

DRAFT

B. PLANS AND RECORDKEEPING

CHAPTER 1

WASTE ANALYSIS PLANS

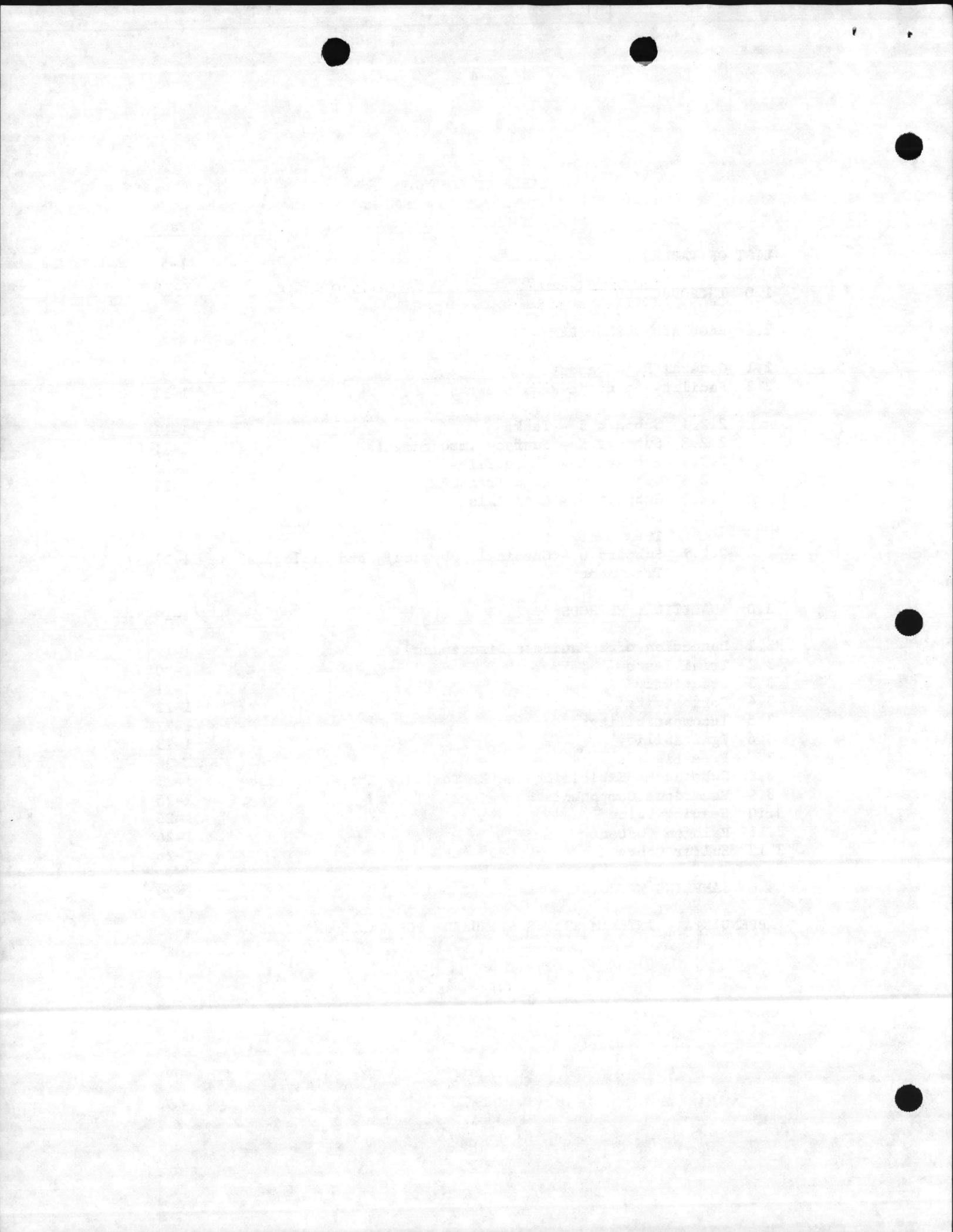
Part 265, Subpart B

§265.13

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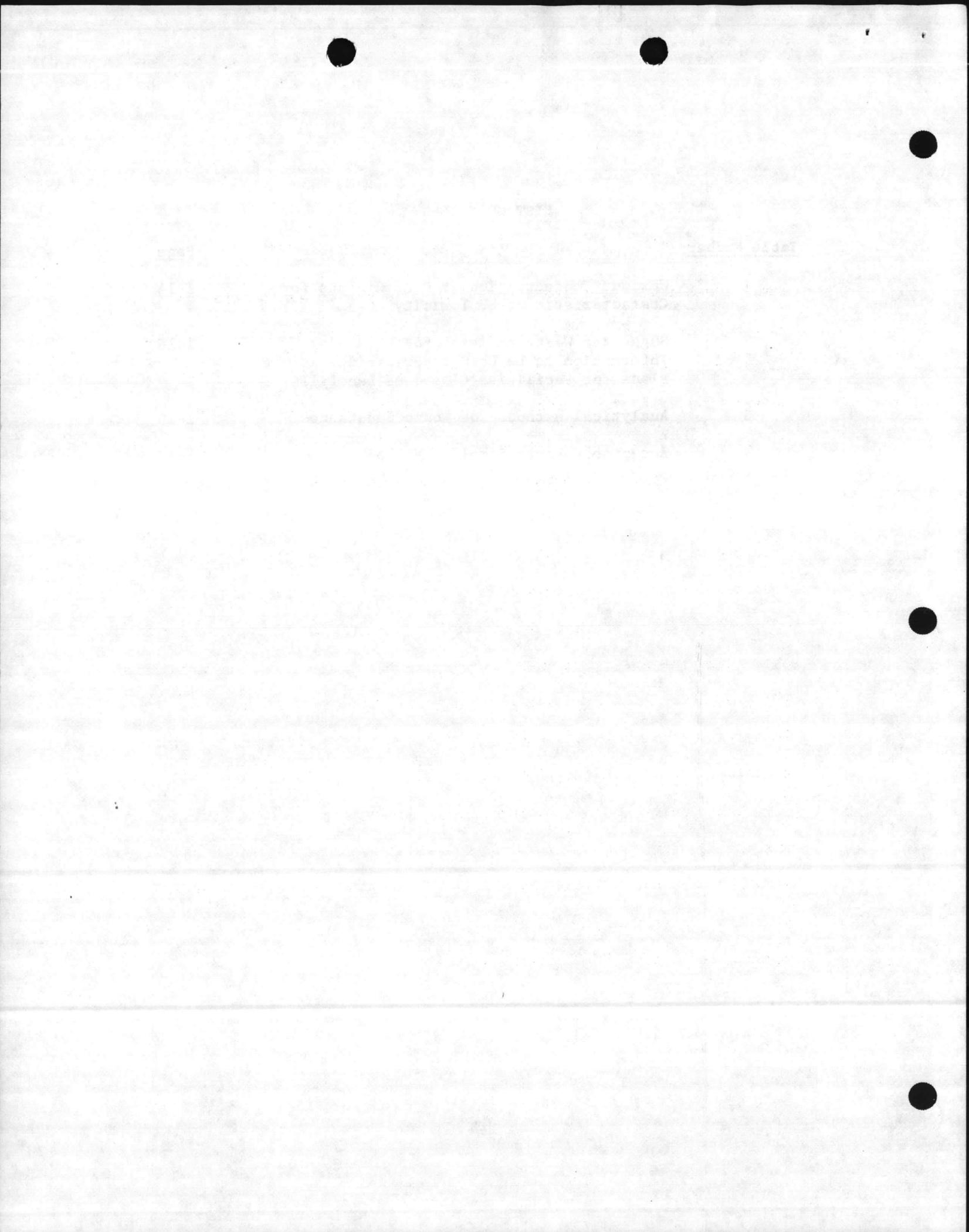
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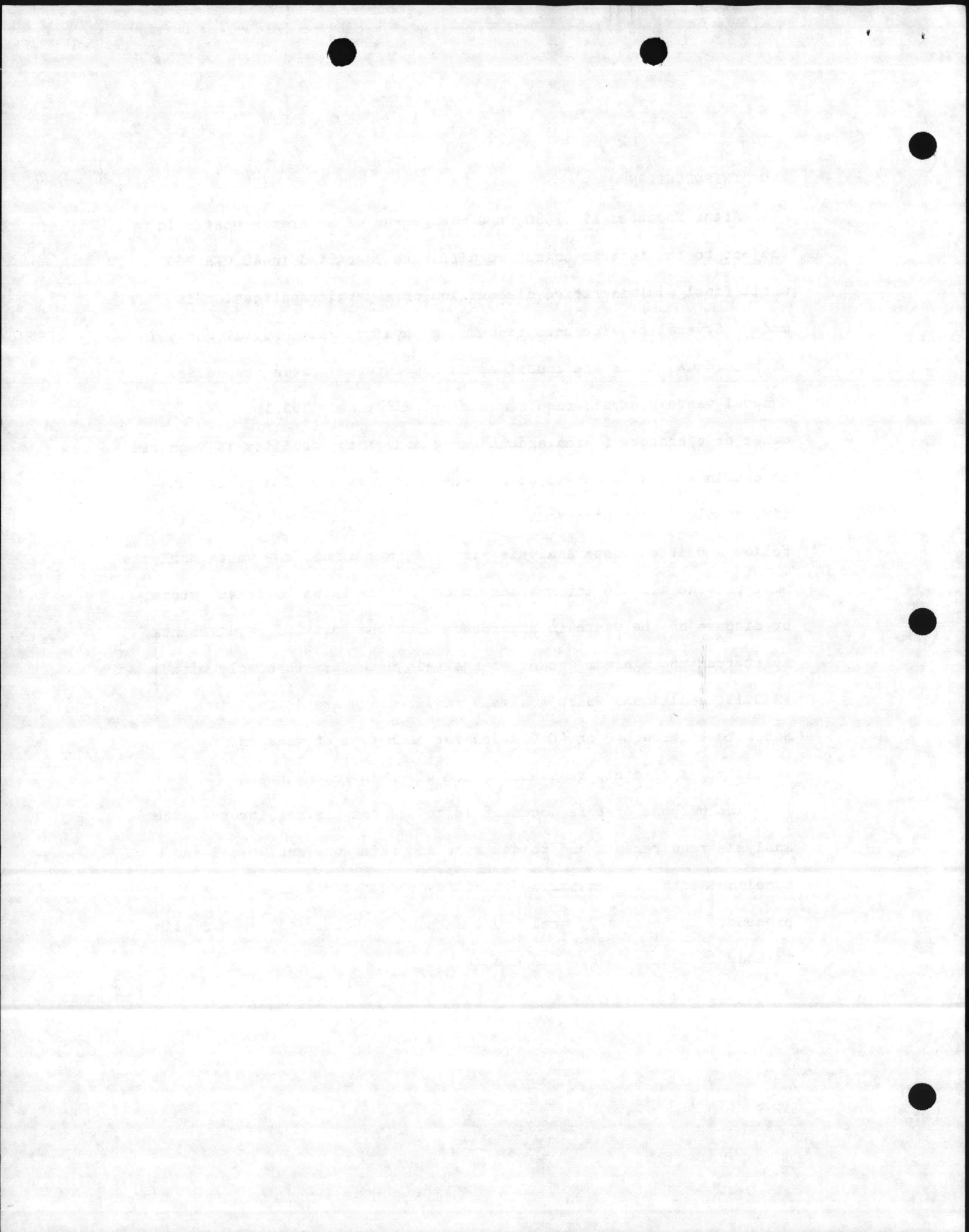
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1.0 INTRODUCTION

After November 19, 1980, the management of hazardous wastes is subject to the interim status requirements specified in 40 CFR 265 until final administrative disposition of a permit application is made. Several requirements concerning physical and chemical analysis of hazardous wastes are contained in the interim status standards. General waste analysis requirements are addressed §265.13. The owner or operator of a hazardous waste management facility is required to obtain a detailed chemical and physical analysis of a representative sample of any hazardous waste to be managed and to develop and follow a written waste analysis plan. At a minimum, the waste analysis must provide all the information which must be known to treat, store, or dispose of the waste in accordance with the Part 265 requirements. Apart from the minimum amount of analysis necessary to comply with §265.13, additional waste analysis requirements are defined in Subparts I through Q of 40 CFR 265 for each type of management facility. Applicable regulations are given in Appendix A.

The purpose of this document is to present the regulatory waste analysis requirements and to describe and reference analytical and sampling methods. General and facility-specific requirements are presented in Section 2, analytical methods in Section 3, and sampling methods in Section 4 of this chapter.



2.0 REGULATORY REQUIREMENTS

The general waste analysis requirements as given in §265.13 specify that any hazardous waste must be analyzed prior to its management and that an owner or operator of a hazardous waste management facility must develop and follow a written waste analysis plan. In addition, Subparts J through Q each contain special requirements for managing ignitable, reactive or incompatible wastes. The impact of these special requirements on waste analysis is examined. The facility specific requirements are presented for each of the types of facilities identified in Subparts J through Q in this section.

2.1 General Requirements

At a minimum, the waste analysis plan required under §265.13 must specify the following:

- The waste sampling method used to obtain a representative sample.
- The parameters selected for laboratory analysis for each waste, including those required in Subparts J through Q.
- The rationale for selection of these parameters for laboratory analysis.
- The methods or procedures applied during laboratory analysis.
- The frequency of sampling and analysis to be conducted on subsequent shipments of the same waste to ensure that the analysis is accurate and up to date.

- For off-site facilities, the sampling method and procedure used to identify each movement of hazardous waste to ensure that the waste is the same as the one indicated on the accompanying manifest or shipping paper.

The owner or operator of a hazardous waste management facility must keep a waste analysis plan available for inspection by EPA personnel during the interim status period. A waste analysis plan must be included with Part B of a permit application as required under 40 CFR 122.25. Should the permit writer wish to evaluate a waste analysis plan, guidance is presented in subsequent sections of this document to assess each component of the plan.

Similarly, waste analysis results and data must be recorded by the owner or operator and be accessible to EPA personnel during the interim status period. Analytical data must be included with a Part B permit application. Guidance on the evaluation and interpretation of analytical data is presented in the various facility specific guidance manuals and is not provided in this document.

The owners or operators of a hazardous waste management facility must include provisions in their waste analysis plans to detect ignitability, reactivity, or incompatibility in any waste managed. Characteristics for ignitability and reactivity are defined in §261.21 and 261.23, respectively, and examples of potentially incompatible wastes are provided in Appendix V of Part 265. Specific analytical methods to determine ignitability, reactivity, or incompatibility are discussed in Section 3 of this document.

2.2 Facility-Specific Requirements

The following analytical requirements are contained in Subparts J through Q of the 40 CFR 265 regulations. These analyses must be included in the waste analysis plan. The required analyses are presented for each type of hazardous waste management facility identified in Part 265.

2.2.1 Subpart J - Tanks

As required under §265.193, whenever a tank is to be used to treat or store a waste which is "substantially different" from one previously treated or stored in that tank or if the treatment process is "substantially different", trial treatment or storage tests must be performed or documented information must be obtained demonstrating that the intended practice will comply with the general operating requirements of §265.192(a) and (b). Management of ignitable or reactive waste is regulated under §265.198 and management of incompatible waste is regulated under §265.199.

2.2.2 Subpart K - Surface Impoundments

Trial tests or documented information in lieu of a trial test are required for treatment of "substantially different" hazardous wastes or for use of a "substantially different" treatment process in surface impoundments, as required under §265.225. Management of ignitable or reactive waste is regulated under §265.229 and management of incompatible wastes is regulated under §265.230. If the surface impoundment is to be closed as a landfill, the owner or operator

must comply with the §265.310 landfill closure requirements, which require information on the characteristics and mobility of the waste. The Section 265.310 requirements are discussed in the landfill section of this chapter.

2.2.3 Subpart L - Waste Piles

The waste analyses required under §265.252 must ensure that wastes added to a pile are compatible with each other and with the material in the pile to which it will be added. A trial test may satisfy this requirement. Incompatible wastes must not be stored in the same pile, and piles of incompatible wastes must be physically separated as required under §265.257. Waste analyses must include a visual comparison of color and texture for detection of potentially incompatible wastes as required by §265.252. Management of ignitable or reactive wastes is regulated under §265.256.

2.2.4 Subpart M - Land Treatment

Section 265.72(a) prohibits placing hazardous waste in land treatment facilities unless the waste can be made less hazardous by biological degradation or chemical reactions occurring in the soil. If data are not available from past experience, the waste analysis plan should include biodegradation or other treatment tests which demonstrate the decomposition of the waste into trace amounts of hazardous residuals and nonhazardous substances. Under §265.73(a), the owner or operator must determine the concentrations of any substances which cause the waste to fail the EP toxicity characteristic

(§261.24). Maximum concentrations for the specified contaminants are given in Table 1. Under §265.73(b), for any waste listed in Part 261, Subpart D, the concentrations of any substances which caused the waste to be listed must be determined. In addition, §265.273(c) requires analyses for arsenic, cadmium, lead, and mercury if food chain crops are grown at the facility. The closure and post-closure regulations in §265.250 require that an owner or operator consider the hazardous waste constituents present in a facility when developing closure and post-closure plans. The purpose of determining the properties of hazardous constituents remaining in the facility is to determine the level of closure and post-closure care which will be necessary. The types of waste analyses suggested for obtaining the necessary information are discussed in the following section. Management of ignitable or reactive waste is regulated under §265.281, and management of incompatible waste is regulated under §265.282.

2.2.5 Subpart N - Landfills

No specific analyses are required in this subpart; however, there are special requirements for the management of liquid wastes and wastes containing free liquids. Therefore, the owner or operator of a landfill must determine whether a waste contains free liquids. The closure and post-closure regulations in §265.310 require that an owner or operator must consider the hazardous waste constituents present in a facility and the mobility of these constituents when

TABLE 1
 MAXIMUM CONCENTRATION OF CONTAMINANTS FOR
 CHARACTERISTIC OF EP TOXICITY

EPA Hazardous Waste Number	Contaminant	Maximum Concentration (milligrams per liter)
D004	Arsenic	5.0
D005	Barium	100.0
D006	Cadmium	1.0
D007	Chromium	5.0
D008	Lead	5.0
D009	Mercury	0.2
D010	Selenium	0.2
D011	Silver	5.0
D012	Endrin (1,2,3,4,10,10- hexachloro-1,7-epoxy- 1,4,4a,5,6,7,8,8a- octahydro-1,4-endo, endo 5,8-dimethano naphthalene	0.02
D013	Lindane (1,2,3,4,5,6- hexachlorocyclohexane, gamma isomer	0.4
D014	Methoxychlor (1,1,1- Trichloro-2,2-bis(p- methoxyphenyl)ethane)	10.0
D015	Toxaphene (C ₁₀ H ₁₀ Cl ₈ Technical chlorinated comphene, 67-69 percent chlorine)	0.5
D016	2,4-D(2,4- Dichlorophenoxyacetic acid)	10.0
D017	2,4,5,-TP Silvex (2,4,5- Trichlorophenoxypropionic acid)	1.0

developing closure and post-closure plans. The purpose of obtaining information on the composition, characteristics, and mobility of a waste is to determine the extent of closure and post-closure care which will be necessary to protect human health and the environment. Inadequate closure can result in the escape of hazardous constituents from the landfill through a variety of paths. Gas formation caused by physical, biological or chemical reactions within the landfill can lead to the escape of toxic or ignitable gases. Leachate formation and the solubilization of hazardous constituents can result in discharges to ground and/or surface waters. Damage to the final cover can result in the contamination of run-off to surface waters and in increased leachate formation. Waste analysis will provide the owner or operator with the information needed to determine the extent of closure and post-closure care necessary to prevent the escape of hazardous constituents. Table 2 provides suggestions for waste analyses which could be useful in some situations. However, the specific information necessary is highly dependent on both facility design and location. (Further information on closure is available in the "Subpart G - Closure and Post-Closure Guidance Document" and in several technical resource documents to be completed in November 1980). Management of ignitable or reactive waste is regulated under §265.312, and management of incompatible waste is regulated under §265.313.

TABLE 2

SUGGESTED WASTE ANALYSES FOR OBTAINING INFORMATION
TO BE USED IN PREPARING CLOSURE PLANS FOR
FACILITIES CLOSED AS LANDFILLS

Potential Paths of Release

Gas Formation	Leaching	Damage to Cover From Excessive Settling
1. Vapor pressure	1. pH	1. General description of waste including:
2. Chemical analysis for hazardous constituents which could be emitted to air	2. Solubility in water, hydrocarbons, and chlorocarbons	a. weight b. volume c. estimate of solid or bulk density
	3. Chemical analysis for hazardous constituents which could be leached	d. percent solids

2.2.6 Subparts O and P - Incinerators and Thermal Treatment

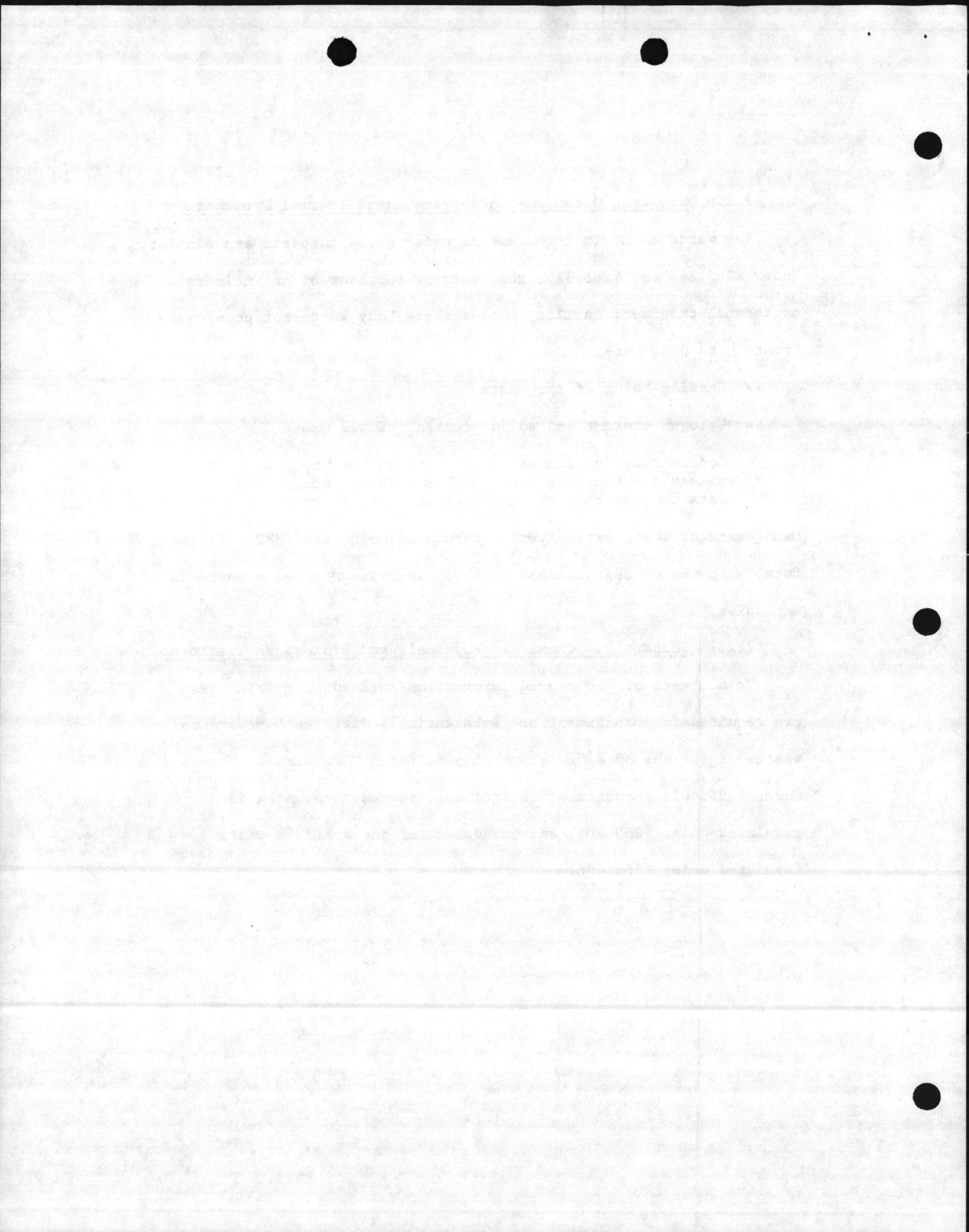
The waste analysis requirements under these subparts are similar. Under §265.345 and §265.375, the owner or operator of an incinerator or thermal treatment facility must analyze "any waste not previously treated" to determine:

- Heating value of the waste
- Halogen content and sulfur content of the waste
- Concentrations of lead and mercury in the waste, unless the owner or operator has written, documented data to show that the elements are not present.

Management of waste explosives is regulated under §265.382. Therefore, an owner or operator may wish to determine whether a waste is explosive.

2.2.7 Subpart Q - Chemical, Physical, and Biological Treatment

Trial tests or documented information in lieu of a trial test are required for management of "substantially different" hazardous wastes or for use of a "substantially different" treatment process under §265.402. Management of ignitable or reactive waste is regulated under §265.405, and management of incompatible waste is regulated under §265.406.



3.0 ANALYTICAL METHODS

Analytical methods, sufficient to provide information and data in compliance with the regulatory requirements, are presented in this section. The methods are referenced in Part 261 and the majority of them are contained in "Test Methods for Evaluating Solid Waste", EPA publication SW-846. Each of the parameters for analyses required under the regulations will be discussed individually.

3.1 Detection of a Manifest Discrepancy

Manifest discrepancies are differences between the quantity, including differences in weight and number count, or type of hazardous waste designated on a manifest or shipping paper and the quantity or type of hazardous waste a facility receives. Significant discrepancies in type, as defined in §265.72, are "obvious differences which can be discovered by inspection or waste analysis." Little more than the proper shipping name of the waste is required to appear as a description on the manifest under §262.21. Accordingly, in the preamble to Part 265 detection of manifest discrepancies in type is intended "to have facilities flag obvious differences in waste type ..., as opposed to more subtle changes, such as part-per-million variations in the concentrations of heavy metals within a sludge".

Therefore, it is suggested that detection of manifest discrepancies occur primarily by visual inspection and rapid chemical

analyses that may be performed during sampling. Examples of waste characteristics which may be determined by visual inspection and rapid chemical analysis include:

- Physical state of the waste - powdered or granular solids, slurries, sludges, liquids or compressed gases
- Color and texture
- Whether liquids and slurries are primarily aqueous or organic
- pH of aqueous wastes
- Odor
- Specific gravity or density

3.2 Trial Tests

The purpose of conducting trial tests for waste management at tanks, surface impoundments and chemical, physical and biological treatment facilities is to prevent accidents and haphazard experimentation with new wastes or new treatment techniques when chemical treatment of large batches of waste is involved. These requirements ensure that the operator knows not only the characteristics of the waste involved but also the behavior of the waste in a treatment process, or the effects of a new treatment process on the wastes and the facility. Haphazard experimentation or treatment of waste without trial tests may cause corrosion of containment devices, fires, explosions, and other problems associated with ignitable, reactive, or incompatible wastes. Trial tests, or documented information on similar wastes under similar treatment processes and similar

operating conditions, should bring to light unanticipated problems before large batches of waste are treated.

Trial tests should simulate intended treatment processes and conditions as faithfully as possible to ensure compliance with the facility specific requirements and the general requirements for managing ignitable, reactive or incompatible wastes under §265.17. Information and guidance about trial test protocol and conduct is contained in the "Guidance Manual on Trial Treatment Tests and Compatibility" (Fred C. Hart Associates, for Office of Solid Waste). The fate of the hazardous components present in a waste should be monitored during a trial test. Information about the analysis of hazardous components is presented in Section 3.9 of this chapter.

3.3 Reactivity

A waste is classified as reactive if it has any of the properties listed in 261.23, which are:

- It is normally unstable and readily undergoes violent change without detonating
- It reacts violently, or forms potentially explosive mixtures, or generates toxic gases, vapors or fumes upon contact with water
- It contains cyanide or sulfide and can generate toxic gases, vapors, or fumes
- It is explosive under standard conditions or in the presence of heat or an initiator

Several analyses are necessary, therefore, to determine whether a hazardous waste is reactive according to the regulatory definition. The owner or operator of a waste management facility must analyze a representative sample of a waste for the potential generation of

hydrogen cyanide or hydrogen sulfide, determine whether the waste is explosive, and determine the type of reaction occurring when the waste contacts water. A method for determining if HCN or H₂S generation is a problem is being developed for "Test Methods for Evaluating Solid Waste", SW-846. Explosive wastes are defined and methods of determination are referenced in Section 6.2 of SW-846. Reactivity of the waste with water may be determined under controlled conditions as part of the trial tests described in Section 3.2 of this chapter

3.4 Corrosivity

Both of the characteristics of corrosivity defined in §261.22 involve analytical testing of the waste. An aqueous waste is classified as corrosive if the pH is less than or equal to 2 or greater than or equal to 12.5, as determined by Method 5.2 in SW-846. A liquid waste is corrosive if it corrodes SAE 1020 steel at a rate greater than 6.35mm (.250 inch) per year at 55°C (130°F) as determined by Method 5.3 in SW-846, which is adapted from National Association of Corrosion Engineers Standard TM-01-69.

3.5 Incompatibility

Incompatible wastes are defined as those hazardous wastes that may cause corrosion or decay of containment facilities or may generate heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases if mixed with another waste or material under uncontrolled conditions. Incompatible wastes are defined to include waste-to-containment device incompatibility and waste-to-waste incompatibility.

If a complete chemical analysis of the waste is available, waste-to-waste incompatibility may be determined by the methods developed by the Hazardous Materials Management Section of the California Department of Health Services and presented in "A Method for Determining Hazardous Wastes Compatibility". Similar methods for determining waste-to-waste compatibility and guidance for determining waste-to-containment device compatibility are presented in the "Guidance Manual on Trial Treatment Tests and Compatibility."

Waste incompatibility may be determined during trial tests. Devices to measure temperature and pressure and to collect gases generated during the test for subsequent analysis may be incorporated into the trial test apparatus. Monitoring of these devices during the trial test will provide information to determine whether the system is incompatible within the regulatory definition.

3.6 Ignitability

The characteristics of ignitable wastes defined in §261.21 are based on the results obtained from several analytical procedures, including a flash point determination and identification of flammable compressed gases and oxidizers. The flash point of liquid wastes may be determined by ASTM Standards D-93-79 or D-3278-78, or equivalent test methods approved by the EPA Administrator. Ignitable compressed gases and oxidizers are defined in Section 4 of SW-846, using ASTM Standard D-323 to determine a compressed gas, and Bureau of Explosives methods to determine an ignitable compressed gas.

Examples of oxidizers are provided in Section 4.5 of SW-846. The liberation of oxygen during a trial test would serve to identify an oxidizer. No methods are suggested for identifying ignitable wastes defined in §261.21(a)(2), which are wastes that are not liquids and are capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burn so vigorously and persistently that they create a hazard. Information from previous experience and trial tests under controlled conditions may be the best method to identify these wastes.

3.7 Free Liquids

Free liquids are defined as "liquids which readily separate from the solid portion of a waste under ambient temperature and pressure." This term distinguishes a waste containing liquids that will readily flow from the waste in a landfill to product leachate. For sludges or semi-solids that are not obviously liquids, the following test may be used to determine if they contain "free liquids." Place a one to five kilogram (2.2. to 11.0 lbs) sample of waste on a level or slightly sloping plate of glass or other similarly flat and smooth solid material for at least five minutes. If a liquid phase separation is observed, the waste contains "free liquids." EPA feels this test provides a practical way to test sludges and semi-solids and helps to clarify the meaning of free liquids until a more rigorous test is devised.

The test is intended to simulate, in a sample way, the behavior of semi-solid wastes placed on the surface of a landfill. If liquids can be observed as a separate phase draining over an impermeable substrate from the base of a small sample of the waste, such liquids can also be expected to drain from the waste itself when it is placed on the surface of the landfill, and will be free to migrate into the landfill much as liquid wastes would. The fact that liquids cannot be observed to migrate from a small sample after a few minutes does not, of course, ensure that they will not migrate from a larger sample, after a longer period of time, when the waste is compressed or the temperature is raised. This test thus represents a rough minimum for the containment of free liquids.

3.8 Substances Exhibiting the EP Toxicity Characteristic

Analytical methods contained in "Test Methods for Evaluating Solid Waste", SW-846, for the extraction procedure toxic substances listed in Table 1 (Maximum Concentrations of Contaminants for Characteristic of EP Toxicity) of Section §261.24 are referenced in Table 2. These methods must generate accurate, quantitative data. It is important that the quality control procedures described in SW-846 are incorporated with the waste analysis. References to these analytical methods are contained in Appendix III of Part 261 as well.

3.9 Hazardous Components

The hazardous constituents of the hazardous wastes listed in Subpart D of Part 261, 261.31 and 261.32, are tabulated in Appendix VII of Part 261.

TABLE 3

ANALYTICAL METHODS FOR TOXIC SUBSTANCES

Substances	Analytical Method in SW-846
Arsenic	8.51
Barium	8.52
Cadmium	8.53
Chromium	8.54
Lead	8.56
Mercury	8.57
Selenium	8.59
Silver	8.60
Endrin	8.08*
Lindane	8.08*
Methoxychlor	8.08
Toxaphene	8.08*
2,4-D	8.40*
2,4,5-TP Silvex	8.40*

*Confirmation by GC/MS method is presented in 8.25.

3.10 Heating Value

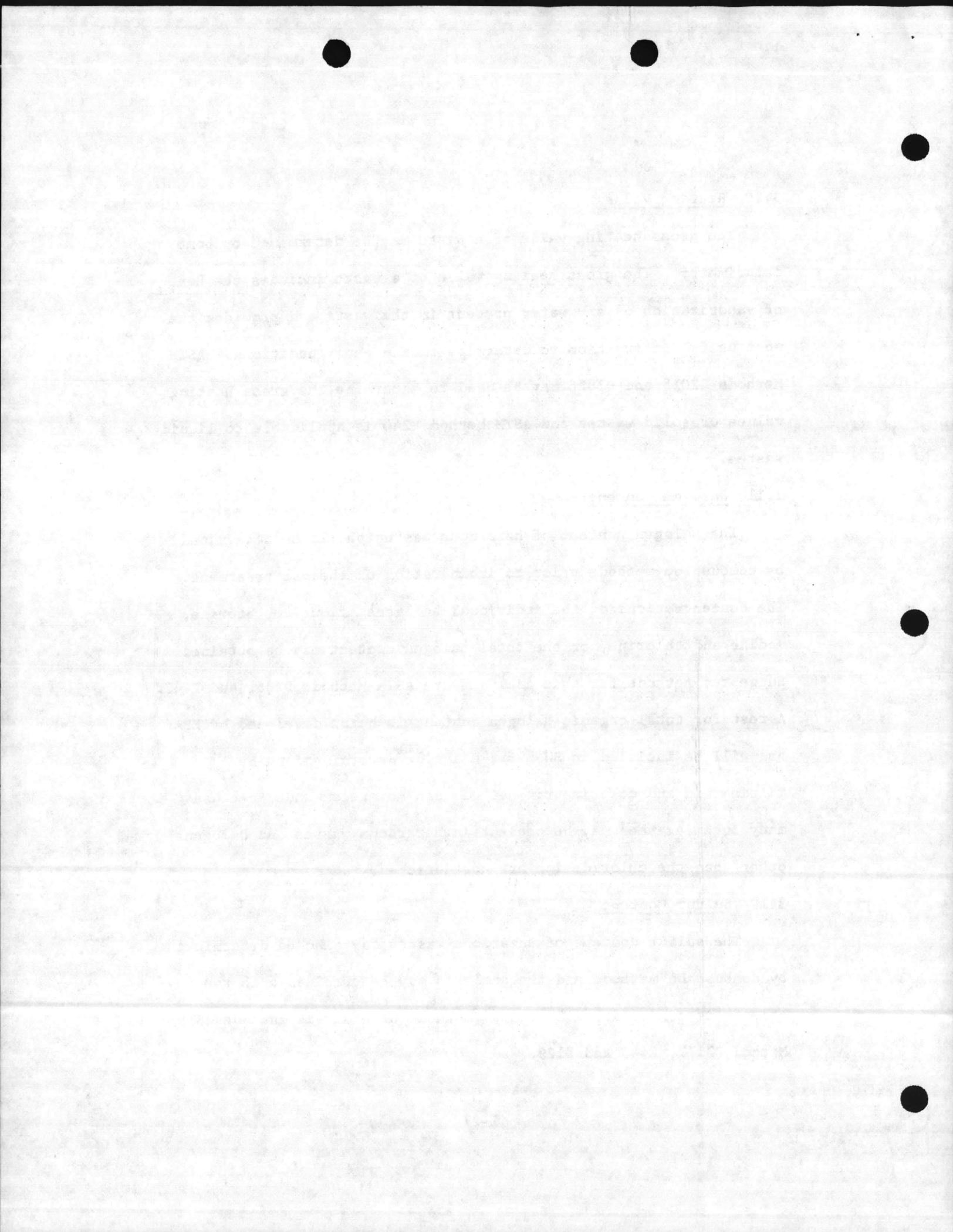
The gross heating value of a waste may be determined by bomb calorimetry. The gross heating value of a waste includes the heat of vaporization of any water present in the waste and provides the most useful information to determine incinerator conditions. ASTM Methods D2015 and D3826 may be used to determine the gross heating values of solid wastes and ASTM Method E240 is applicable to liquid wastes.

3.11 Halogen Content

The halogen content of hazardous wastes should be determined by combustion methods prior to incineration or thermal treatment. The concentrations of the individual halogens, fluorine, bromine, iodine and chlorine, or the total halogen content may be obtained. Suggested methods for this analysis are ASTM Methods D2361 and E442. A test for total organic halogen content is being developed by EPA and will be included in SW-846. Chloride determinations by titrimetric and colorimetric methods are not recommended because many interferences may be present in hazardous wastes and halogens other than the chloride ion are not detected.

3.12 Sulfur Content

The sulfur content of hazardous wastes may also be determined by combustion methods and the analysis may be combined with the halogen determination. Suggested methods of analysis include ASTM Method D3177, E443 and D129.



4.0 WASTE SAMPLING METHODS

Proper sampling is a necessary part of obtaining reliable information for management of hazardous wastes. Hazardous wastes may be contained and shipped in a variety of devices and quantities. Sampling methods used at hazardous waste facilities must ensure that a representative sample of a waste is obtained.

All precautions should be taken to ensure that the material of construction of the sampling device is inert to the waste being sampled. Glass containers are inert to most hazardous wastes. Sample sizes of 1 to 2 liters should be sufficient for analysis.

In Table 4, sampling methods are presented as a function of the waste containment device and the physical state of the waste. Hazardous wastes have been classified into five categories based upon the physical state of the waste. Solids, liquids, slurries, sludges, and compressed gases may be readily identified by visual inspection. Sludges and slurries are both mixtures of solids and liquids, but the difference is that slurries will flow freely under normal conditions and sludges will not. The notation of not applicable (NA) in Table 4 indicates that containment of hazardous waste in a particular physical state is not common practice in the device indicated.

Many of the sampling methods referenced in Table 4 are contained in "Test Methods for the Evaluation of Solid Waste", SW-846. The construction and operation of the Coliwasa sampler

TABLE 4
ACCEPTABLE WASTE SAMPLING METHODS

Waste Containment Device	Recommended Number of Samples for Composite	Sampling Method for Physical State of Solid Waste				
		Liquids	Slurries*	Sludges*	Solids	Compressed Gases
Open trucks, hopper car, bin, barge	10 to 12	NA	NA	Split tube thief	Trier Grain - free-flowing Sampler Soil Auger - compacted	NA
Tank truck, tank car	Sample from each hatch at 3 depths	Coliwasa Weighted bottle Bleed sample	Coliwasa Weighted bottle Bleed sample	Coliwasa Split tube thief	NA	NA
Drums, fiberboard containers, sacks, cylinders	1 representative sample	Coliwasa	Coliwasa	Coliwasa Split tube thief	Trier Scoop	Bleed sample
Pile	Depends on size of pile-at least 5	NA	NA	Split tube thief Scoop	Trier Soil auger Scoop	NA
Surface Impoundment	At least five	Dip sampler	Dip sampler	Dip sampler	NA	NA
Tanks	Sample at three depths; top, middle and bottom, at a minimum	Weighted bottle Tap sample	Weighted bottle Tap sample	Split tube thief	Trier Soil auger	Bleed sample
Flow in pipe	1 Representative sample	Gravity flow auger Sample cutter Vacuum sampler Tube sampler	Gravity flow auger Sample cutter Vacuum sampler Tube sampler	NA	NA	Bleed sample

NA - Not Applicable

*Slurries have a kinematic viscosity less than 10,000 SSU, sludges greater than 10,000 SSU.

Abstracted from: 1) ASTM Standard E300, in Part 29.

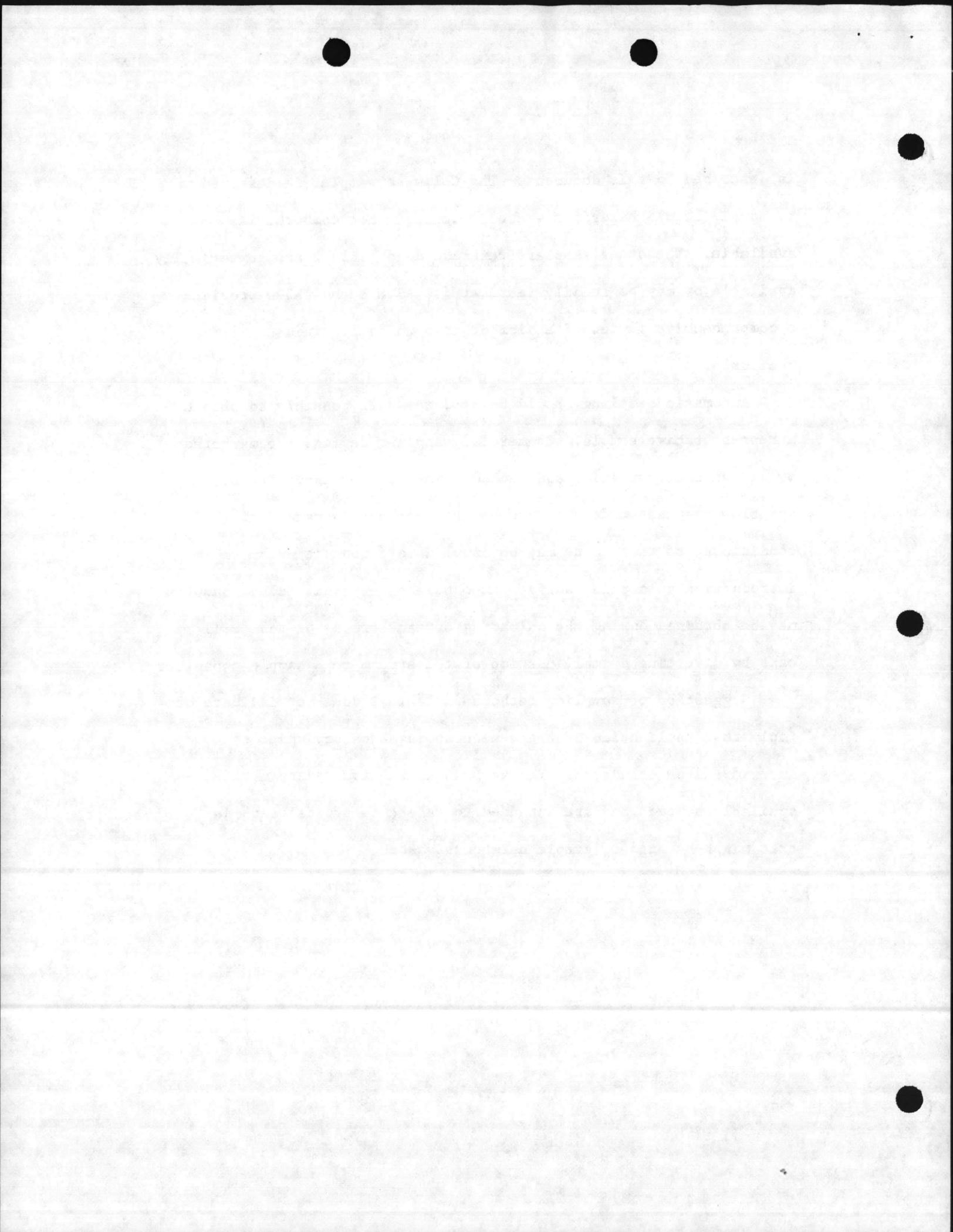
2) Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018.

3) 40 CFR 261, Appendix I.

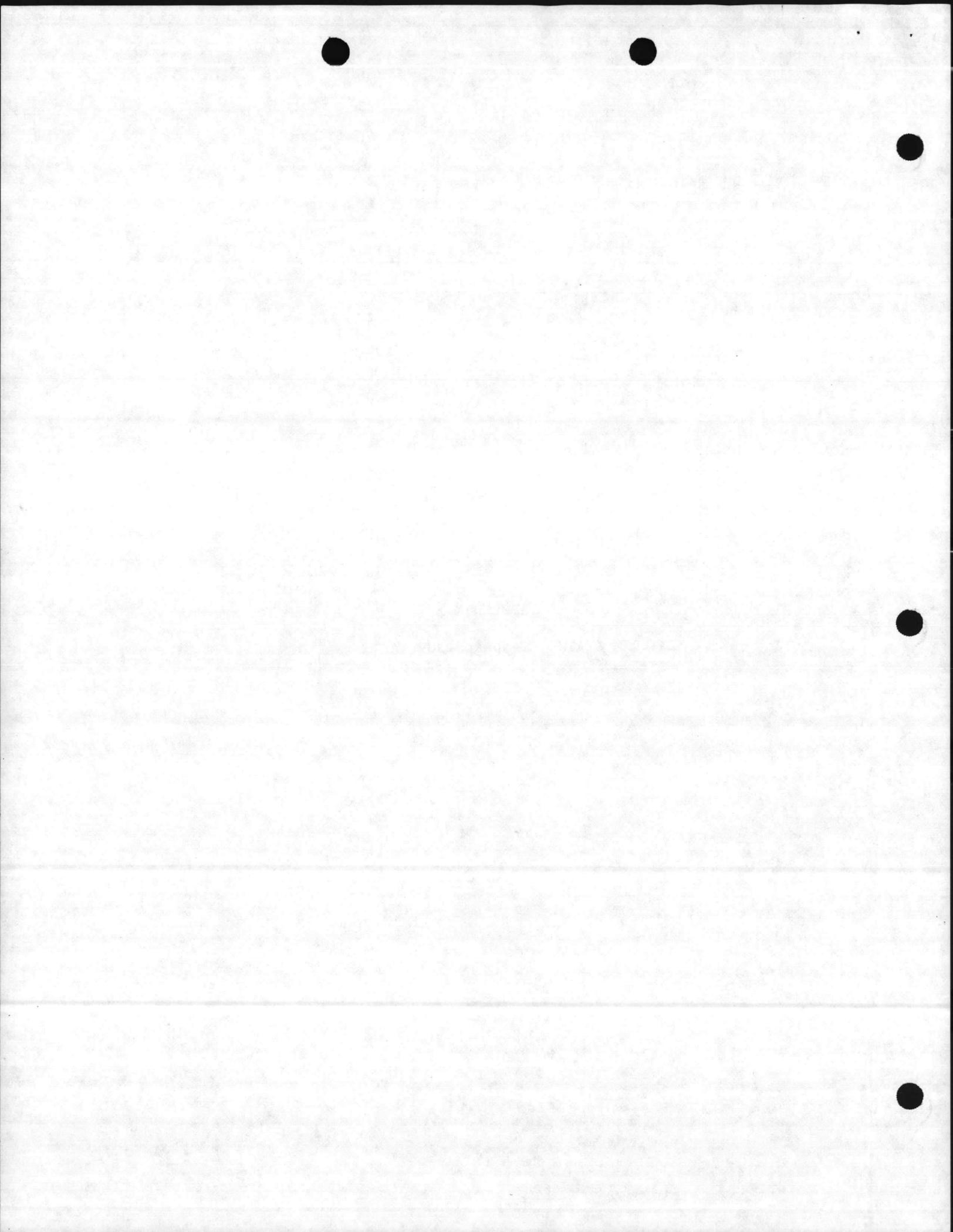
is described in this document. The Coliwasa sampler is designed to sample liquid hazardous wastes, but it is not commercially available. The other samplers referenced in Table 2 are commercially available or may be readily fabricated. ASTM Method E300 provides a comprehensive review of equipment used to sample industrial chemicals.

Automatic sampling should be used whenever possible to obtain a representative sample. Commercial sampling devices are marketed by at least 40 companies and include timed-cycle, intermittent, and flow response models. Most of the samplers operate during flow conditions, so that waste may be sampled in a conduit prior to introduction to a pile, surface impoundment, or tank. Bleed samples may be obtained during the unloading of tank trucks or tank rail cars by diverting a small portion of the stream to a sample container.

Suggestion of sampling methods in Table 2 does not indicate or imply that application of these methods is mandatory under the interim status standards. The methods are abstracted from widely-available sources and are intended to reference typical methods that might be used to sample hazardous wastes.



APPENDIX A
INTERIM STATUS STANDARDS FOR WASTE ANALYSIS



APPENDIX A
INTERIM STATUS STANDARDS FOR WASTE ANALYSIS
Characteristics of Hazardous Wastes

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79, or a Setaflash Closed Cup Tester, using the test method specified in ASTM standard D-3278-78, or as determined by an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.¹

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D001.

¹ASTM Standards are available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

§ 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using either the test method specified in the "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" ² (also described in "Methods for Analysis of Water and Wastes" EPA 600/4-79-020, March 1979), or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-89 ³ as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(b) A solid waste that exhibits the characteristic of corrosivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D002.

²This document is available from Solid Waste Information, U.S. Environmental Protection Agency, 26 W. St. Clair Street, Cincinnati, Ohio 45268.

³The NACE Standard is available from the National Association of Corrosion Engineers, P.O. Box 988, Katy, Texas 77450.

APPENDIX A (Continued)
 Characteristics of Hazardous Wastes (Concluded)

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

§ 261.24 Characteristic of EP Toxicity.

(a) A solid waste exhibits the characteristic of EP toxicity if, using the test methods described in Appendix II or equivalent methods approved by the Administrator under the procedures set forth in §§ 280.20 and 280.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table I at a concentration equal to or greater than the respective value given in that Table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering, is considered to be the extract for the purposes of this section.

(b) A solid waste that exhibits the characteristic of EP toxicity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

Table I.—Maximum Concentration of Contaminants for Characteristic of EP Toxicity—Continued

EPA hazardous waste number	Contaminant	Maximum concentration (milligrams per liter)
D004	Arsenic	5.0
D005	Barium	100.0
D006	Cadmium	1.0
D007	Chromium	5.0
D008	Lead	5.0
D009	Mercury	0.2
D010	Selenium	1.0
D011	Silver	5.0
D012	Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0.02
D013	Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.4
D014	Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl)ethane)	10.0
D015	Toxaphene (C ₁₂ H ₈ Cl ₆ , Technical chlorinated camphene, 67-69 percent chlorine)	0.5
D016	2,4-D, (2,4-Dichlorophenoxyacetic acid)	10.0
D017	2,4,5-TP Silver (2,4,5-Trichlorophenoxypropionic acid)	1.0

APPENDIX A (Continued)
General Standards

§ 265.13 General waste analysis.

(a)(1) Before an owner or operator treats, stores, or disposes of any hazardous waste, he must obtain a detailed chemical and physical analysis of a representative sample of the waste. At a minimum, this analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with the requirements of this Part.

(2) The analysis may include data developed under Part 261 of this Chapter, and existing published or documented data on the hazardous waste or on waste generated from similar processes.

[Comment: For example, the facility's record of analyses performed on the waste before the effective date of these regulations, or studies conducted on hazardous waste generated from processes similar to that which generated the waste to be managed at the facility, may be included in the data base required to comply with paragraph (a)(1) of this Section. The owner or operator of an off-site facility may arrange for the generator of the hazardous waste to supply part or all of the information required by paragraph (a)(1) of this Section. If the generator does not supply the information, and the owner or operator chooses to accept a hazardous waste, the owner or operator is responsible for obtaining the information required to comply with this Section.]

(3) The analysis must be repeated as necessary to ensure that it is accurate and up to date. At a minimum, the analysis must be repeated:

(i) When the owner or operator is notified, or has reason to believe, that the process or operation generating the hazardous waste has changed; and

(ii) For off-site facilities, when the results of the inspection required in paragraph (a)(4) of this Section indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper.

(4) The owner or operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste movement received at the facility to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper.

(b) The owner or operator must develop and follow a written waste analysis plan which describes the procedures which he will carry out to comply with paragraph (a) of this Section. He must keep this plan at the facility. At a minimum, the plan must specify:

(1) The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters (i.e., how analysis for these parameters will provide sufficient information on the waste's properties to comply with paragraph (a) of this Section);

(2) The test methods which will be used to test for these parameters;

(3) The sampling method which will be used to obtain a representative sample of the waste to be analyzed. A representative sample may be obtained using either:

(i) One of the sampling methods described in Appendix I of Part 261 of this Chapter; or

(ii) An equivalent sampling method.

[Comment: See § 260.20(c) of this Chapter for related discussion.]

(4) The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date;

(5) For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply; and

(6) Where applicable, the methods which will be used to meet the additional waste analysis requirements for specific waste management methods as specified in §§ 263.193, 265.225, 265.252, 265.273, 265.345, 265.375, and 265.402.

(c) For off-site facilities, the waste analysis plan required in paragraph (b) of this Section must also specify the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper. At a minimum, the plan must describe:

(1) The procedures which will be used to determine the identity of each movement of waste managed at the facility; and

(2) The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling.

APPENDIX A (Continued)

Facility-Specific Requirements

Subpart K—Surface Impoundments

Subpart L—Waste Piles

§ 265.225 Waste analysis and trial tests.

(a) In addition to the waste analyses required by § 265.13, whenever a surface impoundment is to be used to:

(1) Chemically treat a hazardous waste which is substantially different from waste previously treated in that impoundment; or

(2) Chemically treat hazardous waste with a substantially different process than any previously used in that impoundment; the owner or operator must, before treating the different waste or using the different process:

(i) Conduct waste analyses and trial treatment tests (e.g., bench scale or pilot plant scale tests); or

(ii) Obtain written, documented information on similar treatment of similar waste under similar operating conditions; to show that this treatment will comply with § 265.17(b).

[Comment: As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.229 and 265.230. As required by § 265.73, the owner or operator must place the results from each waste analysis and trial test, or the documented information, in the operating record of the facility.]

§ 265.229 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive waste must not be placed in a surface impoundment, unless:

(1) The waste is treated, rendered, or mixed before or immediately after placement in the impoundment so that (i) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (ii) § 265.17(b) is complied with; or

(2) The surface impoundment is used solely for emergencies.

§ 265.230 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same surface impoundment, unless § 265.17(b) is complied with.

§ 265.252 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must analyze a representative sample of waste from each incoming movement before adding the waste to any existing pile, *unless* (1) the only wastes the facility receives which are amenable to piling are compatible with each other, or (2) the waste received is compatible with the waste in the pile to which it is to be added. The analysis conducted must be capable of differentiating between the types of hazardous waste the owner or operator places in piles, so that mixing of incompatible waste does not inadvertently occur. The analysis must include a visual comparison of color and texture.

[Comment: As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.256 and 265.257. As required by § 265.73, the owner or operator must place the results of this analysis in the operating record of the facility.]

§ 265.256 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive wastes must not be placed in a pile, *unless*:

(1) Addition of the waste to an existing pile (i) results in the waste or mixture no longer meeting the definition of ignitable or reactive waste under

§§ 261.21 or 261.23 of this Chapter, and (ii) complies with § 265.17(b); or

(2) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react.

§ 265.257 Special requirements for incompatible wastes.

(a) Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same pile, unless § 265.17(b) is complied with.

(b) A pile of hazardous waste that is incompatible with any waste or other material stored nearby in other containers, piles, open tanks, or surface impoundments must be separated from the other materials, or protected from them by means of a dike, berm, wall, or other device.

[Comment: The purpose of this is to prevent fires, explosions, gaseous emissions, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the contact or mixing of incompatible wastes or materials.]

(c) Hazardous waste must not be piled on the same area where incompatible wastes or materials were previously piled, unless that area has been decontaminated sufficiently to ensure compliance with § 265.17(b).

APPENDIX A (Continued)

Facility-Specific Requirements (Continued)

Subpart M—Land Treatment

§ 265.273 Waste analysis.

In addition to the waste analyses required by § 265.13, before placing a hazardous waste in or on a land treatment facility, the owner or operator must:

(a) Determine the concentrations in the waste of any substances which exceed the maximum concentrations contained in Table I of § 261.24 of this Chapter that cause a waste to exhibit the EP toxicity characteristic;

(b) For any waste listed in Part 261, Subpart D, of this Chapter, determine the concentrations of any substances which caused the waste to be listed as a hazardous waste; and

(c) If food chain crops are grown, determine the concentrations in the waste of each of the following constituents: arsenic, cadmium, lead, and mercury, *unless* the owner or operator has written, documented data that show that the constituent is not present.

[*Comment:* Part 261 of this Chapter specifies the substances for which a waste is listed as a hazardous waste. As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.281 and 265.282. 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.]

§ 265.280 Closure and post-closure.

(a) In the closure plan under § 265.112 and the post-closure plan under § 265.118, the owner or operator must address the following objectives and indicate how they will be achieved:

(1) Control of the migration of hazardous waste and hazardous waste constituents from the treated area into the ground water;

(2) Control of the release of contaminated run-off from the facility into surface water.

(3) Control of the release of airborne particulate contaminants caused by wind erosion; and

(4) Compliance with § 265.276 concerning the growth of food-chain crops.

(b) The owner or operator must consider at least the following factors in addressing the closure and post-closure care objectives of paragraph (a) of this Section:

(1) Type and amount of hazardous waste and hazardous waste constituents applied to the land treatment facility;

(2) The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;

§ 265.281 Special requirements for ignitable or reactive waste.

Ignitable or reactive wastes must not be land treated, unless the waste is immediately incorporated into the soil so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (2) § 265.17(b) is complied with.

§ 265.282 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials (see Appendix V for examples), must not be placed in the same land treatment area, unless § 265.17(b) is complied with.

APPENDIX A (Continued)

Facility-Specific Requirements (Continued)

Subpart N—Landfills

Subpart O—Incinerators

§ 265.310 Closure and post-closure.

(a) The owner or operator must place a final cover over the landfill, and the closure plan under § 265.112 must specify the function and design of the cover. In the post-closure plan under § 265.118, the owner or operator must include the post-closure care requirements of paragraph (d) of this Section.

(b) In the closure and post-closure plans, the owner or operator must address the following objectives and indicate how they will be achieved:

(1) Control of pollutant migration from the facility via ground water, surface water, and air;

(2) Control of surface water infiltration, including prevention of pooling; and

(3) Prevention of erosion.

(c) The owner or operator must consider at least the following factors in addressing the closure and post-closure care objectives of paragraph (b) of this Section:

(1) Type and amount of hazardous waste and hazardous waste constituents in the landfill;

(2) The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;

§ 265.314 Special requirements for liquid waste.

(a) Bulk or non-containerized liquid waste or waste containing free liquids must not be placed in a landfill, unless:

(1) The landfill has a liner which is chemically and physically resistant to the added liquid, and a functioning leachate collection and removal system with a capacity sufficient to remove all leachate produced; or

(2) Before disposal, the liquid waste or waste containing free liquids is treated or stabilized, chemically or physically (e.g., by mixing with an absorbent solid),

so that free liquids are no longer present.

(b) A container holding liquid waste or waste containing free liquids must not be placed in a landfill, unless:

(1) The container is designed to hold liquids or free liquids for a use other than storage, such as a battery or capacitor; or

(2) The container is very small, such as an ampule.

(c) The date for compliance with this Section is 12 months after the effective date of this Part.

§ 265.345 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously burned in his incinerator to enable him to establish steady state (normal) operating conditions (including waste and auxiliary fuel feed and air flow) and to determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

(a) Heating value of the waste;

(b) Halogen content and sulfur content in the waste; and

(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.]

§ 265.312 Special requirements for ignitable or reactive waste.

Ignitable or reactive waste must not be placed in a landfill, unless the waste is treated, rendered, or mixed before or immediately after placement in the landfill so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (2) § 265.17(b) is complied with.

§ 265.313 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same landfill cell, unless § 265.17(b) is complied with.

APPENDIX A (Concluded)

Facility-Specific Requirements (Concluded)

Subpart P—Thermal Treatment

§ 265.375 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously treated in his thermal 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 determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

- (a) Heating value of the waste;
- (b) Halogen content and sulfur content in the waste; and
- (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.]

Subpart Q—Chemical, Physical, and Biological Treatment

§ 265.402 Waste analysis and trial tests.

(a) In addition to the waste analysis required by § 265.13, whenever:

(1) A hazardous waste which is substantially different from waste previously treated in a treatment process or equipment at the facility is to be treated in that process or equipment, or

(2) A substantially different process than any previously used at the facility is to be used to chemically treat hazardous waste;

the owner or operator must, before treating the different waste or using the different process or equipment:

(i) Conduct waste analyses and trial treatment tests (e.g., bench scale or pilot plant scale tests); or

(ii) Obtain written, documented information on similar treatment of similar waste under similar operating conditions;

to show that this proposed treatment will meet all applicable requirements of § 265.401 (a) and (b).

[*Comment:* As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.405 and 265.408. As required by § 265.73, the owner or operator must place the results from each waste analysis and trial test, or the documented information, in the operating record of the facility.]

§ 265.406 Special requirements for incompatible wastes.

(a) Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same treatment process or equipment, unless § 265.17(b) is complied with.

(b) Hazardous waste must not be placed in unwashed treatment equipment which previously held an incompatible waste or material, unless § 265.17(b) is complied with.

§ 265.405 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive waste must not be placed in a treatment process or equipment unless:

(1) The waste is treated, rendered, or mixed before or immediately after placement in the treatment process or equipment so that (i) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under § 261.21 or 261.23 or this Chapter, and (ii) § 265.17(b) is complied with; or (2) The waste is treated in such a way that it is protected from any material or conditions which may cause the waste to ignite or react.

