RESOURCE CONSERVATION AND RECOVERY ACT

SUBTITLE C - HAZARDOUS WASTE MANAGEMENT

SECTION 3004 - STANDARDS APPLICABLE TO OWNERS AND OPERATORS

OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

FINAL

BACKGROUND DOCUMENT

40 CFR PART 265

SUBPART P INTERIM STATUS STANDARDS FOR HAZARDOUS WASTE FACILITIES FOR THERMAL TREATMENT PROCESSES OTHER THAN INCINERATION AND FOR OPEN BURNING

ENVIRONMENTAL PROTECTION AGENCY

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I. INTRODUCTION

A. Need For Thermal Treatment Interim Status Standards

This is one of a series of documents providing support and background information for regulations issued under Section 3004 of the Resource Conservation and Recovery Act of 1976. Each Background Document describes a regulation as originally proposed, summarizes and responds to comments received that relate to that original proposal, and indicates the Agency's rationale for final regulations.

This background document discusses the rationale for regulations for facilities for hazardous waste thermal treatment other than incineration. This document contains an analysis of comments relevant to regulations for thermal treatment facilities including an analysis of comments received on the proposed regulations for incinerators (§250.45-1). A background document for regulations for hazardous waste incinerators closely parallels this document although the rationales for each of the two sets of regulations are contained within each of the two documents to avoid constant referral.

The Agency proposed standards on December 18, 1978 applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities. Included in those regulations were requirements for owners and operators of hazardous waste incinerators (43 FR 59008). The Agency is still considering the extensive comments that were received on all aspects of that proposal. However, the Agency has decided to issue

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interim status standards that apply to owners and operators of these facilities during the time between submittal of the application for a permit and the issuance of a permit.

These standards are being issued on an interim final basis. This means that the Agency will continue to receive and consider comments on the regulations for a period of 90 days from the date the regulations are issued. As a result of these comments, the Agency may revise, add, or delete specific requirements. These regulations, however, are in force and effective six months after promulgation.

Several commenters on the proposed regulations expressed concern that the standards for incinerators might have a constraining effect on incineration technology development. These commenters felt that EPA's design and operating criteria, (particularly the requirement for incinerators to meet minimum temperatures, retention times, and excess oxygen levels) would restrict progress. The "note" following Section 250.45-1d was intended to add flexibility to the regulations by recognizing and allowing the use of other technologies and other design and operating criteria. It said that permits would be issued, provided that owners and operators could demonstrate that an equivalent degree of combustion was taking place. This was viewed by the commenters as ineffective because permitting officials might be inclined to apply the standard without the "note" rather than take on the responsibility of determining what alternative operating and design conditions constitute equivalent performance.

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Similarly, commenters felt that the proposed incineration regulations would discourage innovative thinking relative to hazardous waste thermal treatment and disposal. These commenters pointed out that certain new and emerging technologies such as molten salt processes, catalytic incinerators, pyrolysis units, and microwave plasma destruction might be seriously stifled or even eliminated by having to comply with incinerator operating and design standards. Commenters felt that the regulations failed to recognize the existance of these and other incineration-like processes which might soon be capable of effectively handling a greater proportion of the hazardous waste generated.

Several commenters suggested that design parameters based on conventional incinerator technology should be replaced by performance standards for destruction efficiency. These performance standards would be broadly applicable to conventional or innovative thermal treatment techniques. As one commenter pointed out, pyrolysis combined with an after-burner could achieve destruction efficiencies (at point of release to the environment) that were comparable to incineration results for many wastes.

The Agency believes that the regulations should encourage the development of new techniques for management of hazardous waste. Furthermore, the Agency recognizes that the proposed incineration regulations did not provide sufficient latitude to accomodate other thermal treatment approaches. There fore, the Agency added in the final regulations a new and

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distinct set of requirements for thermal treatment processes other than incineration.

These interim status standards for thermal treatment are the first part of these final regulations. Together with more performance based permanent status standards for thermal treatment, planned for promulgation in a few months, they allow application of new technology to hazardous waste management while maintaining protection of human health and the environment.

B. Key Definitions

The definitions given in Part 260 should aid the reader in understanding this specific document and the interim status standards. Some of those definitions are provided here for readers' convenience.

- "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air, or discharged into any waters, including ground waters.

- "Facility" means all contiguous land and structures, other appertnances and improvements on the land, used for the treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, and disposal operational units e.g., one or more landfills, surface impoundments, or combinations of them.

- "Hazardous Waste" means a hazardous waste as defined in §261.3 of this Chapter.

- "Incinerator" means an enclosed device using controlled flame combustion, the primary purpose of which is to thermally break down hazardous waste. Examples of incinerators are rotary kiln, fluidized bed, and liquid injection incinerators.

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This definition has been modified from the proposed rules as a result of a number of comments. The Agency's response to comments on this definition is provided in the Background Document for Subpart O; Incinerators.

- "Open Burning" means the combustion of any material without the following characteristics:

  (a) control of combustion air to maintain adequate temperature for efficient combustion,

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

  (c) control of emission of the gaseous combustion products.

- "Thermal Treatment" means the treatment of hazardous waste in a device which uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste. Examples of thermal treatment processes are incineration molten salt pyrolysis, calcination, wet air oxidation, and microwave discharge.

  This is a new definition. Commenters suggested that because the proposed definition of incinerators excluded thermal treatment processes which did not use flame combustion, other forms of thermal treatment technology would be unnecessarily stifled. The Agency believes that by defining "thermal treatment" and requiring applicable standards, much confusion will be avoided. See Section III (Issue #2) of this Background Document for a discussion of these comments.

- "Treatment" means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous, safer to transport, store, or dispose of or, amenable for recovery, amenable for storage, or reduced in volume.

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II. RATIONALE FOR THE REGULATIONS

A. RCRA Mandate for the Regulation

The Congress of the United States, in Section 3004 of Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580), required that the Administrator of the U.S. Environmental Protection Agency:

> "...promulgate regulations establishing such performance standards, applicable to owners and operators of facilities for the treatment, storage, or disposal of hazardous waste identified or listed under this Subtitle, as may be necessary to protect human health and the environment. Such standards shall include, but need not be limited to, requirement respecting - ...
>
> (3) treatment, storage, or disposal of all such wastes received by the facility pursuant to such operating methods, techniques, and practices as may be satisfactory to the Administrator;
>
> (4) the location, design, and construction of such hazardous waste treatment, storage, or disposal facilities;" [emphasis added]

The term "treatment" is defined in Section 1004(34) of the Act to mean:

> "...any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste non-hazardous, safer for transport, amenable for recover, amenable for storage, or reduced in volume..."

One objective of thermal treatment of waste is normally to change the physical form, biological character, or chemical composition of the waste so as to render it non-hazardous or less hazardous. Thermal treatment may also render the waste "safer for transport, amenable for recovery, amenable for storage, or reduced in volume." Therefore, thermal treatment

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is a treatment process within the meaning of the Act, and the Agency is mandated to produce operating, location, design, and construction regulations for the thermal treatment of hazardous waste adequate to protect human health and the environment.

The Agency encourages thermal treatment in properly designed and operated facilities as a management technique which is preferable to land disposal of hazardous wastes. Thermal treatment of hazardous waste other than incineration has not been widely practiced as compared to land disposal and incineration. With the exception of incinerators most thermal treatment units are experimental or have only recently been scaled to larger units. However, with state and federal laws eliminating open dumping and inadequate landfilling, interest in thermal treatment, particularly incineration as a means of hazardous waste destruction, is increasing. Thermal treatment is capable of destroying the hazardous nature of organic wastes, while simultaneously reducing the volume of remaining wastes. Agency tests have demonstrated that incineration of a broad range of hazardous waste can be conducted safely and properly using existing technology.[1] Commenters have suggested that other thermal treatment processes can achieve similar results. Analysis of pyrolysis processes combined with the use of after-burners suggests that this may be correct.[2]

Thermal treatment can be conducted improperly, however. In the past, hazardous wastes have been burned in the open,

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in drums, in makeshift burners, often without emission controls and many times without proper combustion conditions to ensure proper destruction. Improper treatment can lead to the emission of odors and toxic gases and fumes, uncontrolled fires and explosions. The production of hazardous residues can, if not managed properly, pose as much of a hazard as the original waste.

The potential for damage to the environment and to human health is also related to the types of waste thermally treated. For example, sludges from oil and solvent recovery operations often contain toxic heavy metals including lead, chromium, and cadmium.[3] Uncontrolled incineration of these sludges or the use of other thermal treatment processes without proper controls could result in significant air emissions of these hazardous heavy metals or other toxic chemical compounds.[4]

Even properly designed thermal treatment units have limitations regarding the kinds and characteristics of the hazardous materials they can safely treat. Certain thermal treatment units are designed specifically to treat only certain classes of waste streams. Pyrolysis without an after-burner or a close-coupled heat recovery system may be unsuitable for treatment of many hazardous waste streams since pyrolysis is a conversion process rather than a destruction process.[2] Calcination is a thermal treatment process applicable to inorganic wastes contaminated by organic residues. For incinerators and other thermal treatment processes, significant amounts of water or other noncombustible components of

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the waste can affect attainable temperatures, appropriate feed rates, the amount of auxiliary fuel necessary, and the adequacy of control equipment. Failure to respect the limitations inherent in each thermal treatment process can increase the probability of environmental and human health injuries.

B. Incidents Involving Improper Thermal Treatment

Recently, thermal treatment of hazardous waste, both adequate and inadequate, has been increasing. This is especially true of incineration. Several damage incidents and near incidents have come to the Agency's attention. A few, summarized below, serve to illustrate the potential problems associated with improper thermal treatment:

1. In early 1974, following reports of air and ground water pollution caused by the incineration of hazardous wastes, the Air Compliance Division of the Connecticut Department of Environmental Protection closed two organic solvent recovery operations. One, in Southington, Connecticut, was contaminating the air with heavy metals from the incineration of solvent recovery sludges which contained lead and zinc. Additionally, the company's operations contaminated the soil and ground water in the area and the company's own well. Incineration ceased in early 1974. In Beacon Falls, Connecticut, a similar operation was closed for reasons of air pollution.[5]

2. An incinerator in Grafton, Ohio, has been the target of numerous citizen complaints for unpleasant odors and air pollution. Odors, which normally signify organic emissions, are a common problem at incinerators due to the volatility of many of the wastes. Release of odoriferous material usually occurs as a result of careless handling of the waste, fugitive emissions, or incomplete combustion. The area surrounding the facility is reported to have become contaminated with unburned Kepone on one occasion.[6]

3. An on-site investigation by EPA officials at a closed hazardous waste facility in Seymour, Indiana, revealed that a makeshift incinerator had been used to destroy

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hazardous wastes. The unit was little more than an open burning operation with an air blower to supply extra air.[7]

4. An incinerator in Chicago, Illinois, was shut down in August 1976, after numerous violations of stack emission standards. The City of Chicago required that the facility cease operations after three violations of air standards (particulates, opacity, and odors) occurred within a 180-day period. The facility has since reopened, after extensive modification of its air pollution control equipment. To date, the City has issued permits allowing only a limited number of wastes to be burned.[8]

5. In April 1977, the State of New York shut down a liquid waste incinerator in Oswego, New York. The facility was a constant source of odor complaints from local residents. The State Division of Air Resources sampled the incinerator stack several times and found, in one case, a particulate level of 10 times the allowable limit. After the facility was closed, the State of New York was left with a one-million gallon lagoon, four 50,000-gallon tanks and 8,500 drums of waste materials.[9]

The Agency believes that unless thermal treatment regulations are written and implemented, damage incidents such as these can be expected to continue.

C. <u>The Experience Base for Thermal Treatment Regulations</u>

In developing both the proposed regulations for incinerators and these interim status standards for thermal treatment, the Agency made use of its own experience in testing destruction of hazardous wastes in thermal treatment facilities.[1,4] The Agency has also relied upon state and other federal regulatory experience.

EPA, under the Clean Air Act, has promulgated emission limits for particulates for solid waste incineration and sewage sludge incineration.[10] However, these controls were not developed to deal specifically with <u>hazardous</u> waste

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incinerators or other thermal treatment processes. There are, moreover, an almost infinite variety of toxic chemical entities which could be emitted as a result of the infinite variety of chemical species which make up hazardous waste. It is difficult, expensive, and time-consuming to gather rigorous data on threshold levels for area-wide health effects for these potential emissions. Thus, it has not been feasible to use comprehensive pollutant-by-pollutant emission standards, developed under the procedural requirements of section 112 of the Clean Air Act, as a means of protecting human health from emissions associated with hazardous waste thermal treatment. Yet, common sense, public concern, and sporadic incidents suggest that the problem is already serious. The results of improper thermal treatment of hazardous wastes can be expected to become acute in proportion to the expected increase in the volume of hazardous wastes thermally treated and the number of thermal treatment facilities.

Therefore, while the Agency utilized its experience with the Clean Air Act, it was necessary to design the proposed hazardous waste incinerator regulations around performance criteria for destruction efficiency and design and operating requirements based on RCRA's statutory requirement to protect human health and the environment. Attainable performance criteria were developed, based on the results of a series of trial burns and analyses conducted in 1975 and 1976 with 14 different wastes in 7 different full-scale commercial thermal

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treatment facilities.[1] These tests provided core data for development of the proposed incinerator regulations and the operational knowledge gained in that test series supports the requirements designed for interim status.

The only Federal regulations currently in effect which relate specifically to hazardous waste thermal treatment are embodied in EPA's PCB disposal regulations. These regulations require that certain PCB wastes be incinerated. The regulation also includes destruction and combustion efficiency requirements; specifications for temperature, retention time, and excess air; requirements for inspecting (monitoring) operating conditions; and for automatic feed cutoff in the event of a malfunction. The PCB regulations also call for formal test burn procedures and for the installation of scrubbers. The requirements parallel the proposed RCRA regulations to a considerable degree, and were helpful during development of the proposed regulations, primarily in suggesting alternative regulatory approaches and ensuring comprehensiveness of coverage.

In addition to developing and promulgating incinerator standards pursuant to Clean Air requirements, some States have found it necessary to control hazardous waste thermal treatment as well. The work done by these states in developing their regulations and their experiences in implementation was reviewed by the Agency during development of the December 18, 1978 proposal for incineration and of these interim status standards for thermal treatment.

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In the absence of regulations specifically addressing emissions from incinerators burning hazardous waste, States have restricted the operations of hazardous waste incinerators by the authority of a general protection or "nuisance" rule. The following general nuisance rule of the Wisconsin Department of Natural Resources is typical:

> NR 154. Control of Hazardous Pollutants. General Limitations. No person shall cause, suffer, allow, or permit emissions into the ambient air hazardous substances in such quantity, concentration, or duration as to be injurious to human health, plant, or animal life unless the purpose of that emission is for the control of plant or animal life. Hazardous substances include, but are not limited to, the following materials, their mixtures, or compounds: asbestos, beryllium, cadmium, chlorine, flourine, lead, mercury, pesticides, or radioactive material.[12]

While this type of rule provides no specific regulatory guidelines, the general authority of similar statutes has been used in different States to impose a variety of emission restrictions on a case-by-case basis.

An initial survey of specific State regulations relevant to these interim status standards revealed the following:

> Arkansas - The Arkansas Solid Waste Disposal code has incineration requirements for continuous temperature monitoring, reporting, and ash disposal only into an approved site.[13]
>
> California - The "Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes" require that operators of off-site facilities "inspect wastes before accepting them to ensure that the delivered waste has essentially the same general properties as identified by the producer on the manifest."[14]
>
> Pennsylvania - Solid Waste Rules require that incinerator ash disposal be approved by the Department of Environmental Resources, and that liquid effluents be treated as an industrial waste and handled as approved by the Department of Environmental Resources.[15]

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Several States, including Missouri, Nevada, Tennessee, and South Carolina are currently in the process of proposing regulations covering hazardous waste thermal treatment or incineration facilities.

D. Basis for the Interim Status Standards for Thermal Treatment

Given the Congressional mandate to protect human health and the environment from inadequate hazardous waste treatment, storage, and disposal and the demonstrated problems associated with inadequate treatment via incineration, the Agency proposed regulations for hazardous waste incinerators and chemical, physical, and biological treatment on December 18, 1978. These proposed regulations included permanent status standards and very limited interim status standards for chemical, physical, and biological treatment. Interim status standards are applicable during the period of time between submittal of an application for a permit and the granting of a permit.

The Agency has determined that it is important to bring some additional control over incineration and other thermal treatment by promulgating additional interim status standards. This Background Document and the associated regulations are limited to those regulations, which are to be in effect during the interim status period. Regulations covering the permanent status period, the period after permitting, will be issued in the next few months. At that time the complex technical questions raised by commenters will be addressed.

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For its interim status standards (ISS), the Agency is mandating those requirements which: (1) can reasonably be implemented by the regulated community within the six-month period between promulgation and the effective date of the regulations; (2) do not require large capital expense for items which require approval and, thus, might be altered as part of the permitting process; and (3) can be implemented directly by the regulated community with the need for minimal consultation with or interpretation by the Agency. The rationale for these decision criteria is discussed in more depth in the Background Document entitled "Purpose, Scope and Applicability." It should be understood, however, that the Agency used the criteria only as guidance in deciding which standards to require during interim status. They are not hard-and-fast rules. The Agency has gone beyond these guidelines where it appeared justified and may do so in the future.

For thermal treatment processes, the proposed incinerator technical performance and design requirements do not meet these criteria and, thus, cannot be implemented during interim status. The time required and the costs of conducting trial burns and upgrading most existing facilities will be considerable, and the designs will require Agency approval during the permitting process. Technical performance and design requirements were not proposed for thermal treatment processes other than for incinerators. The Agency has, however, developed general operating standards for thermal

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treatment that meet the criteria for interim status standards and can be implemented during the interim status period. These have been designed primarily to improve operating procedures, i.e., to eliminate the careless and sloppy practices which have resulted in serious problems in the past.

Specifically, requirement §265.373 that the thermal treatment unit be brought to its steady state operating condition before hazardous wastes are introduced meets ISS criteria because: (1) no EPA approval or interpretation is required, (2) any capital expenditures necessary to install auxiliary fuel capability are not likely to be the topic of disagreement during permitting activities, and (3) it can be implemented with little lead time needed to obtain and install equipment.

The requirement of §265.375 that the owner or operator must sufficiently analyze any waste which he has not previously treated in his thermal treatment process to enable him to establish steady state (normal) or other appropriate conditions and to determine the type of pollutants which might be emitted: (1) can be implemented with no EPA involvement, since the sampling and analytical procedures at this time are largely left to the owner/ operator; (2) can commence as soon as any necessary testing equipment is delivered; and (3) requires only limited (and necessary) expense for the purpose of procuring testing equipment (if not already available).

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The requirement of §276.377 for instrument monitoring and control and stack plume inspections: (1) can be initiated by thermal treatment process operators immediately, (2) requires no interpretation by the Agency, and (3) requires no capital expenditures, since only existing, in-place equipment and instruments must be inspected.

The requirement of §265.381 that hazardous waste and hazardous residues (including sludge, ash) be removed from the incinerator at closure, will be incorporated as part of the closure plan required by Subpart G (closure and post-closure) to be prepared during interim status. This will be subject to Agency review and approval before it is implemented. Implementation of these requirements will not be necessary until closure but they may require significant expenditures. These rules are being promulgated despite the interim status critera because of the importance the Agency places on proper closure. For further discussion on this issue, see the Background Document on Closure and Post-closure.

The requirement of §265.382 prohibiting open burning expect for the open burning and detonation of waste explosives (1) can be implemented within the six-month period between promulgation and the effective date of the regulations; (2) does not require large capital expense for items which require approval and (3) requires no EPA interpretation.

A commenter suggested that the proposed incinerator permanent status standards for trial burns and operational emissions monitoring be made applicable during the interim status

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period. Since such requirements do not meet any of the interim status criteria (as outlined above), the Agency has not added them to the interim status requirements. However, a requirement that waste be burned only at proper operating temperature is consistent with these criteria and will prevent incomplete treatment of hazardous waste. Thus, the requirement for preheating to proper operating conditions for other than non-continuous (batch) processes was added to these interim status standards.

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III. ANALYSIS OF AND RESPONSE TO COMMENTS RELEVANT TO THE INTERIM STATUS STANDARDS FOR THERMAL TREATMENT

Many of the comments received on the proposed incinerator standards went to technical points or issues that will be resolved only in the Phase II incinerator and thermal treatment regulations. These are not discussed here. Other comments raised issues relevant to any RCRA regulation of hazardous waste incineration. These and other comments relevant to thermal treatment other than incineration are discussed immediately below. Comments specifically relevant to these Interim Status Standards are discussed after the general issues raised.

It is important to recognize that comments discussed below were directed to the incineration regulations. The issues they raise are discussed here in the context of their applicability to Interim Status Standards for Thermal Treatment. Most of these comments are also discussed in the Background Document for Part 265, Subpart O: Incinerators.

Issue #1 General Issues

A. Summary of Comments

1. Incineration should be regulated in three ways: emissions should be controlled by the Clean Air Act, effluents by the NPDES system, and land disposal by Subtitle D of RCRA. Legislative history does not indicate that Section 1004(3) "disposal" was intended to include incineration.

2. Design and operation regulations are a mistake. The owner/operator should be allowed to determine how to operate the process so as to meet performance standards.

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B. Analysis of and Response to General Issue Comments

1. Hazardous Waste Incineration and Other Thermal Treatment Falls Within the RCRA Statute

The commenters' discussion of whether hazardous waste incineration falls within the Section 1004(3) definition of "disposal" is not to the point. The Agency is required by Section 3004 to regulate "treatment" of hazardous wastes. RCRA section 1004(34) defines treatment as follows:

> (34) The term "treatment", when used in connection with hazardous waste, means any method, technique, or process, including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to render waste non-hazardous, safer to transport, amenable for recovery, amenable for storage, or reduced in volume.

As a process designed to render hazardous waste non-hazardous and reduced in volume, thermal treatment falls squarely within this definition. This mandate also serves the objectives of the statute defined by Congress in Section 1003(4) as, among other things, "regulating the treatment... of hazardous wastes which have adverse affects on health and the environment." The Administrator's authority in the matter is made even more clear later in Section 3004, which says that standards set by the Agency "shall include, but need not be limited to, requirements respecting--

> (3) treatment...of all such wastes...pursuant to such operating methods, techniques, and practices as may be satisfactory to the Administrator."

In addition, incineration of hazardous wastes was discussed extensively in EPA's 1974 Report to Congress: Disposal of

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Hazardous Wastes, a document that strongly influenced Congressional development of RCRA.

Some commenters suggested that the proposed regulations should be replaced by, or were in conflict with, the Clean Air Act. Congress, in Section 1006(b), required the Administrator to integrate RCRA with the Clean Air Act, but "only to the extent that it can be done in a manner consistent with the goals and policies expressed in this Act..." It is significant that Congress, in Section 1006(a), omitted the Clean Air Act from a list of statutes that were specified as unaffected by RCRA's provisions. As a result, the Administrator has substantial discretion to determine the interplay between RCRA and the Clean Air Act, so as to best effect the purposes of both statutes. Since thermal treatment of hazardous waste poses dangers that go beyond the general concerns of the Clean Air Act, it is appropriate to regulate such facilities under RCRA. Also thermal treatment sites, will in many cases receive and generate hazardous waste, and thus will necessarily be brought within the RCRA framework of manifest systems and recordkeeping. Such facilities will be receiving manifested wastes, temporarily storing hazardous wastes, and (usually) generating hazardous wastes in their ash and scrubber effluents. Thus regulation of their operations under RCRA has the added advantage of simplifying the regulatory framework applicable to each facility.

The Clean Air Act controls air contaminant emissions largely on a pollutant-by-pollutant basis, or on a pollutant-

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facility basis. Its regulations include area-wide standards for relatively ubiquitous pollutants such as sulfur dioxide and lead, and for certain hazardous air pollutants, such as beryllium and vinyl chloride. Such action is adequate and necessary for the pollutants and facilities heretofore regulated (e.g., particulates from steam fired power plants, vinyl chloride emissions from vinyl chloride production plants). In contrast, a case-by-case, chemical by chemical, regulatory approach is not practical for control of hazardous waste thermal treatment. The hazardous air pollutant provisions of Section 112 of the Clean Air Act, 42 U.S.C. §7412, require the use of extensive procedures for each pollutant regulated.

The pollutant species which could be emitted from thermal treatment of hazardous waste number in the tens of thousands. Many of them could be acutely toxic or carcinogenic. The procedures of the Clean Air Act are less effective and efficient in such situations. RCRA has authority to control emissions broadly through destruction and combustion performance standards and directly through operating and design standards. These standards can be more effectively applied to the entire mix of pollutants treated in each facility. Thus, the Agency has decided to regulate hazardous waste incinerators and other thermal treatment devices directly under RCRA.

Effluent discharges to surface waters will still require NPDES permits. Finally, removal of hazardous waste ash generated by an incinerator or other thermal treatment process

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to landfills or other sites will have to be in compliance with RCRA regulations for hazardous waste generators. There are no provisions of regulations issued by the Agency under the Clean Air Act or the Clean Water Act which are incompatible with these RCRA requirements.

C. Thermal Treatment of PCB's is regulated under 40 CFR 761.40.

2. Performance Standards are the Best Approach

The Agency believes that performance standards are desirable and, in fact, the proposed incinerator destruction and combustion efficiency requirements and the halogen removal requirements were types of perfomance standards. The use of performance standards tends to encourage innovative technologies and provides maximum cost-effectiveness and flexibility to the owner or operator. Highly specific design requirements, on the other hand, tend to freeze technology. The Agency does not agree, however, that RCRA regulations should depend solely and totally on performance standards.

There are a number of "good management practices," which are currently routinely practiced by the reputable and knowledgeable incinerator operators, which the Agency believes should be practiced by anyone, regardless of the type of waste and thermal treatment employed. Some of these "good management practices" have been included in these interim status regulations. These general operating requirements are based on the belief that it is better to prevent injury to human health through careful management than to take after-the-fact enforcement measures when poor management

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has led to an inevitable breach of a performance standard. The Agency recognizes that these general operating requirements may not be sufficient for the long term protection of human health and the environment. The permanent status standards to be issued in the coming months, will rely more heavily on performance standards together with guidance to permitting officials on design and operating requirements. This will allow a great deal more flexibility in tailoring design and operating requirements to waste, site, and process specific factors. The Agency believes this flexibility is necessary for the regulation of the performance of such widely diverse and innovative hazardous waste thermal treatment processes as molten salt processes, wet air oxidation, calcination, microwave discharge pyrolysis, and incineration.

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Issue #2 Thermal Treatment Other Than Incineration

A. Synopsis of the Proposed Regulation

The proposed rules defined an incinerator as an engineered device using controlled flame combustion to thermally degrade hazardous waste (250.41(b)(44)). The proposed rules for incineration required standards of performance which focused on flame combustion device design, construction, and operations. (§250.45-1).

B. Summary of Comments

1. Incineration operating and design standards would restrict thermal treatment technology. The use of new and innovative technologies and processes would be discouraged by these standards.

2. The definition of an incinerator would restrict thermal treatment to flame combustion. Other thermal treatment systems which do not use flame combustion may be adequate for the destruction of hazardous waste.

Comments relative to each of the proposed operating and design standards for incinerators are not discussed in this background document since these standards are not proposed for the interim status period.

C. Analysis of and Response to Comments and Rationale for the Final Regulation

The Agency agrees that the proposed definition of incineration excludes those thermal treatment systems which do not use flame combustion. Incineration technology is fairly well developed, and has been in existence for a number of years. Thus, the Agency feels it is appropriate to designate a specific section of these regulations for those requirements which are specific to incinerators.

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The Agency also recognizes the existence of several other alternative technologies which may be employed to thermally treat hazardous wastes. These devices may use various mechanisms which result in destruction efficiencies for hazardous waste comparable to that accomplished by conventional flame combustion incinerators. The Agency wants to encourage such technology development and application.

The Agency agrees with comments pointing out that the proposed incinerator regulations might have unintentionally discouraged new and innovative technology. The Agency recognizes that classical incineration utilizing controlled flame combustion systems contained within various forms of refractory chambers is the primary state-of-the-art today, but agrees that new and innovative systems should be built and evaluated, and have their performance compared to that of flame combustion incinerators.

Several new thermal treatment processes are beginning to emerge. For example, an EPA research and development program exploring the performance characteristics of a microwave discharge system for destruction of toxic compounds in gaseous, liquid and solid forms is currently underway. Currently, the system has been found successful, with some inherent limitations, for the treatment of certain toxic organic compounds.

However, it is clear that such technologies are not as well developed or understood as conventional flame combustion systems.[2] The Agency will continue to observe and monitor the state-of-the-art of lesser developed thermal treatment pro-

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cesses. This concern ranges from an awareness of additional areas needing study to an interest in any new, novel, or unique emerging technologies.

The Agency did not propose any regulations specific to this class of thermal treatment processes. Based on reported damage incidents the comments received, and risk of harm to human health and the environment, however, the Agency believes that these minimal standards for thermal treatment processes should be instituted during interim status.

D. Summary of the Interim Status Standards

Many of the interim status standards provided in these regulations for thermal treatment processes are similar in nature to those being required for incinerators. This is to be expected, since incinerators represent a sub-class of thermal processes. However, it is anticipated that there will be some significant differences between the requirements for incinerators versus other thermal treatment processes in the phase II regulations.

As discussed under Issue #3, the interim status standards require that thermal treatment processes achieve steady state (normal) conditions of operation prior to introducing hazardous waste. This good operating practice will avoid the problems which can occur during periods, such as facility start-up, when thermal treatment processes can be subject to wide fluctuations in temperature or other operating conditions, potentially resulting in the release of hazardous emissions. A variance has been added to the steady state requirement to

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recognize that some acceptable thermal treatment processes may operate in a batch-wise or non-continuous mode.

Requirements for waste analysis were contained in the General Facility Standards section of the proposed regulations. In response to the comments received as discussed under Issue #4, the waste analysis requirements for thermal treatment processes include only those parameters and constituents considered necessary to determine whether the waste can be adequately thermally treated, and to allow the operator to estimate the necessary thermal treatment conditions. This is a one-time analysis conducted prior to thermal treatment of a new waste. The General Waste Analysis section (264.13 and 265.13) requires that each shipment received must be compared visually or by simple tests against a standard sample of the waste to confirm that the waste received is the same as that expected. A description of such testing is to be included in the Waste Analysis Plan (which is discussed in the Waste Analysis Background Document).

A minimum set of monitoring and inspection requirements is also contained in these interim status standards as discussed under Issue #5. Minimum monitoring and inspection requirements are provided for instruments relating to temperature, emission control and the stack plume (where applicable), the complete thermal treatment device, and associated ancillary equipment.

A requirement that all residues be removed from thermal treatment processes and/or equipment at closure is contained

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in these interim status standards. That requirement is intended to prevent potential human health or environmental damage associated with retention of hazardous residuals after closure.

A ban on open burning of hazardous wastes was contained in the General Facility Standards section of the proposed regulations. Although not proposed as an interim status standard, because of the need for owners and operators to deal with the Regional Administrator, it is incorporated into these thermal treatment interim status standards because the potential public health hazards associated with the practice dictate that it be ended now, as discussed under Issue #7. Comments received on the proposed requirement centered around the need to dispose of waste explosives in the open. The Agency agrees that open burning and detonation are presently the only alternative for disposal of most waste explosives and, thus, the proposed variance meant for waste explosives has been incorporated in a modified form.

Finally, a definition of "thermal treatment" has been added to the final rules which more explicitly defines the relationship between incinerators and other thermal treatment devices.

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Issue: #3 Allowance of Variances During Startup Periods

A. Synopsis of the Proposed Regulations

The proposed regulations (Section 250.45-1) required that incinerators operate at 1000°C with at least a two-second residence time and at least 2 percent excess air (except for halogenated aromatics, which required 1200°C for 2 seconds and at least 3 percent excess air) whenever burning hazardous wastes. Similarly, a 99.9 percent combustion efficiency and 99.99 percent destruction efficiency were required whenever burning hazardous wastes. These standards were not proposed as requirements for the interim status period.

B. Summary of Comments

1. Define a one-hour start-up period after wastes are introduced before destruction efficiency and combustion efficiency requirements are applied.

2. Allowance should be made for excursions and operational variations during start-ups and shutdowns.

C. Analysis of and Response to Comments and Rationale for the Final Regulation

The Agency cannot agree with the request for a variance during start-up and shutdown times. Such an allowance would open the door to the possibility of thermal treatment device being allowed to spew out significant quantities of hazardous wastes. Test burns in the past have indicated that it is good management practice, and entirely feasible, to use auxiliary fuel to bring the thermal treatment device up to steady-state operating conditions before burning hazardous wastes. The Agency's test burn experience has demonstrated that, if preheating to standard conditions is coupled with

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careful control, dangerous temperature and residence time deviations can be eliminated when waste feed commences.[2,4]

While there may be a small increase in operating costs caused by increased reliance on auxiliary fuels, that cost is clearly out-weighed by the human health benefits of proper thermal treatment. This regulation, as a side benefit, will prevent unscrupulous owners or operators from gaining an economic advantage over reputable facilities.

The Agency agrees that combustion condition variations, with attendent deviations in destruction efficiencies and increased emissions, are most likely to occur during start-up periods. If the practice suggested by these comments becomes widespread, significant health and environmental damages are likely to result. Therefore, while the Agency is currently unready to implement permanent combustion, operating, and performance standards, it is reasonable and necessary to require owners or operators of existing facilities to achieve steady-state operating conditions within the thermal treatment process before introducing any hazardous waste. Reputable firms currently practice this safeguard, regardless of the design capability of their unit.[16]

Batch thermal treatment processes are not dependent upon the continuous flow of fuel to reach steady state conditions. Wet air oxidation of hazardous waste, for example, occurs in a reaction vessel, at relatively low temperatures but very high pressure. The requirement that a thermal treatment process introduce waste following the achievement of steady

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state conditions is therefore not required during Interim Status of (batch) thermal treatment processes which require a complete thermal cycle to treat a discrete quantity of hazardous waste. The Agency will be reviewing the performance of these processes and may require applicable control devices in future regulations.

D. Summary of the Interim Status Regulations

As a result of comments received regarding combustion efficiency deviations during start-up periods, the Agency is requiring (Section 265.403) all thermal treatment devices during the interim status period to achieve steady state conditions including temperature using auxiliary fuel or other means before adding hazardous waste, unless the process is a non-continuous (batch) thermal treatment process which requires a complete thermal cycle to treat a discrete quantity of hazardous waste.

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Issue #4 Analysis of Wastes

A. Synopsis of the Proposed Regulation

In Section 250.43(g) of the proposed General Facility Standards, the owner/operator of any facility, including an incinerator, was required to obtain a detailed chemical and physical analysis of each hazardous waste stream at least annually. Also owners/operators were required (Section 250.43(h)) to sample each truckload of hazardous waste received and analyze it for appearance, specific gravity, pH, and vapor pressure.

In the incineration section (Section 250.45-1(b)(1) (i), (ii) and (iii)), these requirements were proposed to be extended to trial burns by requiring analysis of: (1) the waste for halogens and principal hazardous components, (2) ash and scrubber wastes for principal hazardous components, and (3) exhaust gas for halides, CO, CO_2, O_2, particulates and principal hazardous components.

B. Comments Received

Most of the general comments received on these requirements are addressed in the Background Document entitled "Waste Analysis". Few comments related specifically to incinerators. These comments, also appropriate for other thermal treatment, can be summarized as follows:

1. Required testing and analysis are unnecessary for certain wastes, or are too expensive.

2. It is not clear what is to be tested and what owners/operators are to do with the information thus gathered.

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3. Site owners/operators should be able to rely on information in manifests, rather than duplicating work done by generators.

C. Analysis and Response to the Comments and Rationale for the Final Regulation

The Agency based the proposed general requirements for making a detailed chemical and physical analysis of the wastes on the belief that, to properly determine the adequacy of a facility (thermal treatment process in this case) to manage a given waste, the operator must know something about the waste (compatibility, heating value, primary pollutants, etc.) However, since the necessary properties varied by facility type (e.g., tanks, incinerators, or landfills), the Agency did not specify exactly what should be tested for, except in the case of incineration where halogens and hazardous components were mandated for trial burns in order to determine the efficiency of the incinerator to remove the halogen and destruct the principle hazardous components. A number of commenters on other sections agreed with the second commenter, i.e., that the standard did not adequately spell out what is to be tested and what is to be done with the information obtained. The Agency has decided to require all facility owners or operators to develop a waste analysis plan which will detail the characteristics of a waste which they must know in order to adequately manage the waste. This plan is discussed in detail in the Background Document entitled "Waste Analysis". However, since all owners or operators are not equally knowledgeable, the Agency has decided

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to place minimum and more specific analytical requirements within the facility regulation sections. This will guarantee that, as a minimum, owners or operators will obtain at least rudimentary information on a new hazardous waste which will enable them to evaluate the capability of their equipment and techniques to properly manage it.

For wastes to be thermally treated, the Agency will not require trial burns during the interim status period. The Agency has not fully developed its test protocol and the trial burns are fully useful only in conjunction with the permitting process. Nevertheless, reputable incinerator operators have found it necessary to know certain waste characteristics prior to burning wastes which they have not previously burned.[17,18] Based on such industry experience and its own test burning the Agency will require thermal treatment process operators to include the following information on new wastes in their waste analysis plan: heating value, halogens, sulfur, lead, and mercury.

Heating value analysis is necessary to determine adequate operating parameters, such as the rate of auxiliary fuel feed. Hydrogen chloride and sulfur dioxide are commonly recognized air pollutants which result from combustion of wastes containing chlorinated organic compounds and sulfur compounds. Sulfur dioxide emissions are causative agents for an increasingly worrisome problem acid rain. Also, hydrogen halides, particularly HCL and HF, can cause serious corrosion problems in a thermal treatment system. This can lead to rapid

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deterioration of the structural and operating integrity of the thermal treatment system.

Sampling is also required for certain heavy metals, which are known to be hazardous, which are likely to be emitted and for which some guidance on emission levels is available. The Agency has decided to require waste sampling for lead and mercury during interim status.

Lead is oxidized during combustion and is emitted from uncontrolled incinerators as particulate.[19] Lead has been found to produce an adverse effect on public health. The Criteria Document for lead, which served as a basis upon which the Administrator on October 5, 1978 published a National Ambient Air Quality Standard for lead, summarizes the relationships between airborne lead and its effects on man.[20,33] Lead enters the body principally through ingestion and inhalation with consequent absorption into the blood stream and distribution to all body tissues. Uncontrolled incineration of waste containing lead can be a significant lead emission source. EPA established ambient air quality standards for lead at 43 FR 46246.

Mercury compounds vaporize readily when heated and are emitted to the atmosphere during combustion from uncontrolled incineration. Mercury has been found to cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness. On March 31, 1971, the Administrator listed mercury as one of these hazardous air pollutants for which he intended to establish emission

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standards.[21] The publication entitled "Background Information on Development of National Emission Standards for Hazardous Air Pollutants; Asbestos, Beryllium and Mercury" describes the health criteria for the EPA standards for mercury. The Agency found that mercury compound, particularly methyl mercury to be a hazardous air pollutant. Elemental mercury has been shown to be carcinogenic while methyl mercury is considered to be the most hazardous of mercury compounds.[22] The National Emission Standard for Mercury, published under the authority of Section 112 of the Clean Air Act on October 14, 1975 is applicable to stationary sources that incinerate wastewater treatment sludge.[23] The Agency may add to or modify these minimum requirements for waste analysis as more information is received relative to their adequacy. The permanent status regulations (Phase II), to be promulgated later in 1980, will contain provisions to control emissions of these pollutants. Until that time the Agency recommends that facilities consider relevant regulations under the Clean Air Act in determining emissions levels for mercury and lead.*

Most thermal treatment process operators find it useful to obtain additional information such as viscosity and solids content, but the Agency believes that certain types of faci-

* The Agency has prescribed emission limits for mercury under 40 CFR 61.52 for incinerators of waste water treatment sludges and an ambient air quality standard for lead under 43 FR 46246. Owners and operators of incinerators and other thermal treatment processes should not permit their incinerator to emit concentrations of lead that would result in an exceedance of the lead ambient air quality standard.

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lities would not need this information to operate safely. Therefore, while viscosity and solids content analyses are not required for all thermal treatment processes, where they are relevant they must be included in the waste analysis plan.

These criteria are issued on an interim final basis, but they (like the general waste analysis requirements) will be in effect throughout the interim status period. The Agency believes that the additional cost of these analyses will be limited, since facilities already need such information for their own safety. On the other hand, the dangers associated with not properly analyzing wastes prior to waste thermal treatment are simply too high to be tolerated in the potentially lengthy period prior to issuance of a permit.

Thus, the Agency disagrees with the first comment that basic information which will allow an evaluation of thermal treatment and pollutant potential can be "too expensive" or unnecessary. The Agency has dropped the requirement for annual analysis to reduce expense for possibly unnecessary analytical work. Since the requirement is for a one time analysis, the cost, using standard laboratory analytical procedures, would usually be less than $500.[24,25]

The purpose of the second requirement, to perform some simple analyses on each truckload, was to ensure that the facility was actually receiving what the owner or operator thought was being shipped, i.e., that the generator had not made an error in the shipment or labeling. This requirement

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is now placed in §265.13(c), the General Waste Analysis Section. This requirement was made necessary by the fact that sources of waste shipments vary widely from shipment to shipment and even with particular shipments, and that thermal treatment process owners or operators cannot rely on information provided by transporters and off-site waste generators.[17,18] Safe operation of the thermal treatment equipment requires a final verification of the substance to be processed before initiation of treatment. This is similar to the California regulations previously discussed. The Agency does not, therefore, agree with the third comment that the manifest can be absolutely relied upon to be accurate. Also the manifest will not necessarily include all information needed for proper treatment of the waste.

The Agency agrees with the first comment, as it may relate to this requirement, that some of the parameters for which analysis was proposed would simply provide superfluous information for some facilities. For example, knowing vapor pressure might not be useful for wastes to be thermally treated, since most wastes received may be quite volatile. What is really needed is a "fingerprint" of each waste, i.e., identification of waste properties which can be quickly and easily tested for, at minimum expense, while the truck is waiting to unload in order to ensure that the waste received is the same as expected without major deviation. Depending on the mix of wastes received, such tests might include color, texture, solids content, viscosity, and pH,

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among others. Reputable existing facilities have found it necessary to check each shipment to protect their equipment and to ensure that they don't violate any existing permits.[17] As a result, as part of the waste analysis plan, the Agency is requiring during interim status that treatment process owners or operators sample each shipment and analyze it sufficiently to confirm that the waste received is the one expected.

D. Summary of the Final Interim Status Regulation

As part of the waste analysis plan required by §265.13, the owner or operator must obtain a sample of each new waste to be incinerated and analyze it sufficiently to establish normal combustion conditions and the potential for emissions. (§265.375) At the minimum, this analysis must include heating value, halogen and sulfur content, and the concentrations of lead and mercury.

Each shipment received must be sampled and analyzed sufficiently to conclude that no major deviation was made in the shipment, i.e., that the waste actually received was the one expected. This is required under regulations for Waste Analysis.

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Issue #5 Instrument Monitoring and Facility Inspection

A. Synopsis of the Proposed Regulation

During both incinerator trial and operating burns, the following parameters (§250.45-1(c)) were to be monitored and recorded:

1. combustion temperature
2. exhaust gas CO and O_2 concentrations continuously, and
3. waste, fuel, and excess air feed at least every 15 minutes.

These requirements were not proposed for the interim status period.

B. Summary of Comments

1. New equipment to monitor gas emissions (particularly CO) would be expensive.
2. 15-minute inspection of waste flows is unnecessarily rigorous.
3. Points of measurement are unclear.
4. NO_x, SO_x, CO_2 should be added to the list of monitored effluents. One commenter suggested they be included during interim status.

C. Analysis of and Response to Comments and Rationale for the Final Regulation

The Agency believes it unwise, during the interim status period to require specific monitoring equipment, (such as the proposed continuous oxygen and carbon monoxide instrumentation for incineration), for other thermal treatment processes. The first commenter is correct: this equipment is expensive and complex.[26] The design of these systems and their sampling locations will be the subject of

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Agency review during the permit process and, thus, it is unwise to require their installation before that interaction can take place. Also lead time on purchase of this equipment can be lengthy. For similar reasons, the Agency does not believe that NO_x, SO_x, and CO_2 measurements should be required for thermal treatment during interim status.

At this time, however, it appears that some of the benefits of monitoring and inspecting can be realized simply by requiring that thermal treatment and emission control monitoring equipment already in place be monitored on a regular basis and that appropriate follow-up actions be taken. This will ensure that, within the design limitations of the existing equipment, the thermal treatment and emission control conditions will not be allowed to wander unmonitored and uncontrolled. It also seems reasonable and prudent to set up routine inspection schedules to observe visible emissions from the stack; monitor for fugitive emissions, odors, or smoke; and to look for leaks, spills, and inoperative alarm and control systems. As discussed in the Background Document covering inspections, routine inspections can often detect a malfunction or operator error before it leads to a human health or environmental incident. The omission of these requirements in the proposed interim status standards was an oversight on the part of the Agency.

EPA disagrees with the comment that a 15-minute inspection frequency for waste flow is unnecessarily rigorous. The instruments (or other devices) which measure the thermal

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treatment conditions (e.g., temperature) should be monitored and corrections made as often as possible, continuously and automatically where possible. The relevant control points on which the thermal treatment conditions depend in most processes include waste feed rate and auxiliary energy supply (e.g., fuel, microwave energy). Variations in any of these, or in the heating value of either the waste or the auxiliary energy supply, can quickly lead to poor conditions for waste destruction and to emission of incompletely destroyed wastes. Some incinerators already have some of these control loops (temperature via auxiliary fuel flow, for example) operating on a continuous basis.[18] The Agency encourages such continuous control but feels that those controls and, even more importantly any manual control loops (where the operator makes the correction), be monitored or inspected at least every 15 minutes.

No specific data base can demonstrate the wisdom of the precise 15-minute frequency. It is based on the Agency's generalized engineering expertise and the specific knowledge of thermal treatment operations gained in the 1975 and 1976 testing. In some cases, where thermal treatment conditions are subject to rapid swings, arguments can be made that more frequent (near continuous) monitoring and control are needed. This is, however, a facility specific situation and depends on instrument and process design parameters, such as the effectiveness of the instrumentation and the response period once control changes are made. Thus, it is more appropriately treated during the permitting process. Therefore, in deve-

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loping the inspection schedule required in §265.15, more frequent monitoring and control activities should be conducted where appropriate (see the Inspection Background Document for discussion of Inspection schedule development).

The 15-minute schedule is a minimum. The Agency believes that control loops which affect thermal treatment conditions should not be allowed to wander out of control for longer than that period of time. Even where automatic control is installed, it is necessary to check the instrumentation to ensure that it is functioning. The 15-minute minimum ensures that improper conditions do not persist for longer than that period. The Agency feels similarly about existing control loops which might effect emissions or which could result in spills if out of control. These could vary, depending on the design of the equipment.

All of these inspections are to be part of the Inspection Schedule called for in Section 265.15, and significant results are to be recorded in accordance with the provisions of that section. Additionally, stack emissions (if such emissions exist) should be monitored hourly and the entire facility inspected at least daily for leaks, spills, fugitive emissions, odors, and smoke. All of these discharges can result in human health or environmental impacts if not detected early. Control system alarms must also be inspected daily to be sure they are functioning.

Again, no body of information can specifically support any given frequency. Based on its own experience, however,

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with incinerator and other thermal treatment process tests, the Agency believes that inspections at these frequencies will uncover problems in time to prevent serious incidents. Further, the cost impact of conducting these inspections is expected to be small, given the fact that an operator must be on duty to run an incinerator anyway. For further discussion of the rationale for routine inspections, the reader is referred to the Background Document on Inspections.

D. Final Interim Status Regulations (§265.377)

During interim status, operators are required to routinely monitor and make appropriate corrections to the control equipment already installed. Similarly, in accordance with the inspection schedule provisions of §265.15 and the other sections dealing with facility standards (landfills, tanks, etc.), routine inspections for malfunctions, spills, etc., are being required during the interim status period. Specifically, as part of the inspection schedule, operators must monitor:

1. existing (in place) thermal treatment process and emission control instruments and make appropriate corrections, to maintain steady state conditions, at least every 15 minutes,

2. stack plume, if a stack plume exists, for normal appearance (opacity and color) at least hourly,

3. the entire unit, daily, for leaks, spills, fugitive emissions, odors, and all emergency shutdown controls and system alarms to assure proper operation.

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Issue #6 Residue Management

A. Synopsis of the Proposed Regulation

In the General Facility Standards (§250.43(e)) of the proposed regulations, owners or operators of any facility were required to consider hazardous residue generated by the treatment of a hazardous waste as a hazardous waste. Owners or operators were required to analyze all residue from treatment to determine if it was hazardous (§250.45-6(i))

B. Summary of Comments

1. Regulations must specifically address the disposition of incinerator ash.

2. Regulations must protect human health and the environment from the leachate of hazardous waste ash which is temporarily stored.

3. The California State leaching test should be used to determine the leaching potential of ash from incineration of hazardous wastes.

C. Analysis of and Response to Comments and Rationale for the Final Regulation

The Agency agrees with the first comment and has clarified that waste from incineration of hazardous wastes is also hazardous. This clarification is described in a comment in the final regulations. Section 261.3(c) and (d) should also address the concerns of the second commenter since leachate discharged from the stored ash resulting from incineration of a hazardous waste would also be a hazardous waste unless either the leachate or the ash had been tested and found not to be hazardous in accordance with §§261.20 and 260.22.

The Agency responded to these comments in this way because of difficulties in regulating toxic waste. These

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problems are described below.

The Agency has determined that test procedures for identifying if a waste is a toxic waste by virtue of its being carcinogenic, mutagenic, teratogenic, or bioaccumulative have not been sufficiently developed for routine use by waste generators in determining if their waste is subject to regulation under Part 261. As a result the toxicity characteristic in Part 261 now, is limited to test procedures that focus on the concentration in the waste of those metals and pesticides for which there are National Primary Drinking Water Standards. These procedures have been sufficiently developed and will be used by waste generators to determine if their waste is a toxic waste and thus subject to regulation. Despite the current lack of sufficiently developed test procedures the Agency has retained comprehensive criteria for listing other toxic wastes including those which are carcinogenic, mutagenic, terategenic and bioaccumulative. Thus, many wastes are listed as hazardous because data has shown that they are carcinogenic or otherwise toxic even though they do not meet the characteristics in Part 261.

This anomaly (a waste listed as hazardous for reasons other than its meeting one of the characteristic tests in Part 261) leads to some potentially troublesome loopholes. For example, an owner or operator could superfically "treat" a waste which is listed because it is carcinogenic and claim that the "treatment" has produced a new waste. And since the new waste (residue from the "treatment") is not listed

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and does not contain the heavy metals or pesticides which would cause it to fail the characteristic for toxicity in Part 261, it would not be considered hazardous and would be unregulated. It might however, be just as carcinogenic as the original waste.

To close this loophole, the Agency has added requirements §261.3(c) and (d) that a solid waste is a hazardous waste unless and until it does not possess the characteristics of a hazardous waste or it is exempted from rules governing listed hazardous waste (in accordance with the procedures for petitioning the Agency to amend Part 261 to exclude a waste produced at a particular facility (§260.20 and 260.22)). Any solid waste generated from the treatment, storage or disposal of a hazardous waste, including any sludge, spill residue, ash, emission control dust or leachate is a hazardous waste (§261.3(c)(2) unless the owner or operator shows by means of the procedures for petitioning the agency for an exemption (§260.20 and 260.22) that it is not hazardous. For a more complete analysis of these requirements, the reader is referred to the background document dealing with the definition of hazardous waste.

The third comment suggested reliance on the 30-day California leaching test. As discussed above neither this test nor EPA's Extraction Procedure promulgated under part 261 would not comprehensively demonstrate that ash would not meet the criteria for being regulated as a hazardous waste. The Agency's rationale for rejection of the California test

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is explained in the Background Document entitled "Toxicity Characteristic."

To be consistent with the format and requirements of the other facility specific requirements (landfills, surface impoundments, etc.) and the closure and post-closure requirements (Subpart G), Section 265.351 has been reoriented to specify what must be done with residues at closure. Section 265.114 of general Closure and Post-Closure requirements, specifies that equipment must be decontaminated and Section 265.113(a) requires that remaining hazardous wastes must be removed. Section 265.351 amplifies and further defines these requirements for incinerators, specifying that remaining hazardous residues, including ash, scrubber waters, and scrubber sludges, must be removed at closure.

D. Summary of the Interim Status Regulation (§265.351)

Facility owners or operators must remove any remaining hazardous wastes and residues at closure. A comment clarifies that any waste or residue removed from a thermal treatment process must be managed as a hazardous waste unless the owner or operator can demonstrate in accordance with §261.3(c) and (d) that it is not.

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Issue #7: Open Burning

A. Synopsis of the Proposed Regulation

In Section 250.43(d) of the proposed General Facility regulations, owners/operators were forbidden to open burn hazardous wastes. A "note" (variance) procedure allowed open burning if there were no technically or economically feasible alternatives.

B. Comment Summary

1. The regulation is good, but no variances should be allowed since a public health hazard or environmental damage could ensue.

2. Open burning and open detonation should be allowed for waste ordnance or explosive wastes since:

   (a) there is no safe alternative,

   (b) alternatives are unnecessarily expensive, and

   (c) it has been done safely for years.

3. Open burning should be allowed for wastes which are hazardous solely because of ignitability.

C. Analysis and Response to Comments and Rationale for the Final Regulation

The ban on open burning resulted from a common-sense analysis of the potential air emissions associated with simple lighting of ignitable hazardous wastes. The variance (note) was added chiefly to allow the disposal of waste explosives and propellants in the open. This has been the common practice for disposal of obsolete ordnance, with no known damage incidents indicating adverse health or environmental effects caused by emissions.

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The Agency's data base in this area is poor. Common sense leads one to conclude, as the first commenters have, that open burning of anything cannot be environmentally sound and many of these explosive materials contain very exotic chemicals, some of which are probably toxic. However, the military's claim appears valid. It is very dangerous to cut or dissassemble large propellants and explosive wastes so that the waste is amenable to present thermal treatment technology, and there are significant human and environmental damage associated with alternatives. [27,28] Damage cases are primarily associated with processing and handling steps and not with the emissions from open burning or detonation of waste explosives.[28]

The Agency is aware that the Department of Defense (DOD), working to develop alternatives to open burning or detonation, has designed and built several incinerators and associated equipment to manage some of these ordnance wastes in a controlled manner. It is the Agency's understanding that equipment does not yet exist to safely disassemble <u>all</u> ordnance, particularly bulk ordnance and missile propellants and that the effectiveness of the new incinerators is not fully proven. [27,28] Therefore, the Agency has decided to allow open burning and detonation of waste explosives during the interim status period, provided it is conducted at minimum separation distances adapted from standards developed and published by the Department of Defense. [29,30,31] These standards require small amounts (up to 100 pounds) of explosives to be at a

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minimum of 204 meters (670 feet) from locations where there may be persons in the open, and succeedingly greater distances for greater explosive amounts. These limits were developed by DOD as minimum safe distances for the protection of persons in the open from fragmentation, flying debris, or the effects of blast overpressure. Since DOD does not provide safe distances for protection from fragmentation for larger amounts of explosive waste than 30,000 pounds, the Agency has limited the amount of explosive waste that can be burned at any one time to 30,000 pounds. The Agency is requiring that separation distances be measured from the open burn area to the "property of others" since the owners or operators cannot assume or control the absence of persons beyond these limits.

The Agency will be monitoring the progress of the ongoing development of safe alternatives, and may propose additional regulations at a later time.

One commenter suggested that wastes which are hazardous solely because of their ignitability can be safely open burned, since any emissions would not be hazardous. Open burning of most material including ignitable waste can lead to clouds of smoke and often to odors, neither of which are environmentally tolerable. In addition, many wastes listed as hazardous because of their ignitability may never have been subjected to further testing necessary to determine whether they might release toxic constituents when burned or whether they might be hazardous for reasons in addition to their ignitability. For example even non-hazardous wastes, such

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as plastics, when burned, produce NO_x, SO_x, and CO, which are common pollutants, and some may produce even more hazardous compounds. Finally, to allow open burning of such wastes would be inconsistent with the ban on open burning of non-hazardous solid wastes recently promulgated by the Agency.[32] That regulation also makes the interim final imposition of this rule appropriate for the interim status period. Therefore, the Agency will not allow open burning of ignitable wastes or any other hazardous waste except for the open burning and detonation of explosives and bulk propellants under proper conditions.

D. Final Interim Status Regulations

The proposed ban on open burning has been incorporated into these interim status standards for thermal treatment. Waste explosives and bulk propellants may be open burned or detonated, however, at the specified minimum separation distances from the property of others.

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IV. TEXT OF INTERIM STATUS STANDARDS

Subpart P - Thermal Treatment

§265.370 Applicability

The regulations in this Subpart apply to owners or operators of facilities that thermally treat hazardous waste in devices other than incinerators, except as §265.1 provides otherwise. Thermal treatment in incinerators is subject to the requirements of Subpart O.

§265.371 [Reserved]

§265.372 [Reserved]

§265.373 General Operating Requirements[Interim Final]

Before adding hazardous waste, the owner or operator must bring his thermal treatment process to steady state (normal) conditions of operation--including steady state operating temperature--using auxiliary fuel or other means, unless the process is a non-continuous (batch) thermal treatment process which requires a complete thermal cycle to treat a discrete quantity of hazardous waste.

§265.374 [Reserved]

§265.375 Waste Analysis [Interim Final]

In addition to the waste analysis required by §265.13, the owner or operator must sufficiently analyze any waste which he has not previously treated in his thermal treatment process to enable him to establish steady state (normal) or other appropriate (for a non-continuous process) operating conditions (including waste and auxiliary fuel feed), and to

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determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

(a) Heating value of the waste in the waste; and

(b) Halogen content and sulfur content;

(c) Concentrations in the waste of lead and mercury, unless the owner or operator has written, documented data that show that the element is not present.

[Comment: As required by §265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

§265.376 [Reserved]

!265.377 Monitoring and Inspections [Interim Final]

The owner or operator must conduct, as a minimum, the following monitoring and inspections when thermally treating hazardous waste:

(1) Existing instruments which relate to temperature and emission control (if an emission control device is present) must be monitored **at least every 15 minutes.** Appropriate corrections to maintain **steady state or** other appropriate thermal treatment conditions must be made immediately either automatically or by the operator. Instruments which relate to temperature and emission control would normally include those measuring waste feed, auxiliary fuel feed, treatment process temperature, and relevant process flow and level controls.

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(2) The stack plume (emissions) where present, must be observed visually at least hourly for normal appearance (color and opacity). The operator must immediately make any indicated operating corrections necessary to return any visible emissions to their normal appearance.

(3) The complete thermal treatment process and associated equipment (pumps, valves, conveyors, pipes, etc.) must be inspected for leaks, spills, and fugitive emissions, and all energency shutdown controls and system alarms must be checked to assure proper operation.

[§265.378 - 265.380 Reserved]

§265.381 Closure [Interim Final]

At closure, the owner/operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash) from the thermal treatment process or equipment. [Comment: At closure, as throughout the operating period unless the owner or operator can demonstrate, in accordance with §261.3(c) or (d) of this Chapter, that any solid waste removed from his thermal treatment process or equipment is not a hazardous waste, the owner or operator becomes a hazardous waste generator and must manage it in accordance with all applicable requirements of Parts 262, 263, and 265 of this Chapter.]

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265.382 Open burning; waste explosives [Interim Final]

Open burning of hazardous waste is prohibited except for the open burning and detonation of waste explosives. Waste explosives include waste which has the potential to detonate and bulk military propellants which cannot safely be disposed of through other modes of treatment. Detonation is an explosion in which chemical transformation passes through the material faster than the speed of sound (0.33 kilometers/ second at sea level). Owners or operators choosing to open burn or detonate waste explosives must do so in accordance with the following table and in a manner that does not threaten human health or the environment.

Pounds Of Waste Explosives Or Propellants	Minimum Distance From Open Burn/Detonation To The Property Of Others
0 - 100	204 meters (670 feet)
101 - 1,000	380 meters (1250 feet)
1,001 - 10,000	530 meters (1730 feet)
10,001 - 30,000	690 meters (2260 feet)

[§§265.383 - 265.399 Reserved]

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