOC emission rate is ≥ 50 Mg, go to #3. If NMOC emission rate is < 50 Mg, go to Attachment A (NMOC Emission Rate Report tracking form).
6	Landfill Closure Report					
7	Control Equipment Removal Report					
8	Amended Design Capacity Report					If the amended design capacity is ≥ 2.5 million Mg and 2.5 million m^3 resulting from an increase in volume or a change in density, go to #2. If capacity is < 2.5 million Mg or 2.5 million m^3, this report is not required. No further action is required unless capacity is increased.

Figure 3-5. Landfill Report Tracking Log

REPORT TRACKING SPREADSHEET[a]

Date Report Expected	Date Postmarked	Report	Facility	Facility Contact Person	Contact Phone Number
1/27/99		Initial Control System Performance Test and Annual Report	Landfill A	J.A. Owner	(999) 444-2222
1/27/99		Annual Report	Landfill B	R.Q. Operator	(222) 999-3333
1/28/99		Revised Emission Rate Report (Tier 3)	Landfill C	B.J. Valadez	(444) 111-1111
1/28/99		Initial Design Capacity Report	Landfill D	J.R. Smith	(333) 666-2121
1/29/99		Collection and Control System Design Plan	Landfill E	L.M. Austin	(888) 454-3131
1/29/99		Emission Rate Report (Tier 1)	Landfill F	S.T. Barnes	(777) 123-0123

[a]This table shows all of the reports due from landfills during the period of January 27 through January 29, 1999.

Figure 3-6. Example Tracking Spreadsheet

The next compliance action can be obtained from the individual landfill report log. After determining the next required report, a new row must be created to indicate the report name and due date.

A convenient method for using the tracking spreadsheet would be to print a list of all the expected reports due that week. This could be accomplished by sorting the spreadsheet by the "Date Report Expected" column and printing all of the spreadsheet records for that week. As the reports are received, the regulator could note receipt by filling in the "Date Postmarked" column. At the end of the week, the regulator could then determine if any reports were not received. The example spreadsheet contains the contact person and telephone number for each landfill. This will facilitate follow-up on any delinquent or insufficient reports.

Reviewing Reports

After reports are received, the regulator needs to determine whether each report contains all the required information. Appendix F includes checklists for each report required by the NSPS. These reports include:

(1) Initial Design Capacity;
(2) Amended Design Capacity;
(3) Annual or 5-year NMOC Emission Rate;
(4) Revised NMOC Emission Rate (Tier 2);
(5) Revised NMOC Emission Rate (Tier 3);
(6) Collection and Control System Design Plan;
(7) Initial Control System Performance Test;
(8) Annual Reports;
(9) Landfill Closure; and
(10) Control Equipment Removal.

The regulator should complete the appropriate checklist for each report as the reports are received. The checklists provide a standard means of ensuring that all requirements of each report are met. In general, the questions in the checklists begin by asking whether the report was submitted within the required timeframe. The questions then follow the requirements in the regulations.

It is likely that some landfills will submit emission estimates or other calculations which do not adhere to those prescribed in the regulations. In such cases, it is the responsibility

of the regulator to verify whether the procedures used by the landfill are acceptable. Because the rule specifies that NMOC emissions must be estimated using the Tier methodology, it is not acceptable for owners or operators to deviate from this methodology. The rule is not as specific regarding design capacity calculations, so the regulator will need to determine whether the landfill procedures are acceptable based on sound engineering practices.

3.2 STATE PLAN DEVELOPMENT FOR EG AND ACTIVITIES TO IMPLEMENT THEIR PLAN

Each State with existing landfills is required to submit a plan to the Administrator for implementing and enforcing the EG. State Plan development is discussed in detail in MSW Landfills, Volume 2. Volume 2 outlines how to develop a State Plan and describes the contents of State Plans. In addition, Volume 2 discusses the submittal and approval process and schedule, the flexibility allowed in State Plans, the relationship of State Plans to SIPs, compliance times, provisions for requirements other than those in the EG, and progress reports in plan enforcement. Volume 2 can be found on the EPA TTN Web as described on page iv of this volume.

This section provides an overview of the actions States must take to implement their plan and ensure that affected landfills are in compliance. For the purposes of this document, it is assumed that States will adopt the requirements of the EG completely. Compliance of a landfill with a State's plan includes determining which landfills are affected and ensuring that monitoring, reporting, and recordkeeping requirements are fulfilled. Compliance with the monitoring and recordkeeping requirements are determined through on-site inspections. Inspections are discussed in section 4.0. The primary means for States to determine whether landfills are complying with the EG is collection and review of reports. The reporting requirements for EG are the same as the NSPS except for the reporting schedule times.

Activities to Implement the EG

Implementing EG is similar to implementing the NSPS; States will first need to identify landfills subject to EG. Only landfills defined as "existing" are affected. Air agencies may be able to obtain information on these landfills from their solid waste counterparts since air agencies typically have limited, if any, information on MSW landfills.

The 1984 Hazardous and Solid Waste Amendments to RCRA required States to establish a permit program or other system of prior approval to ensure that facilities receiving household hazardous waste or small quantity generator hazardous waste are in compliance with 40 CFR Part 257. This permit program was to be established by November 8, 1987. This permit program is one available resource for States to use in locating landfills that are subject to the EG. Another source of information may be county and municipal governments.

One special consideration for identifying all of the existing landfills is that some may be closed. Identifying and locating owners or operators of closed landfills may be difficult; only landfills that have accepted MSW since November 8, 1987 are subject to the EG. Therefore, these landfills may have RCRA permits. Once a closed landfill has been identified, the State will need to identify and locate the owner or operator or responsible party.

After all the landfills subject to the EG are identified, the State must determine which will be affected by the EG. An Initial Design Capacity Report is required of all affected landfills. Landfills with design capacities less than the exemption level of 2.5 million Mg or 2.5 million m^3 have no further requirements unless the design capacity is increased above the exemption level. Table 3-1 in section 3.1 of this document illustrates applicability of the EG to MSW landfills. As shown in this table, existing landfills with design capacities above the minimum size exemption must comply with the requirements of the EG. The requirements of the EG are the same as for the NSPS. Therefore, the flow chart of the compliance actions presented in Figure 2-2 for the NSPS is also applicable to the requirements of the EG, except that the actions would be initiated on the date of State Plan approval or on a date specified by the State instead of on the promulgation date of the NSPS.

EG Title V Permitting

The Title V permitting requirements for landfills subject to the EG are the same as the Title V requirements for the NSPS. These requirements are discussed in section 3.1, NSPS Title V Permitting.

Ensuring Compliance with the EG

Receipt of the required reports is one method of ensuring compliance with the EG. Owners and operators of landfills must submit several different reports, according to the

requirements in the EG. Table 3-2 shows the schedule for an example landfill. It is assumed that the capacity is greater than the minimum size limit and the emission rate cutoff. The table illustrates the sequence of reports the State should receive from the landfill.

The compliance reporting schedule for existing landfills generally follows the reporting requirements of the NSPS, except that rather than beginning reporting (Design Capacity Report and the Initial NMOC emission rate report) 90 days after the NSPS promulgation date, reporting begins with a set date in the State Plan. For consistency with Subparts Cc and WWW, these first two reports could be due 90 days after the effective date of the State standard or other enforceable mechanism. The same information required by the NSPS is required by the EG.

The same methods for ensuring compliance with the NSPS can be used for the EG. The following paragraphs provide a discussion on methods of facilitating the submittal and tracking of reports. These are the same methods previously discussed for ensuring compliance with the NSPS. Refer to the section on ensuring compliance with the NSPS for a more detailed discussion on these methods.

Providing standard reports for the landfills will facilitate receiving reports. The outreach program discussed in section 3.1 to assist in ensuring compliance with the NSPS can be used for all landfills affected by the NSPS and the EG. This outreach program would consist of providing standard report forms that the landfill owner or operator could complete and return to the State. Example report forms are provided in appendix H. These forms can be used by either existing landfills complying with the requirements of the EG and State Plan or new landfills complying with the NSPS.

A convenient method of tracking reports for each landfill is to maintain a log in the individual landfill files. An example of this type of form, referred to in section 3.1 as a Landfill Report Log, is included in appendix K. This log provides a means of noting each report, indicating the next expected report, and noting whether the report was acceptable. Refer to the section on ensuring compliance with the NSPS section for a detailed discussion on using this log.

Table 3-2. Schedule for MSW Landfill Compliance with the Emission Guidelines

Report	Compliance Schedule
Design Capacity Report	A set date in State Plan. For consistency with Subparts Cc and WWW, 90 days after the effective date of the state emission standard or other enforceable mechanism
Initial NMOC Emission Rate Report	A set date in State Plan. For consistency with Subparts Cc and WWW, 90 days after the effective date of the state emission standard or other enforceable mechanism
Collection and Control System Design Plan	A set date in State Plan. For consistency with Subparts Cc and WWW, the collection and control system design plan must be submitted within 1 year after the date of the landfill's submittal of the first Annual Emission Rate Report that shows that NMOC emissions first equal or exceed 50 Mg/yr of NMOC
Complete construction and installation of gas collection and control system	A set date in State Plan. For consistency with Subpart Cc, installation of a collection and control system capable of achieving compliance with the Emission Guidelines must be accomplished within 30 months after a landfill's emission rate first equals or exceeds 50 Mg/yr of NMOC.[1]
First Annual Compliance Report and initial performance test for MSW landfill control system	As scheduled in State Plan and for consistency with the NSPS general provisions, no later than 180 days after installation of the collection and control system

[1]On a case-by-case basis, the state may provide for a longer compliance schedule only if the state demonstrates in the Section 111(d) State Plan that the criteria in § 60.24(f) of Subpart B are met, and the EPA approves the compliance schedule.

The State should also consider using a database or spreadsheet in order to track reports received from all of the landfills in its jurisdiction. This tracking spreadsheet would enable the regulator to determine whether any landfills were delinquent in meeting the reporting requirements. The spreadsheet format discussed in the section 3.1 on ensuring compliance with the NSPS can also be used to track reports from landfills affected by EG. This spreadsheet can be used to indicate which reports have been received and which are expected by sorting the spreadsheet entries by the report due date. An illustration of this type of spreadsheet, referred to earlier as a Report Tracking Spreadsheet, was provided in Figure 3-6.

A convenient method for using this spreadsheet would be to print all of the reports due each week. This could be accomplished by sorting the spreadsheet by report due date and printing a hard copy of the reports due for a given week. This method would allow the regulator to post the hard copy and note each report as it is received. At the end of the period, the updated information could be entered and the next action expected by the landfill determined.

Reviewing Reports

The reports submitted under the requirements of the EG should be reviewed in the same manner as those submitted under the NSPS. Appendix F includes checklists to assist in reviewing the reports. These checklists provide a standard means for ensuring that all of the required information is included in the reports. In addition, some landfills may estimate emissions or perform calculations using procedures other than those prescribed in the regulations. In cases where the rule specifies a calculation methodology (i.e., the tier method for calculating NMOC emissions), it is not acceptable for landfill owners/operators to deviate from the rule. In cases where the rule is not specific (i.e., design capacity calculations), the regulator needs to verify that the procedures are acceptable based on sound engineering practices.

4.0 INSPECTION PROCEDURES

Inspections are an important part of the overall regulatory compliance program. Through inspections; regulatory authorities are able to verify compliance with the required monitoring and recordkeeping procedures and visually inspect control systems. This section provides guidance on how to prepare for and conduct inspections at MSW landfills affected by the NSPS and EG.

Since the requirements of the NSPS and EG are the same except for compliance schedules, the same procedures can be used for inspecting landfills affected by the NSPS or the EG. The guidance presented in this section applies to landfills affected by either regulation. Therefore, this section does not distinguish between landfills affected by the NSPS or EG.

This section presents guidelines for conducting an on-site compliance inspection. Section 4.1 provides guidance on how to prepare for the inspection. Section 4.2 presents the steps for conducting a compliance inspection, and references the corresponding on-site inspection checklists located in appendix G.

4.1 PREPARING FOR THE INSPECTION

Preparing for the inspection includes (1) the search and review of relevant files, (2) notification of landfill management concerning the upcoming inspection, and (3) obtaining necessary equipment and materials for the inspection. These preparation activities are discussed below.

Search and Review Files

Prior to conducting an inspection, the inspector should become familiar with the regulations; search the EPA, State, or local agency files; and review all relevant information related to the landfill targeted for inspection. The regulations require that landfills submit reports

to the States, or the implementing agency. These reports should indicate whether the landfill is subject to the regulations. The required reports begin with the Design Capacity and NMOC Emission Rate Reports. Familiarity with the most recent compliance history of the landfill is useful in planning the inspection. Example report forms are included in appendix H.

These required reports should provide a compliance history for the subject landfill. From the reports, the inspector can determine what type of records must be kept by the landfill and what type of collection and control systems are required. It may also be helpful for the inspector to review the on-site checklists (provided in appendix G) in order to systematically review the file. If prior inspections of the landfill have been made, a review of the files will help the inspector prioritize areas of concern for the upcoming inspection.

Notify the Landfill

Since the primary means of determining compliance is the review of landfill records, the inspector should notify the landfill management prior to the inspection. This will allow landfill personnel time to gather and organize all relevant records and have them available for review. Landfill management should also provide a map and/or diagrams of the landfill to the inspector for use in planning spot checks of equipment and verifying the records.

Inspector's Materials and Equipment

The inspector needs to have suitable materials and equipment to perform an inspection. Materials such as pens, pencils, and writing tablets are obvious since results of the inspection need to be recorded. The primary means of recording an inspection is by completing previously prepared checklists. Checklists provide a standard approach and format for conducting and recording an inspection. Checklists for recording, monitoring, and control equipment are included in appendix G. Copies of these checklists should be made for each inspection.

In addition, the inspector may want to monitor surface methane concentrations during the inspection. In this case, an organic vapor analyzer (OVA), flame ionization detector (FID), or other portable monitor meeting the specifications provided in § 60.755(d) will be needed to monitor the methane emissions.

Also, the inspector may request permission from the landfill owner or operator to take photographs. Photographs can provide a large amount of information concerning the physical layout of the landfill and equipment. In addition, details of the equipment may be difficult to represent adequately in the checklists, but will be clear in photographs.

4.2 INSPECTION OF RECORDS AND EQUIPMENT

The inspection consists of three components: (1) review of landfill records, (2) visual inspection of the collection and control equipment, and (3) visual inspection of the monitoring equipment. All three of these components are discussed below.

Reviewing Records

During the visit, inspectors should verify that all records are maintained by the landfill and are accurate. The compliance recordkeeping checklist provided in appendix G is designed to assist in ensuring that all necessary records are kept on site and are up-to-date. This checklist is appropriate for landfills that are required to install collection and control systems (i.e., those with an emission rate at or above 50 Mg/yr). It is expected that agencies will target these landfills for inspections rather than those landfills that are below the emission rate cutoff.

The recordkeeping checklist is organized into six sections. The first section notes the general requirements for maintaining records. For example, records must be kept for at least 5 years and the records must be on site and accessible. The second section concerns the control equipment compliance determination. The landfill is required to demonstrate that the control equipment is in compliance. Records of compliance tests or other approved methods of demonstrating control equipment compliance must be maintained. The equipment operating parameters and exceedances are covered in the third section. This section assists the inspector in determining whether records of the operating parameters are maintained. The fourth section assists the inspector in verifying that records of the location and identification of the collection system wells are maintained. The checklist in the fifth section assists the inspector in verifying that, if the collection system does not collect LFG from areas that do not warrant controls or from areas that contain asbestos, appropriate records are maintained. Collection and control exceedances are noted in the sixth section.

Inspecting Collection and Control Equipment

Visual inspections enable the inspector to assess the condition of the collection and control equipment. Inspectors should note if there are discrepancies between the landfill records and visual inspections. Collection and control equipment should be checked for obvious leaks and lack of maintenance. A collection and control checklist is provided in appendix G to assist the inspector in determining whether the criteria for active collection systems in § 60.759 are being met. A site-specific collection system design plan must be approved. Visual observations of the collection system may be compared to the design plan in addition to or instead of the checklist.

During the visual inspection of the landfill equipment, the inspector may also choose to conduct monitoring to verify compliance. Surface methane emissions may be monitored to provide an indication of the performance; monitoring may be conducted in a manner similar to that described in the regulations or randomly as a spot check. The regulations state that methane emission monitoring shall be conducted along the perimeter of the collection area and along a path that traverses the landfill at 30-meter intervals, and where visual observations indicate elevated concentrations of landfill gas (e.g., distressed vegetation, cracks or seeps in the cover). Measurements are to be made in accordance with section 4.3.1 of Reference Method 21. When monitoring methane emissions, it is important that the probe inlet be placed within 5-10 centimeters of the ground. A complete description of Method 21 is given in appendix B. An OVA, FID, or other portable monitor meeting the specifications provided in § 60.755(d) will be needed to conduct the Method 21 procedures. Any reading of 500 parts per million or more above background levels at any location is considered an exceedance of the operational standards, and corrective action is required. However, an exceedance of 500 parts per million is <u>not</u> a violation if required corrective actions are taken. As required by the regulations, monitoring shall be performed during typical meteorological conditions.

Inspecting Monitoring Equipment

The inspector should verify that required monitoring equipment is installed on the collection and control equipment. A monitoring checklist is provided in appendix G to assist inspectors in determining whether the monitoring requirements in § 60.756 are being met.