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PART A:

HAZARDOUS WASTE MANAGEMENT PROGRAM
ANALYTICAL OPERATING PROCEDURES MANUAL

PART A: PERMITTING GUIDELINES

A.1. IDENTIFICATION AND CLASSIFICATION OF HAZARDOUS WASTE

1.1. INCLUSION OF A WASTE WITHIN THE SCOPE OF THE SYSTEM

A waste material is identified as potentially hazardous and is included within the permitting responsibility of the Louisiana program:

(1) when it has been included in Categories I or II of Appendix A of the Rules and Regulations of the Louisiana Hazardous Waste Management Plan presented on May 30, 1979, or as may be amended, or

(2) when an analysis of the waste would indicate that it exceeds thresholds designated below defining the "moderate hazard level of 2" for the criteria listed in Category III of those Regulations.

1.2. OPERATIONAL THRESHOLD DEFINITION FOR CATEGORY III WASTES

A waste material is determined to have exceeded the "moderate hazard level threshold" (level 2 in Appendix A, Category III) if any of the following test responses are obtained:

1.2.1. Ignitability: The threshold for a liquid waste being regulated as ignitable is designated to be a flashpoint of less than 140° F (60° C)—as determined in either of the two tests ASTM Std. D-93-79 or ASTM Std. D-3278-78.

In the case of solid wastes, where these tests are not applicable, a waste must be included within the hazardous waste management system when there is no assurance that the waste is free from ignition (spontaneous or otherwise) — under all the climatic and storage circumstances associated with an accredited non-hazardous landfill. This provision however, does not apply to such waste materials as garbage derived from households and in general to refuse consisting entirely of paper products, masonry and scrap lumber when these are in no way contaminated with flammable fluids or other materials as are covered under the hereinafter listed criteria of corrosivity, reactivity or toxicity.

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Ignitable gases and oxidizer chemicals as prescribed in 49 CFR 173.151 and 173.300 (U.S. Department of Transportation) are deemed prima facie to be over the ignitable threshhold.

NOTE: ASTM Std. D-93-79 describes the Pensky-Martens Closed Cup Tester and ASTM Std. D-3278-78, the Setaflash Closed Tester.

1.2.2. Corrosivity and Irritability: The threshold for determining that a waste presents a moderate level corrosive hazard and is to be included in the program is defined by any of the following:

(1) The pH of the waste measures less than or equal to 2.5 (acid) or greater than or equal to 12.5 (base) — as measured with a pH meter test described in EPA-600/4-79-020, the "Manual of Methods for Chemical Analysis of Water and Wastes" (March, 1979), or

(2) The waste corrodes steel (SAE grade 1020) at a rate greater than 0.250 inches per year at 130° F according to the procedure described in NACE Std. TM-01-69.

(3) An albino rabbit patch test (Paragraph 1.3.5) for dermal corrosivity or irritability (which shall be invoked when the waste has not been characterized by prior analysis or experience with known constituent properties) showing that the waste would result in either (a) visible destruction or irreversible alterations (ulceration or necrosis) to the skin — (corrosivity), or (b) a local inflammatory reaction carrying an empirical score of 5 or more — (irritability).

1.2.3. Reactivity: Wastes regulated under this category are those which simply by virtue of being commingled with other materials lead to adverse health or environmental effects through heat generation, violent reaction, or release of toxic fumes of gases. While the level of hazard determination in this category is largely judgmental, the basic criteria for incompatibility described in Table A-I should not be violated in any disposal facility. Simple listing in Table A-I such as for group 4 A does not imply the material is hazardous per se except through its potential for reactivity. Explosives listed in 49 CFR 173.51, 173.53, and 173.88 are to be included in the hazardous wastes management system.

1.2.4. Toxicity: A potential toxicity hazard is deemed to exist for those wastes specifically listed in the Rules and Regulations (Table A-II), for those contained within

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the EPA Interim Primary Drinking Water Standards List (Table A-III), for those in the EPA Hazardous Constituents List (Table A-IV), and for all those wastes containing substances with an oral LD_{50} in humans less than or equal to 800 mg/kg. The generator's responsibility for characterization may be accomplished by analytical testing or by conscientious application of other well documented process knowledge.

Whether or not the waste with this potential hazard is to be within the Hazardous Waste Management Program (i.e. is deemed to cross the "moderate" toxicity hazard level of 2) is to be determined by the criteria of Section 1.2.4.1 applied to waste liquids and/or for extracts and residues drawn from solids and sludges. Preparation of leachate should follow the procedures described in Section 1.3.2.

Attention is called to preemptive designation of the hazardous character of wastes cited in paragraph 1.2.5.

1.2.4.1. Threshold Toxicity Criteria: A waste containing a potentially toxic component (as defined in 1.2.4.) shall be presumed subject to regulation within the Hazardous Waste Management Plan except when the following criteria apply:

I. Acute Toxicity Thresholds

The following conditions provide a basis for excluding wastes with subthreshold concentrations of potentially toxic materials from the Louisiana Hazardous Waste Management Program:

A. The aqueous fraction of the waste or its leachate (from the procedure of paragraph 1.3.2) exhibits an oral LD_{50} toxicity for rats greater than or equal to 500 mg/kg (or a deemed equivalent of 1220 mg/kg = for mice and 80 mg/kg for humans), and

B. For those portions of the aggregate waste (when a solid or nonaqueous mixture) or the residue from the leachate extraction procedure of paragraph 1.3.2 — which are in a state of aggregation less than or equal to 1mm (50 mesh), an oral LD_{50} toxicity for rats or greater than or equal to 50 mg/kg is determined, and

C. The waste contains a concentration of less than 100 times the EPA primary drinking water standards in either its liquid phase or extract (such standards being listed as applicable in Table A-III), and

D. The concentration of those priority pollutants reasonably expected on process grounds (Table A-IV) yields a ratio sum as defined below of less than or equal to 0.2, i.e.

$$\Sigma \frac{Ci}{(96\text{ hr } TLC_{50})\ i} \leq 0.2, \text{ or}$$

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in the event such ratio sum is greater than only 0.2, the bioassay protocol of Section 1.3.3 is conducted and yields a 96 hr. TLC_{50} greater or equal than 560 Q mg/l. (Q represents the ratio of the weight of the raw wet waste to the dry weight.)

NOTE: Sources for the aforementioned toxicity statistics are presented in Tables A-VA, and A-VB.

II. Chronic Toxicity

Guidelines for the characterization of chronic toxicity situations are being deferred until subsequent drafts of these guidelines are issued. They will likely involve tests for bioaccumulation (octanol/water partition coefficients and gross conversion efficiency tests —Weininger, D., University of Wisconsin dissertation, 1978) and for mutagenic activity. At present, potential hazard due to chronic toxicity is handled through the specific listing of wastes in Category I of the Rules and Regulations.

1.2.5. Pre-emptive Designation in Hazardous Waste Status: Wastes listed in Tables A-VI, VII, VIII and IX (corresponding roughly to Category I wastes of the Louisiana program Rules and Regulations) are expressly deemed hazardous and subject to regulation under this program. The program intent is in effect to supplement the list of Category I wastes originally presented in the May 30, 1979, Louisiana Rules and Regulations with the EPA derived lists presented in Tables A-VI through IX.

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TABLE A-I

REACTIVITY HAZARDS

(Materials in any subgroup A should not have contact with those in the corresponding subgroup B by reason of causing the indicated consequence.)

Group 1 A	Group 1 B
Acetylene sludge	Acid sludge
Alkaline caustic liquids	Acid and water
Alkaline cleaner	Battery acid
Alkaline corrosive liquids	Chemical cleaners
Alkaline corrosive battery fluid	Electrolyte acid
Caustic wastewater	Etching acid liquid or solvent
Lime sludge and other corrosive alklines	Liquid cleaning compounds
Lime wastewater	Pickling liquor and other corrosive acids
Lime and water	Spent acid
Spent caustic	Spent mixed acid
	Spent sulfuric acid

Potential consequences: Heat generation, violent reaction

Group 2 A	Group 2 B
Asbestos waste and other toxic wastes	Cleaning solvents
Beryllium wastes	Data processing liquid
Unrinsed pesticide containers	Obsolete explosives
Waste pesticides	Petroleum waste
	Refinery waste
	Solvents
	Waste oil and other flammable and explosive wastes

Potential consequences: Release of toxic substances in case of fire or explosion

Group 3 A	Group 3 B
Aluminum	Any waste in Group 1 A or 1 B
Calcium	
Lithium	
Magnesium	
Potassium	
Sodium	
Zinc powder and other reactive metals and metal hydrides	

Potential consequences: Fire or explosion, generation of flammable hydrogen gas

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TABLE A-I (continued)

Group 4 A	Group 4 B
Alcohols Water	Any concentrated waste in Groups 1 A or 1 B Calcium Lithium Metal hydrides Potassium Sodium SO, CI, SOCI, PCI, CH, S, CI, and other water reactive wastes

Potential consequences: Fire, explosion, or heat generation, generation of flammable or toxic gases

Group 5 A	Group 5 B
Alcohols Aldehydes Halogenated hydrocarbons Nitrated hydrocarbons and other reactive organic compounds and solvents Unsaturated hydrocarbons	Concentrated Group 1 A and 1 B wastes Group 3 A wastes

Potential consequences: Fire, explosion or solvent reaction

Group 6 A	Group 6 B
Spent cyanide and sulfide solutions	Group 1 B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas

Group 7 A	Group 7 B
Chlorates and other strong oxidizers Chlorine Chlorides Chromic acid Hydrochlorides Nitrates Nitric acid fuming Perchlorates Permanganates Peroxides	Acetic acid and other organic acids Concentrated mineral acids Group 2 B wastes Group 3 A wastes Group 5 A wastes and other flammable and combustible wastes

Potential consequences: Fire, explosion, or violent reaction

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TABLE A-III

Maximum Concentration of Contaminants for Characteristic of EP Toxicity

EPA Hazardous Waste Number	Contaminant	Maximum Concentration (milligrams per lite)
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 ($C_{10}H_{10}Cl_8$, Technical chlorinated camphene, 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

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TABLE A-IV

HAZARDOUS CONSTITUENTS

Acetaldehyde

(Acetato)phenylmercury

Acetonitrile

3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts

2-Acetylaminofluorene

Acetyl chloride

1-Acetyl-2-thiourea

Acrolein

Acrylamide

Acrylonitrile

Aflatoxins

Aldrin

Allyl alcohol

Aluminum phosphide

4-Aminobiphenyl

6-Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)-8a-methoxy-5-methylcarbamate azirino(2',3':3,4) pyrrolo(1,2-a)indole-4,7-dione (ester) (Mitomycin C)

5-(Aminomethyl)-3-isoxazolol

4-Aminopyridine

Amitrole

Antimony and compounds, N.O.S.*

Aramite

Arsenic and compounds, N.O.S.

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* The abbreviation N.O.S signifies those members of the general class "not otherwise specified" by name in this listing.

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TABLE A-IV (ontinued)

Arsenic acid

Arsenic pentoxide

Arsenic trioxide

Auramine

Azaserine

Barium and compounds, N.O.S.

Barium cyanide

Benz[c]acridine

Benz[a]anthracene

Benzene

Benzenearsonic acid

Benzenethiol

Benzidine

Benzo[a]anthracene

Benzo[b]fluoranthene

Benzo[j]fluoranthene

Benzo[a]pyrene

Benzotrichloride

Benzyl chloride

Beryllium and compounds, N.O.S.

Bis(2-chloroethoxy)methane

Bis(2-chloroethyl) ether

N,N-Bis(2-chloroethyl)-2-naphthylamine

Bis(2-chloroisopropyl) ether

Bis(chloromethyl) ether

Bis(2-ethylhexyl) phthalate

Bromoacetone

Bromomethane

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TABLE A-IV (continued)

4-Bromophenyl phenyl ether

Brucine

2-Butanone peroxide

Butyl benzyl phthalate

2-sec-Butyl-4,6-dinitrophenol (DNBP)

Cadmium and compounds, N.O.S.

Calcium chromate

Calcium cyanide

Carbon disulfide

Chlorambucil

Chlordane (alpha and gamma isomers)

Chlorinated benzenes, N.O.S.

Chlorinated ethane, N.O.S.

Chlorinated naphthalene, N.O.S.

Chlorinated phenol, N.O.S.

Chloroacetaldehyde

Chloroalkyl ethers

p-Chloroaniline

Chlorobenzene

Chlorobenzilate

1-(p-Chlorobenzoyl)-5-methoxy-
2-methylindole-3-acetic acid

p-Chloro-m-cresol

1-Chloro-2,3-epoxybutane

2-Chloroethyl vinyl ether

Chloroform

Chloromethane

TABLE A-IV (continued)

Chloromethyl methyl ether

2-Chloronaphthalene

2-Chlorophenol

1-(o-Chlorophenyl)thiourea

3-Chloropropionitrile

alpha-Chlorotoluene

Chlorotoluene, N.O.S.

Chromium and compounds, N.O.S.

Chrysene

Citrus red No. 2

Copper cyanide

Creosote

Crotonaldehyde

Cyanides
(soluble salts and complexes), N.O.S.

Cyanogen

Cyanogen bromide

Cyanogen chloride

Cycasin

2-Cyclohexyl-4,6-dinitrophenol

Cyclophosphamide

Daunomycin

DDD

DDE

DDT

Diallate

Dibenz[a,h]acridine

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TABLE A-IV (continued)

Dibenz[a,j]acridine

Dibenz[a,h]anthracene
(Dibenzo[a,h]anthracene)

7H-Dibenzo[c,g]carbazole

Dibenzo[a,e]pyrene

Dibenzo[a,h]pyrene

Dibenzo[a,i]pyrene

1,2-Dibromo-3-chloropropane

1,2-Dibromoethane

Dibromomethane

Di-n-butyl phthalate

Dichlorobenzene, N.O.S.

3,3'-Dichlorobenzidine

1,1-Dichloroethane

1,2-Dichloroethane

trans-1,2-Dichloroethene

Dichloroethylene, N.O.S.

1,1-Dichloroethylene

Dichloromethane

2,4-Dichlorophenol

2,6-Dichlorophenol

2,4-Dichlorophenoxyacetic acid (2,4-D)

Dichloropropane

Dichlorophenylarsine

1,2-Dichloropropane

Dichloropropanol, N.O.S.

Dichloropropene, N.O.S.

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TABLE A-IV (continued)

1,3-Dichloropropene

Dieldrin

Diepoxybutane

Diethylarsine

0,0-Diethyl-S-(2-ethylthio)ethyl ester of phosporothioic acid

1,2-Diethylhydrazine

0,0-Diethyl-S-methylester phosphorodithioic acid

0,0-Diethylphosphoric acid, 0-p-nitrophenyl ester

Diethyl phthalate

0,0-Diethyl-0-(2-pyrazinyl)phosphorothioate

Diethylstilbestrol

Dihydrosafrole

3,4-Dihydroxy-alpha-(methylamino)-methyl benzyl alcohol

Di-isopropylfluorophosphate (DFP)

Dimethoate

3,3'-Dimethoxybenzidine

p-Dimethylaminoazobenzene

7,12-Dimethylbenz[a]anthracene

3,3'-Dimethylbenzidine

Dimethylcarbamoyl chloride

1,1-Dimethylhydrazine

1,2-Dimethylhydrazine

3,3-Dimethyl-1-(methylthio)-2-butanone-0-((methylamino) carbonyl)oxime

Dimethylnitrosoamine

alpha,alpha-Dimethylphenethylamine ?

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TABLE A-IV (continued)

2,4-Dimethylphenol

Dimethyl phthalate

Dimethyl sulfate

Dinitrobenzene, N.O.S.

4,6-Dinitro-o-cresol and salts

2,4-Dinitrophenol

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Di-n-octyl phthalate

1,4-Dioxane

1,2-Diphenylhydrazine

Di-n-propylnitrosamine

Disulfoton

2,4-Dithiobiurat

Endosulfan

Endrin and metabolites

Epichlorohydrin

Ethyl cyanide

Ethylene diamine

Ethylenebisdithiocarbamate (EBDC)

Ethyleneimine

Ethylene oxide

Ethylenethiourea

Ethyl methanesulfonate

Fluoranthene

Fluorine

2-Fluoroacetamide

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TABLE A-IV (continued)

Fluoroacetic acid, sodium salt

Formaldehyde

Glycidylaldehyde

Halomethane, N.O.S.

Heptachlor

Heptachlor epoxide (alpha, beta, and gamma isomers)

Hexachlorobenzene

Hexachlorobutadiene

Hexachlorocyclohexane (all isomers)

Hexachlorocyclopentadiene

Hexachloroethane

1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,endo-dimethanonaphthalene

Hexachlorophene

Hexachloropropene

Hexaethyl tetraphosphate

Hydrazine

Hydrocyanic acid

Hydrogen sulfide

Indeno(1,2,3-c,d)pyrene

Iodomethane

Isocyanic acid, methyl ester

Isosafrole

Kepone

Lasiocarpine

Lead and compounds, N.O.S.

Lead acetate

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TABLE A-IV (continued)

Lead phosphate

Lead subacetate

Maleic anhydride

Malononitrile

Melphalan

Mercury and compounds, N.O.S.

Methapyrilene

Methomyl

2-Methylaziridine

3-Methylcholanthrene

4,4'-Methylene-bis-(2-chloroaniline)

Methyl ethyl ketone (MEK)

Methyl hydrazine

2-Methyllactonitrile

Methyl methacrylate

Methyl methanesulfonate

2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime

N-Methyl-N'-nitro-N-nitrosoguanidine

Methyl parathion

Methylthiouracil

Mustard gas

Naphthalene

1,4-Naphthoquinone

1-Naphthylamine

2-Naphthylamine

1-Naphthyl-2-thiourea

Nickel and compounds, N.O.S.

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TABLE A-IV (continued)

Nickel carbonyl

Nickel cyanide

Nicotine and salts

Nitric oxide

p-Nitroaniline

Nitrobenzene

Nitrogen dioxide

Nitrogen mustard and hydrochloride salt

Nitrogen mustard N-oxide and hydrochloride salt

Nitrogen peroxide

Nitrogen tetroxide

Nitroglycerine

4-Nitrophenol

4-Nitroquinoline-1-oxide

Nitrosamine, N.O.S.

N-Nitrosodi-N-butylamine

N-Nitrosodiethanolamine

N-Nitrosodiethylamine

N-Nitrosodimethylamine

N-Nitrosodiphenylamine

N-Nitrosodi-N-propylamine

N-Nitroso-N-ethylurea

N-Nitrosomethylethylamine

N-Nitroso-N-methylurea

N-Nitroso-N-methylurethane

N-Nitrosomethylvinylamine

N-Nitrosomorpholine

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N-Nitrosonornicotine

N-Nitrosopiperidine

N-Nitrosopyrrolidine

N-Nitrsosarcosine

5-Nitro-o-toluidine

Octamethylpyrophosphoramide

Oleyl alcohol condensed with 2 moles ethylene oxide

Osmium tetroxide

7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid

Parathion

Pentachlorobenzene

Pentachloroethane

Pentachloronitrobenzene (PCNB)

Pentachlorophenol

Phenacetin

Phenol

Phenyl dichloroarsine

Phenylmercury acetate

N-Phenylthiourea

Phosgene

Phosphine

Phosphorothioic acid, O,O-dimethyl ester, O-ester with N,N-dimethyl benzene sulfonamide

Phthalic acid esters, N.O.S.

Phthalic anhydride

Polychlorinated biphenyl, N.O.S.

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TABLE A-IV (continued)

Potassium cyanide

Potassium silver cyanide

Pronamide

1,2-Propanediol

1,3-Propane sultone

Propionitrile

Propylthiouracil

2-Propyn-1-ol

Pryidine

Reserpine

Saccharin

Safrole

Selenious acid

Selenium and compounds, N.O.S.

Selenium sulfide

Selenoureа

Silver and compounds, N.O.S.

Silver cyanide

Sodium cyanide

Streptozotocin

Strontium sulfide

Strychnine and salts

1,2,4,5-Tetrachlorobenzene

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)

Tetrachloroethane, N.O.S.

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TABLE A-IV (continued)

1,1,1,2-Tetrachloroethane

1,1,2,2-Tetrachloroethane

Tetrachloroethene (Tetrachloroethylene)

Tetrachloromethane

2,3,4,6-Tetrachlorophenol

Tetraethyldithiopyrophosphate

Tetraethyl lead

Tetraethylpyrophosphate

Thallium and compounds, N.O.S.

Thallic oxide

Thallium (I) acetate

Thallium (I) carbonate

Thallium (I) chloride

Thallium (I) nitrate

Thallium selenite

Thallium (I) sulfate

Thioacetamide

Thiosemicarbazide

Thiourea

Thiuram

Toluene

Toluene diamine

o-Toluidine hydrochloride

Tolylene diisocyanate

Toxaphene

Tribromomethane

1,2,4-Trichlorobenzene

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TABLE A-IV (continued)

1,1,1-Trichloroethane

1,1,2-Trichloroethane

Trichloroethene (Trichloroethylene)

Trichloromethanethiol

2,4,5-Trichlorophenol

2,4,6-Trichlorophenol

2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)

2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)

Trichloropropane, N.O.S.

1,2,3-Trichloropropane

0,0,0-Triethyl phosphorothioate

Trinitrobenzene

Tris(1-azridinyl)phosphine sulfide

Tris(2,3-dibromopropyl) phosphate

Trypan blue

Uracil mustard

Urethane

Vanadic acid, ammonium salt

Vanadium pentoxide (dust)

Vinyl chloride

Vinylidene chloride

Zinc cyanide

Zinc phosphide

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TABLE A-V

SUMMARY OF DATA AND INFORMATION AVAILABLE FROM SELECTED REFERENCES ON HAZARDOUS SUBSTANCES

Ref. No.	Mammal toxicities[a]	Aquatic toxicities[a] (96-hour LC_{50}'s)	Flammabilities	Corrosivities, Irritation, and Sensitization	Explosivities, and Reactivities	Vapor Pressures	TLV's	Physical Data[b]	Trade Names and Synonyms
1	+	+	-	-	-	-	+	-	+
2	+	-	+	+	-	+	+	+	-
3	+	+	-	-	-	-	-	-	-
4	+	+	-	+	-	-	+	+	-
5	+	-	+	+	+	+	+	+	+
6	+	-	-	+	+	-	-	+	+
7	+	-	-	-	-	-	-	+	+
8	+	-	-	-	-	-	+	-	+
9	-	-	+	+	+	+	+	+	-
10	-	-	+	+	+	-	-	-	-
11	-	-	+	+	+	+	+	+	-
12	-	-	+	+	+	-	+	+	+
13	-	-	+	+	+	-	-	+	+
14	-	-	+	-	+	-	-	-	-
15	-	-	+	-	+	-	+	+	-
16	-	-	+	+	+	-	+	+	-
17	+	+	+	+	+	-	+	+	+
18	-	-	+	-	-	+	+	+	+
19	-	-	-	-	-	+	-	+	-
20	+	+	-	+	-	+	+	+	+
21	+	+	-	-	-	-	-	-	-
22	+	-	+	+	-	+	+	+	-
(and other NIOSH documents)									

[a] Only references which provide specific LD_{50} and LC_{50} data are indicated "+". Other references indicated "-" may provide general toxicological information on substances.

[b] Physical state, boiling point, melting point, molecular weight, solubility, etc.

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TABLE A-VB

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TABLE A-VI

HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES
(TRANSFERRED FROM EPA REGULATIONS Section 261.31)

Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
Generic	F001	The spent halogenated solvents used in degreasing, tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and the chlorinated fluorocarbons; and sludges from the recovery of these solvents in degreasing operations	(T)
	F002	The spent halogenated solvents, tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, o-dichlorobenzene, trichlorofluoromethane and the still bottoms from the recovery of these solvents	(T)
	F003	The spent non-halogenated solvents, xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, n-butyl alcohol, cyclohexanone, and the still bottoms from the recovery of these solvents	(I)
	F004	The spent non-halogenated solvents, cresols and cresylic acid, nitrobenzene, and the still bottoms from the recovery of these solvents	(T)
	F005	The spent non-halogenated solvents, methanol, toluene, methyl ethyl ketone, methyl isobutyl ketone, carbon disulfide, isobutanol, pyridine and the still bottoms from the recovery of these solvents	(I,T)
	F006	Wastewater treatment sludges from electroplating operations	(T)
	F007	Spent plating bath solutions from electroplating operations	(R,T)

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Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	F008	Plating bath sludges from the bottom of plating baths from electroplating operations	(R,T)
	F009	Spent stripping and cleaning bath solutions from electroplating operations	(R,T)
	F010	Quenching bath sludge from oil baths from metal heat treating operations	(R,T)
	F011	Spent solutions from salt bath pot cleaning from metal heat treating operations	(R,T)
	F012	Quenching wastewater treatment sludges from metal heat treating operations	(T)
	F013	Flotation tailings from selective flotation from mineral metals recovery operations	(T)
	F014	Cyanidation wastewater treatment tailing pond sediment from mineral metals recovery operations	(T)
	F015	Spent cyanide bath solutions from mineral metals recovery operations	(R,T)
	F016	Dewatered air pollution control scrubber sludges from coke ovens and blast furnaces	(T)

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TABLE A-VII
HAZARDOUS WASTES FROM SPECIFIC SOURCES
(TRANSFERRED FROM EPA REGULATIONS Section 261.32)

Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
Wood Preservation	K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol	(T)
Inorganic Pigments	K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments	(T)
	K003	Wastewater treatment sludge from the production of molybdate orange pigments	(T)
	K004	Wastewater treatment sludge from the production of zinc yellow pigments	(T)
	K005	Wastewater treatment sludge from the production of chrome green pigments	(T)
	K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated)	(T)
	K007	Wastewater treatment sludge from the production of iron blue pigments	(T)
	K008	Oven residue from the production of chrome oxide green pigments	(T)
Organic Chemicals	K009	Distillation bottoms from the production of acetaldehyde from ethylene	(T)
	K010	Distillation side cuts from the production of acetaldehyde from ethylene	(T)
	K011	Bottom stream from the wastewater stripper in the production of acrylonitrile	(R,T)
	K012	Still bottoms from the final purification of acrylonitrile in the production of acrylonitrile	(T)

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Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	K013	Bottom stream from the acetronitrile column in the production of acrylonitrile	(R,T)
	K014	Bottoms from the acetronitrile purification column in the production of acrylonitrile	(T)
	K015	Still bottoms from the distillation of benzyl chloride	(T)
	K016	Heavy ends or distillation residues from the production of carbon tetrachloride	(T)
	K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin	(T)
	K018	Heavy ends from fractionation in ethyl chloride production	(T)
	K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production	(T)
	K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production	(T)
	K021	Aqueous spent antimony catalyst waste from fluoromethanes production	(T)
	K022	Distillation bottom tars from the production of phenol/acetone from cumene	(T)
	K023	Distillation light ends from the production of phthalic anhydride from naphthalene	(T)
	K024	Distillation bottoms from the production of phthalic anhydride from naphthalene	(T)
	K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene	(T)

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Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	K026	Stripping still tails from the production of methyl ethyl pyridines	(T)
	K027	Centrifuge residue from toluene diisocyanate production	(R,T)
	K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane	(T)
	K029	Waste from the product stream stripper in the production of 1,1,1-trichloroethane	(T)
	K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene	(T)
Pesticides	K031	By-products salts generated in the production of MSMA and cacodylic acid	(T)
	K032	Wastewater treatment sludge from the production of chlordane	(T)
	K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane	(T)
	K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane	(T)
	K035	Wastewater treatment sludges generated in the production of creosote	(T)
	K036	Still bottoms from toluene reclamation distillation in the production of disulfoton	(T)
	K037	Wastewater treatment sludges from the production of of disulfoton	(T)

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Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	K038	Wastewater from the washing and stripping of phorate production	(T)
	K039	Filter cake from the filtration of diethylphosphorodithoric acid in the production of phorate	(T)
	K040	Wastewater treatment sludge from the production of phorate	(T)
	K041	Wastewater treatment sludge from the production of toxaphene	(T)
	K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T	(T)
	K043	2,6-Dichlorophenol waste from the production of 2,4-D	(T)
Explosives	K044	Wastewater treatment sludges from the manufacturing and processing of explosives	(R)
	K045	Spent carbon from the treatment of wastewater containing explosives	(R)
	K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds	(T)
	K047	Pink/red water from TNT operations	(R)
Petroleum Refining	K048	Dissolved air flotation (DAF) float from the petroleum refining industry	(T)

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Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	K049	Slop oil emulsion solids from the petroleum refining industry	(T)
	K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry	(T)
	K051	API separator sludge from the petroleum refining industry	(T)
	K052	Tank bottoms (leaded) from the petroleum refining industry	(T)
Leather Tanning Finishing	K053	Chrome (blue) trimmings generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/chrome tan/retan/wet finish; retan/wet finish; no beamhouse; through-the-blue; and shearling	(T)
	K054	Chrome (blue) shavings generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chromme tan/retan/wet finish; hair save/chrome tan/retan/wet finish; retan/wet finish; no beamhouse; through-the blue; and shearling	(T)
	K055	Buffing dust generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/ chrome tan/retan/wet finish; retan/wet finish; no beamhouse; and through-the blue	(T)
	K056	Sewer screenings generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/ chrome tan/retan/wet finish; retan/wet finish; no beamhouse; through-the-blue; and shearling	(T)

CCR 00003741O

Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
	K057	Wastewater treatment sludges generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/chrome tan/retan/wet finish; retan/wet finish; no beamhouse; through-the-blue and shearling	(T)
	K058	Wastewater treatment sludges generated by the following subcategories of the leather tanning and finishing industry: hair pulp/chrome tan/retan/wet finish; hair save/chrome tan/retan/wet finish; and through-the-blue	(R,T)
	K059	Wastewater treatment sludges generated by the following subcategory of the leather tanning and finishing industry: hair save/non-chrome tan/retan/wet finish	(R)
Iron and Steel	K060	Ammonia still lime sludge from coking operations	(T)
	K061	Emission control dust/sludge from the electric furnace production of steel	(T)
	K062	Spent pickle liquor from steel finishing operations	(C,T)
	K063	Sludge from lime treatment of spent pickle liquor from steel finishing operations	(T)
Primary Copper	K064	Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production	(T)
Primary Lead	K065	Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities	(T)

CCR 000037411

Industry	EPA Hazardous Waste Number	Hazardous Waste	Hazard Code
Primary Zinc	K066	Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production	(T)
	K067	Electrolytic anode slimes/sludges from primary zinc production	(T)
	K068	Cadmium plant leachate residue (iron oxide) from primary zinc production	(T)
Secondary Lead	K069	Emission control dust/sludge from secondary lead smelting	(T)

CCR 000037412

TABLE A-VIII

ACUTE HAZARDOUS WASTES

The following commercial chemical products or manufacturing chemical intermediates are identified as acute hazardous wastes when they are discarded or intended to be discarded. Included in the Louisiana system also are off-specification material that would otherwise have been merchandized as these materials, containers or inner liners having been in contact with these materials and not suitably cleaned, or residue, contaminated soil, water or debris resulting from a spill of these products.

HAZARDOUS WASTE NUMBER	SUBSTANCE†
	1080 see P058
	1081 see P057
	(Acetato)phenylmercury see P092
	Acetone cyanohydrin see P069
P001	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts
P002	1-Acetyl-2-thiourea
P003	Acrolein
	Agarin see P007
	Agrosan GN 5 see P092
	Aldicarb see P069
	Aldifen see P048
P004	Aldrin
	Algimycin see P092
P005	Allyl alcohol
P006	Aluminum phosphide (R)
	ALVIT see P037

† The Agency included those trade names of which it was aware; an omission of a trade name does not imply that the omitted material is not hazardous. The material is hazardous if it is listed under its generic name.

CCR 000037413

TABLE A-VIII (Continued)

	Aminoethylene see P054
P007	5-(Aminomethyl)-3-isoxazolol
P008	4-Aminopyridine
	Ammonium metavanadate see P119
P009	Ammonium picrate (R)
	ANTIMUCIN WDR see P092
	ANTURAT see P073
	AQUATHOL see P088
	ARETIT see P020
P010	Arsenic acid
P011	Arsenic pentoxide
P012	Arsenic trioxide
	Athrombin see P001
	AVITROL see P008
	Aziridene see P054
	AZOFOS see P061
	Azophos see P061
	BANTU see P072
P013	Barium cyanide
	BASENITE see P020
	BCME see P016
P014	Benzenethiol
	Benzoepin see P050
P015	Beryllium dust
P016	Bis(chloromethyl) ether
	BLADAN-M see P071
P017	Bromoacetone
P018	Brucine

CCR 000037414

TABLE A-VIII (Continued)

P019	2-Butanone peroxide
	BUFEN see P092
	Butaphene see P020
P020	2-sec-Butyl-4,6-dinitrophenol
P021	Calcium cyanide
	CALDON see P020
P022	Carbon disulfide
	CERESAN see P092
	CERESAN UNIVERSAL see P092
	CHEMOX GENERAL see P020
	CHEMOX P.E. see P020
	CHEM-TOL see P090
P023	Chloroacetaldehyde
P024	p-Chloroaniline
P025	1-(p-Chlorobenzoyl)-5-methoxy-2-methylindole3-acetic acid
P026	1-(o-Chlorophenyl)thiourea
P027	3-Chloropropionitrile
P028	alpha-Chlorotoluene
P029	Copper cyanide
	CRETOX see P108
	Coumadin see P001
	Coumafen see P001
P030	Cyanides
P031	Cyanogen
P032	Cyanogen bromide
P033	Cyanogen chloride
	Cyclodan see P050

CCR 000037415

TABLE A-VIII (Continued)

P034	2-Cyclohexyl-4,6-dinitrophenol
	D-CON see U001
	DETHMOR see P001
	DETHNEL see P001
	DFP see P043
P035	2,4-Dichlorophenoxyacetic acid (2,4-D)
P036	Dichlorophenylarsine
	Dicyanogen see P031
P037	Dieldrin
	DIELDREX see P037
P038	Diethylarsine
P039	0,0-Diethyl-S-(2-(ethylthio)ethyl)ester of phosphorothioic acid
P040	0,0-Diethyl-0-(2-pyrazinyl)phosphorothioate
P041	0,0-Diethyl phosphoric acid, 0-p-nitrophenyl ester
P042	3,4-Dihydroxy-alpha-(methylamino)-methyl benzyl alcohol
P043	Di-iso-propylfluorophosphate
	DIMETATE see P044
	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a 5,8,8a-hexahydro endo,endo see P060
P044	Dimethoate
P045	3,3-Dimethyl-1-(methylthio)-2-butanone-O-[(methylamino)carbonyl] oxime
P046	alpha,alpha-Dimethylphenethylamine
	Dinitrocyclohexylphenol see P034
P047	4,6-Dinitro-o-cresol and salts
P048	2,4-Dinitrophenol
	DINOSEB see P020

CCR 000037416

TABLE A-VIII (Continued)

	DINOSEBE see P020
	Disulfoton see P039
P049	2,4-Dithiobiuret
	DNBP see P020
	DOLCO MOUSE CEREAL see P108
	DOW GENERAL see P020
	DOW GENERAL WEED KILLER see P020
	DOW SELECTIVE WEED KILLER see P020
	DOWICIDE G see P090
	DYANACIDE see P092
	EASTERN STATES DUOCIDE see P001
	ELGETOL see P020
P050	Endosulfan
P051	Endrin
	Epinephrine see P042
P052	Ethylcyanide
P053	Ethylenediamine
P054	Ethyleneimine
	FASCO FASCRAT POWDER see P001
	FEMMA see P091
P055	Ferric cyanide
P056	Fluorine
P057	2-Fluoroacetamide
P058	Fluoroacetic acid, sodium salt
	FOLODOL-80 see P071
	FOLODOL M see P071
	FOSFERNO M 50 see P071

CCR 000037417

TABLE A-VIII (Continued)

FRATOL see P058

Fulminate of mercury see P065

FUNGITOX OR see P092

FUSSOF see P057

GALLOTOX see P092

GEARPHOS see P071

GERUTOX see P020

P059 Heptachlor

P060 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,endo-dimethanonaphthalene

1,4,5,6,7,7-Hexachloro-cyclic-5-norbornene-2,3-dimethanol sulfite see P050

P061 Hexachloropropene

P062 Hexaethyl tetraphosphate

HOSTAQUICK see P092

HOSTAQUIK see P092

Hydrazomethane see P068

P063 Hydrocyanic acid

ILLOXOL see P037

INDOCI® see P025

Indomethacin see P025

INSECTOPHENE see P050

Isodrin see P060

P064 Isocyanic acid, methyl ester

KILOSEB see P020

KOP-THIODAN see P050

KWIK-KIL see P108

KWIKSAN see P092

KUMADER see P001

CCR 000037418

TABLE A-VIII (Continued)

	KYPFARIN see P001
	LEYTOSAN see P092
	LIQUIPHENE see P092
	MALIK see P050
	MAREVAN see P001
	MAR-FRIN see P001
	MARTIN'D MAR-FRIN see P001
	MAVERAN see P001
	MEGATOX see P005
P065	Mercury fulminate
	MERSOLITE see P092
	METACID 50 see P071
	METAFOS see P071
	METAPHOR see P071
	METAPHOS see P071
	METASOL 30 see P092
P066	Methomyl
P067	2-Methylaziridine
	METHYL-E 605 see P071
P068	Methyl hydrazine
	Methyl isocyanate see P064
P069	2-Methyllactonitrile
P070	2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime
	METHYL MIRON see P042
P071	Methyl parathion
	METRON see P071
	MOLE DEATH see P108

CCR 000037419

TABLE A-VIII (Continued)

	MOUSE-NOTS see P108
	MOUSE-RID see P108
	MOUSE-TOX see P108
	MUSCIMOL see P007
P072	1-Naphthyl-2-thiourea
P073	Nickel carbonyl
P074	Nickel cyanide
P075	Nicotine and salts
P076	Nitric oxide
P077	p-Nitroaniline
P078	Nitrogen dioxide
P079	Nitrogen peroxide
P080	Nitrogen tetroxide
P081	Nitroglycerine (R)
P082	N-Nitrosodimethylamine
P083	N-Nitrosodiphenylamine
P084	N-Nitrosomethylvinylamine
	NYLMERATE see P092
	OCTALOX see P037
P085	Octamethylpyrophosphoramide
	OCTAN see P092
P086	Oleyl alcohol condensed with 2 moles ethylene oxide
	OMPA see P085
	OMPACIDE see P085
	OMPAX see P085
P087	Osmium tetroxide
P088	7-Oxabicyclo[2.2.1]heptane-2, 3-dicarboxylic acid

CCR 000037420

TABLE A-VIII (Continued)

	PANIVARFIN see P001
	PANORAM D-31 see P037
	PANTHERINE see P007
	PANWARFIN see P001
P089	Parathion
	PCP see P090
	PENNCAP-M see P071
	PENOXYL CARBON N see P048
P090	Pentachlorophenol
	Pentachlorophenate see P090
	PENTA-KILL see P090
	PENTASOL see P090
	PENWAR see P090
	PERMICIDE see P090
	PERMAGUARD see P090
	PERMATOX see P090
	PERMITE see P090
	PERTOX see P090
	PESTOX III see P085
	PHENMAD see P092
	PHENOTAN see P020
P091	Phenyl dichloroarsine
	Phenyl mercaptan see P014
P092	Phenylmercury acetate
P093	N-Phenylthiourea
	PHILIPS 1861 see P008
	PHIX see P092
P094	Phorate

CCR 000037421

TABLE A-VIII (Continued)

P095	Phosgene
P096	Phosphine
P097	Phosphorothioic acid, O,O-dimethyl ester, O-ester with N,N-dimethyl benzene sulfonamide
	Phosphorothioic acid O,O-dimethyl-O-(p-nitrophenyl) ester see P071
	PIED PIPER MOUSE SEED see P108
P098	Potassium cyanide
P099	Potassium silver cyanide
	PREMERGE see P020
P100	1,2-Propanediol
	Propargyl alcohol see P102
P101	Propionitrile
P102	2-Propyn-1-ol
	PROTHROMADIN See P001
	QUICKSAM see P092
	QUINTOX see P037
	RAT AND MICE BAIT see P001
	RAT-A-WAY see P001
	RAT-B-GON see P001
	RAT-O-CIDE #2 see P001
	RAT-GUARD see P001
	RAT-KILL see P001
	RAT-MIX see P001
	RATS-NO-MORE see P001
	RAT-OLA see P001
	RATOREX see P001
	RATTUNAL see P001

CCR 000037422

TABLE A-VIII (Continued)

	RAT-TROL see P001
	RO-DETH see P001
	RO-DEX see P108
	ROSEX see P001
	ROUGH & READY MOUSE MIX see P001
	SANASEED see P108
	SANTOBRITE see P090
	SANTOPHEN see P090
	SANTOPHEN 20 see P090
	SCHRADAN see P085
P103	Selenourea
P104	Silver cyanide
	SMITE see P105
	SPARIC see P020
	SPOR-KIL see P092
	SPRAY-TROL BRAND RODEN-TROL see P001
	SPURGE see P020
P105	Sodium azide
	Sodium coumadin see P001
P106	Sodium cyanide
	Sodium fluoroacetate see P056
	SODIUM WARFARIN see P001
	SOLFARIN see P001
	SOLFOBLACK BB see P048
	SOLFOBLACK SB see P048
P107	Strontium sulfide
P108	Strychnine and salts
	SUBTEX see P020

CCR 000037423

TABLE A-VIII (Continued)

	SYSTAM see P085
	TAG FUNGICIDE see P092
	TEKWAISA see P071
	TEMIC see P070
	TEMIK see P070
	TERM-I-TROL see P090
P109	Tetraethyldithiopyrophosphate
P110	Tetraethyl lead
P111	Tetraethylpyrophosphate
P112	Tetranitromethane
	Tetraphosphoric acid, hexaethyl ester see P062
	TETROSULFUR BLACK PB see P048
	TETROSULPHUR PBR see P048
P113	Thallic oxide
	Thalluim peroxide see P113
P114	Thallium selenite
P115	Thallium (I) sulfate
	THIFOR see P092
	THIMUL see P092
	THIODAN see P050
	THIOFOR see P050
	THIOMUL see P050
	THIONEX see P050
	THIOPHENIT see P071
P116	Thiosemicarbazide
	Thiosulfan tional see P050
P117	Thiuram

CCR 000037424

TABLE A-VIII (Continued)

	THOMPSON'S WOOD FIX see P090
	TIOVEL see P050
P118	Trichloromethanethiol
	TWIN LIGHT RAT AWAY see P001
	USAF RH-8 see P069
	USAF EK-4890 see P002
P119	Vanadic acid, ammonium salt
P120	Vanadium pentoxide
	VOFATOX see P071
	WANADU see P120
	WARCOUMIN see P001
	WARFARIN SODIUM see P001
	WARFICIDE see P001
	WOFOTOX see P072
	YANOCK see P057
	YASOKNOCK see P058
	ZIARNIK see P092
P121	Zinc cyanide
P122	Zinc phosphide (R,T)
	ZOOCOUMARIN see P001

CCR 000037425

TABLE A-IX

TOXIC WASTES

The commercial chemical products or manufacturing chemical intermediates are identified as toxic wastes when they are discarded or intended to be discarded. Included in the Louisiana system also are off-specification material that would otherwise have been merchandized as these materials, containers of inner liners having been in contact with these materials and not suitably cleaned, or residue, contaminated soil, water or debris resulting from a spill of these products. Their particularly toxic nature will impact considerations of the treatment of even small quantities.

HAZARDOUS WASTE NUMBER	SUBSTANCE†
	AAF see U005
U001	Acetaldehyde
U002	Acetone (I)
U003	Acetonitrile (I,T)
U004	Acetophenone
U005	2-Acetylaminoflourene
U006	Acetyl chloride (C,T)
U007	Acrylamide
	Acetylene tetrachloride see U209
	Acetylene trichloride see U228
U008	Acrylic acid (I)
U009	Acrylonitrile
	AEROTHENE TT see U226
	3-Amino-5-(p-acetamidophenyl)-1H-1,2,4-triazole, hydrate see U011
U010	6-Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)8-methoxy-5-methylcarbamate azirino(2',3':3,4) pyrrolo(1,2-a)indole-4, 7-dione (ester)

† The Agency included those trade names of which it was aware; an omission of a trade name does not imply that it is not hazardous. The material is hazardous if it is listed under its generic name.

CCR 000037426

TABLE A-IX (Continued)

U011	Amitrole
U012	Aniline (I)
U013	Asbestos
U014	Auramine
U015	Azaserine
U016	Benz[c]acridine
U017	Benzal chloride
U018	Benz[a]anthracene
U019	Benzene
U020	Benzenesulfonyl chloride (C,R)
U021	Benzidine
	1,2-Benzisothiazolin-3-one, 1,1-dioxide see U202
	Benzo[a]anthracene see U018
U022	Benzo[a]pyrene
U023	Benzotrichloride (C,R,T)
U024	Bis(2-chloroethoxy)methane
U025	Bis(2-chloroethyl) ether
U026	N,N-Bis(2-chloroethyl)-2-naphthylamine
U027	Bis(2-chloroisopropyl) ether
U028	Bis(2-ethylhexyl) phthalate
U029	Bromomethane
U030	4-Bromophenyl phenyl ether
U031	n-Butyl alcohol (I)
U032	Calcium chromate
	Carbolic acid see U188
	Carbon tetrachloride see U211
U033	Carbonyl fluoride

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TABLE A-IX (Continued)

U034	Chloral
U035	Chlorambucil
U036	Chlordane
U037	Chlorobenzene
U038	Chlorobenzilate
U039	p-Chloro-m-cresol
U040	Chlorodibromomethane
U041	1-Chloro-2,3-epoxypropane
	CHLOROETHENE NU see U226
U042	Chloroethyl vinyl ether
U043	Chloroethene
U044	Chloroform (I,T)
U045	Chloromethane (I,T)
U046	Chloromethyl methyl ether
U047	2-Chloronaphthalene
U048	2-Chlorophenol
U049	4-Chloro-o-toluidine hydrochloride
U030	Chrysene
	C.I. 23060 see U073
U051	Cresote
U052	Cresols
U053	Crotonaldehyde
U054	Cresylic acid
U055	Cumene
	Cyanomethane see U003
U056	Cyclohexane (I)
U057	Cyclohexanone (I)
U058	Cyclophosphamide

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TABLE A-IX (Continued)

U059	Daunomycin
U060	DDD
U061	DDT
U062	Diallate
U063	Dibenz[a,h]anthracene
	Dibenzo[a,h]anthracene see U063
U064	Dibenzo[a,i]pyrene
U065	Dibromochloromethane
U066	1,2-Dibromo-3-chloropropane
U067	1,2-Dibromoethane
U068	Dibromomethane
U069	Di-n-butyl phthalate
U070	1,2-Dichlorobenzene
U071	1,3-Dichlorobenzene
U072	1,4-Dichlorobenzene
U073	3,3'-Dichlorobenzidine
U074	1,4-Dichloro-2-butene
	3,3'-Dichloro-4,4'-diaminobiphenyl see U073
U075	Dichlorodifluoromethane
U076	1,1-Dichloroethane
U077	1,2-Dichloroethane
U078	1,1-Dichloroethylene
U079	1,2-trans-Dichloroethylene
U080	Dichloromethane
	Dichloromethylbenzene see U017
U081	2,4-Dichlorophenol
U082	2,6-Dichlorophenol

CCR 000037429

TABLE A-IX (Continued)

U083	1,2-Dichloropropane
U084	1,3-Dichloropropene
U085	Diepoxybutane (I,T)
U086	1,2-Diethylhydrazine
U087	O,O-Diethyl-S-methyl ester of phosphorodithioic acid
U088	Diethyl phthalate
U089	Diethylstilbestrol
U090	Dihydrosafrole
U091	3,3'-Dimethoxybenzidine
U092	Dimethylamine (I)
U093	p-Dimethylaminoazobenzene
U094	7,12-Dimethylbenz[a]anthracene
U095	3,3'-Dimethylbenzidine
U096	alpha,alpha-Dimethylbenzylhydroperoxide (R)
U097	Dimethylcarbamoyl chloride
U098	1,1-Dimethylhydrazine
U099	1,2-Dimethylhydrazine
U100	Dimethylnitrosoamine
U101	2,4-Dimethylphenol
U102	Dimethyl phthalate
U103	Dimethyl sulfate
U104	2,4-Dinitrophenol
U105	2,4-Dinitrotoluene
U106	2,6-Dinitrotoluene
U107	Di-n-octyl phthalate
U108	1,4-Dioxane
U109	1,2-Diphenylhydrazine

CCR 000037430

TABLE A-IX (Continued)

U110	Dipropylamine (I)
U111	Di-n-propylnitrosamine
	EBDC see U114
	1,4-Epoxybutane see U213
U112	Ethyl acetate (I)
U113	Ethyl acrylate (I)
U114	Ethylenebisdithiocarbamate
U115	Ethylene oxide (I,T)
U116	Ethylene thiourea
U117	Ethyl ether (I,T)
U118	Ethylmethacrylate
U119	Ethyl methanesulfonate
	Ethylnitrile see U003
	Firemaster T23P see U235
U120	Fluoranthene
U121	Fluorotrichloromethane
U122	Formaldehyde
U123	Formic acid (C,T)
U124	Furan (I)
U125	Furfural (I)
U126	Glycidylaldehyde
U127	Hexachlorobenzene
U128	Hexachlorobutadiene
U129	Hexachlorocyclohexane
U130	Hexachlorocyclopentadiene
U131	Hexachloroethane
U132	Hexachlorophene
U133	Hydrazine (R,T)

CCR 000037431

TABLE A-IX (Continued)

U134	Hydrofluoric acid (C,T)
U135	Hydrogen sulfide
	Hydroxybenzene see U188
U136	Hydroxydimethyl arsine oxide
	4,4'-(Imidocarbonyl)bis(N,N-dimethyl)aniline see U014
U137	Indeno(1,2,3-cd)pyrene
U138	Iodomethane
U139	Iron Dextran
U140	Isobutyl alcohol
U141	Isosafrole
U142	Kepone
U143	Lasiocarpine
U144	Lead acetate
U145	Lead phosphate
U146	Lead subacetate
U147	Maleic anhydride
U148	Maleic hydrazide
U149	Malononitrile
	MEK Peroxide see U160
U150	Melphalan
U151	Mercury
U152	Methacrylonitrile
U153	Methanethiol
U154	Methanol
U155	Methapyrilene
	Methyl alcohol see U154
U156	Methyl chlorocarbonate

CCR 000037432

TABLE A-IX (Continued)

	Methyl chloroform see U226
U157	3-Methylcholanthrene
	Methyl chloroformate see U156
U158	4,4'- Methylene-bis-(2-chloroaniline)
U159	Methyl ethyl ketone (MEK) (I,T)
U160	Methyl ethyl ketone peroxide (R)
	Methyl iodide see U138
U161	Methyl isobutyl ketone
U162	Methyl methacrylate (R,T)
U163	N-Methyl-N'-nitro-N-nitrosoguanidine
U164	Methylthiouracil
	Mitomycin C see U010
U165	Naphthalene
U166	1,4-Naphthoquinone
U167	1-Naphthylamine
U168	2-Naphthylamine
U169	Nitrobenzene (I,T)
	Nitrobenzol see U169
U170	4-Nitrophenol
U171	2-Nitropropane (I)
U172	N-Nitrosodi-n-butylamine
U173	N-Nitrosodiethanolamine
U174	N-Nitrosodiethylamine
U175	N-Nitrosodi-n-propylamine
U176	N-Nitroso-n-ethylurea
U177	N-Nitroso-n-methylurea
U178	N-Nitroso-n-methylurethane

CCR 000037433

TABLE A-IX (Continued)

U179	N-Nitrosopiperidine
U180	N-Nitrosopyrrolidine
U181	5-Nitro-o-toluidine
U182	Paraldehyde
	PCNB see U185
U183	Pentachlorobenzene
U184	Pentachloroethane
U185	Pentachloronitrobenzene
U186	1,3-Pentadiene (I)
	Perc see U210
	Perchlorethylene see U210
U187	Phenacetin
U188	Phenol
U189	Phosphorous sulfide (R)
U190	Phthalic anhydride
U191	2-Picoline
U192	Pronamide
U193	1,3-Propane sultone
U194	n-Propylamine (I)
U196	Pyridine
U197	Quinones
U200	Reserpine
U201	Resorcinol
U202	Saccharin
U203	Safrole
U204	Selenious acid
U205	Selenium sulfide (R,T)
	Silvex see U233

CCR 000037434

TABLE A-IX (Continued)

U206	Streptozotocin
	2,4,5-T see U232
U207	1,2,4,5-Tetrachlorobenzene
U208	1,1,1,2-Tetrachloroethane
U209	1,1,2,2-Tetrachloroethane
U210	Tetrachloroethene
	Tetrachloroethylene see U210
U211	Tetrachloromethane
U212	2,3,4,6-Tetrachlorophenol
U213	Tetrahydrofuran (I)
U214	Thallium (I) acetate
U215	Thallium (I) carbonate
U216	Thallium (I) chloride
U217	Thallium (I) nitrate
U218	Thioacetamide
U219	Thiourea
U220	Toluene
U221	Toluenediamine
U222	o-Toluidine hydrochloride
U223	Tolylene diisocyanate
U224	Toxaphene
	2,4,5-TP see U233
U225	Tribromomethane
U226	1,1,1-Trichloroethane
U227	1,1,2-Trichloroethane
U228	Trichloroethene
	Trichloroethylene see U228
U229	Trichlorofluoromethane

CCR 000037435

TABLE A-IX (Continued)

U230	2,4,5-Trichloropheno
U231	2,4,6-Trichlorophenol
U232	2,4,5-Trichlorophenoxyacetic acid
U233	2,4,5-Trichlorophenoxypropionic acid
	alpha, alpha, alpha- Trichlorotoluene see U023
	TRI-CLENE see U228
U234	Trinitrobenzene (R,T)
U235	Tris(2,3-dibromopropyl)phosphate
U236	Trypan blue
U237	Uracil mustard
U238	Urethane
	Vinyl chloride see U043
	Vinylidene chloride see U078
U239	Xylene

CCR 000037436

1.3. SPECIAL TEST PROTOCOLS

1.3.1. Application of Tests: The toxicity threshold criteria defined in Section 1.2. must be applied to the waste's liquid fraction, to leachate derived from the contained solids, and to residual solids from such a leachate procedure. The procedure outlined in the following section or its equivalent is to be used in obtaining the leachate.

1.3.2. Leachate Extraction Procedure: One hundred grams of subject waste (finely ground to less than 40 mesh) are to be agitated with 2 liters of extract wash solution for 24 hours at 25° C in a closed system. The nature of the extract wash solution is to be designated by class as follows with the extract solution subjected to the toxicity and corrosivity determinations prescribed by Section 1.2. A single leachate solution will be satisfactory based on the specified setting for the waste's disposal.

Class A: For Biologically Active Organic Wastes — Test to be performed as prescribed by EPA in the Federal Register (December 18, 1978, page 58957) Appendix I here. Applicable where sanitary landfill disposal is possible.

Class B: For Inorganic Wastes — Test to be performed with one of six leaching solutions prepared with deionized water or 0.5 M NaCl and at pH of 5 (HNO_3), 7, or 9 (NaOH), depending on specified disposal setting.

Class C: For Non-Biologically Active Organic Wastes — Provisional placement is made into Class A pending development of a humate extract procedure. The matrix of Table A-VIII recapitulates this choice of extract solutions.

1.3.3. Bioassay Procedure: Bioassay testing shall follow the aquatic 96-hour TLC_{50} protocol on fathead minnows and/or bluegills for freshwater settings or on Atlantic Croaker (Micropegon undulatis) and/or the Spot (Leiostomus xanthurus) for brackish or marine systems. (Species substitution may be made with the concurrence of Department staff.) The appropriate procedures are as described in "Standard Methods for the Examination of Water and Wastewater, Part 800 (14th Edition). The waste is to be diluted to concentrations described in Standard Methods and the determination made for whether half of the subject fish expire in the 96-hour test period. Generally, a static test will be acceptable unless special properties of the waste necessitate a continuous flow bioassay. For solids, slurries not entirely soluble in water, suspensions or emulsions, the waste should be examined as a waste extract as prescribed in Section 1.3.2.

1.3.4. Data on Oral LD_{50} for Humans: The LD_{50} value for a substance is the amount of the substance in milligrams per kilogram of body weight of the test subj ct which would kill 50% of a population of such subjects.

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For humans, the LD_{50} value can be estimated from the LD_{50} value for oral exposure to rats. Where a value for the rat is not available, mouse oral LD_{50} data may be employed. Where an appropriate LD_{50} value for the rat or mouse is listed in NIOSH (National Institute for Occupational Safety and Health) 1978 Registry of Toxic Effects of Chemical Substances, this value may be used without validation. If other values are used, they must be supported by specific and verified laboratory reports. The appropriate conversion factors to use in estimating human $LD_{50's}$ are 0.16 for the rat and 0.066 for the mouse. Thus human LD_{50} equals 0.16 rat LD_{50} or 0.066 mouse LD_{50}. As an example, tetraethylenepentamine has a listed oral rat LD_{50} of 3990 mg/kg. Thus, the human LD_{50} equals 3990 times 0.16, or 638 mg/kg, which is less than the 800 mg/kg limit.

1.3.5. Albino Rabbit Skin Testing for Corrosivity and Irritability:

A. Corrosivity to Skin

1. Corrosion to the skin is measured by patch-test technique on the intact skin of the albino rabbit, clipped free of hair. A minimum of six subjects are to be used in this test.
2. Introduce under a square cloth patch, such as surgical gauze measuring 1 inch by 1 inch and two single layers thick, 0.5 milliliter (in the case of liquids) or 0.5 gram (in the case of solids and semisolids) of the substance to be tested.
3. Immobilize the animals, with patches secured in place by adhesive tape.
4. Wrap the entire trunk of each animal with an impervious material, such as rubberized cloth, for the 4 hour period of expsoure. This material is to aid in maintaining the test patches in position and retards the evaporation of volatile substances. It is not applied for the purpose of occlusion.
5. After 4 hours of exposure, the patches are to be removed and resulting reactions are to be evaluated for corrosion.
6. Readings are again to be made at least at the end of a total of 48 hours (44 hours after the first reading).
7. Corrosion will be considered to have resulted if the substance in contact with the rabbit skin has caused destruction or irreversible alteration of the tissue. Tissue destruction is considered to have occurred if, at any of the readings, there is ulceration or necrosis.

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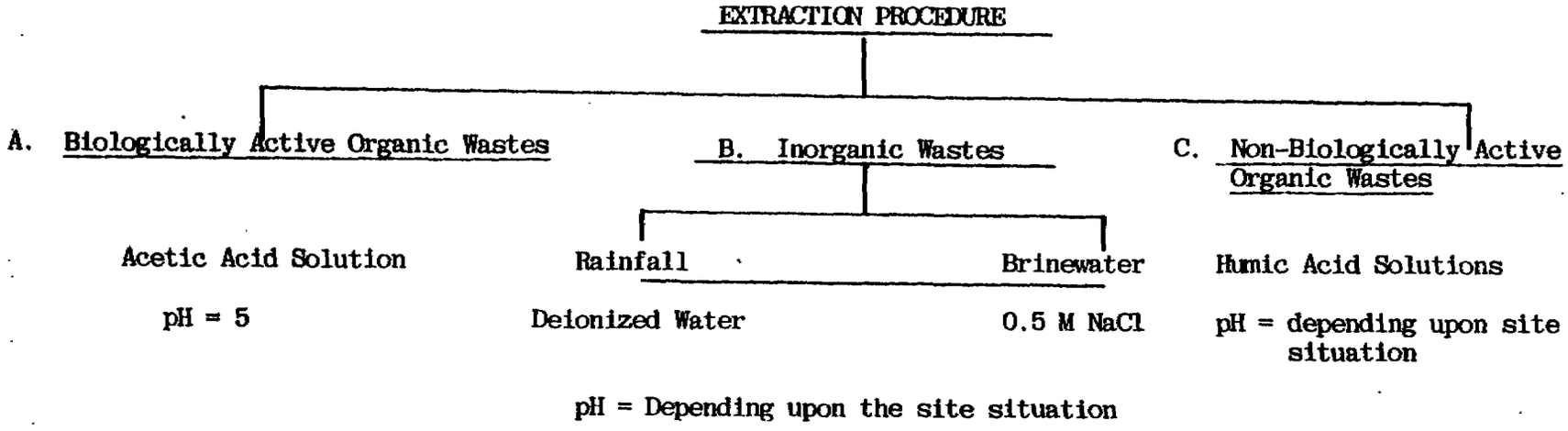
FIGURE A-VIII



CCR 00003743 9

Tissue destruction does not include merely sloughing of the epidermis, or erythema, edema, or fissuring.

B. Irritability to Skin

The irritability testing procedure is taken from Title 16, Chapter II — Consumer Product Safety Commission:

Primary irritation to the skin is measured by a patch-test technique on the abraded and intact skin of the albino rabbit, clipped free of hair. A minimum of six subjects are used in abraded and intact skin tests. Introduce under a square patch, such as surgical gauze measuring 1 inch by 1 inch and two single layers thick, 0.5 milliliter (in the case of liquids) or 0.5 gram (in the case of solids and semisolids) of the test substance. Dissolve solids in an appropriate solvent and apply the solution as for liquids. The animals are immobilized with patches secured in place by adhesive tape. The entire trunk of the animal is then wrapped with an impervious material, such as rubberized cloth, for the 24-hour period of exposure. This material aids in maintaining the test patches in position and retards the evaporation of volatile substances. After 24 hours of exposure, the patches are removed and the resulting reactions are evaluated on the basis of the designated values in the following table:

Skin Reaction	Value [1]
Erythema and eschar formation:	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formations (injuries in depth)	4
Edema formation:	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (raised approximately 1 millimerer)	3
Severe edema (raised more than 1 millimeter and extending beyond the area of exposure)	4

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[1] The "value" recorded for each reading is the average value of the six or more animals subject to the test.

Readings are again made at the end of a total of 72 hours (48 hours after the first reading). An equal number of exposures are made on areas of skin that have been previously abraded. The abrasions are minor incisions through the stratum corneum, but not sufficiently deep to disturb the derma or to produce bleeding. Evaluate the reactions of the abraded skin at 24 hours and 72 hours, as described in this paragraph. Add the values for erythema and eschar formation at 24 hours and at 72 hours for intact skin to the values on abraded skin at 24 hours and at 72 hours (four values). The total of the eight values is divided by four to give the primary irritation score; for example:

Skin reaction	Exposure time (hours)	Evaluation value
Erythema and eschar formation:		
Intact skin	24	2
Do	72	1
Abraded skin	24	3
Do	72	2
Subtotal		8
Edema formation:		
Intact skin	24	0
Do	72	1
Abraded skin	24	1
Do	72	2
Subtotal		4
Total		12

Thus, the primary irritation score is 12÷4=3.

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A.2. MONITORING EXPECTATIONS

1. SCOPE OF ANALYTICAL REQUIREMENTS

Monitoring expectations for each disposal facility will include the following:

A. Baseline establishment

B. Initial comprehensive operational analysis

C. Continuing annual operational analysis

D. Quarterly screening analysis

2.1.1. Establishment of Baseline: In order to establish baseline levels, samples from monitoring wells and leachate collection systems should be analyzed and interpreted on a comprehensive basis prior to treatment, storage, or disposal of any hazardous waste at each new facility. This baseline analysis should include the determinations for parameters designated during the permit review procedure. Comparable sampling and analysis should be conducted for existing facilities prior to award of an unconditional permit and within fifteen months of the effective date of the Louisiana Hazardous Waste Management Plan Rules and Regulations....in order to establish the baseline for these facilities.

Sampling procedures and the leachate and groundwater analyses should be consistent with the guidelines presented in this document.

Baseline levels for groundwater and leachate quality (reflecting seasonal variability as appropriate) should be established through comprehensive analysis on a quarterly basis for a period of at least one year. Less frequent sampling for the baseline should be planned only when there is a firm basis for not anticipating significant seasonal groundwater quality changes.

2.1.2. Comprehensive Operational Analyses: The comprehensive operational analyses should include the identification of the presence and level of the pertinent parameters for waste liquids, extracts, and permitted solids from the following list. A guideline on relevant analyses for the various industry classes is provided in Appendix A:

(a) specific conductivity, mho/cm at 25° C

(b) temperature, C (field and laboratory)

(c) pH

(d) total dissolved solids, mg/liter

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(e) t tal suspended solids, mg/liter

(f) total settleable solids, mg/liter

(g) dissolved organic carbon (DOC), mg/liter

(h) total chlorinated hydrocarbons, mg/liter

(i) phenolic compounds (as phenol), mg/liter

(j) metals:

antimony, mg/liter

arsenic, mg/liter

barium, mg/liter

beryllium, mg/liter

cadmium, mg/liter

chromium, mg/liter

copper, mg/liter

iron, mg/liter

lead, mg/liter

magnesium, mg/liter

manganese, mg/liter

mercury, mg/liter

nickel, mg/liter

selenium, mg/liter

silver, mg/liter

thalium, mg/liter

vanadium, mg/liter

zinc, mg/liter

(k) ammonia (as N), mg/liter

(l) chlorides, mg/liter

(m) cyanide, mg/liter

(n) fluoride, mg/liter

(o) nitrate, mg/liter

(p) phosphate, total mg/liter

(r) ortho-phosphate (as P), mg/liter

(s) organic contaminant scanning (volatile, base neutrals, acid extracts) by Gas Chromatography

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2.1.3. Continuing Annual Operational Analysis: The comprehensive operational analysis will be conducted annually and its scope may be reduced by the Secretary after baseline establishment so as to eliminate any compounds consistently not found in the waste handled at the facility. Sample collection and analysis are to be in accordance with Part B of these guidelines.

2.1.4. Quarterly Screening Analysis: Confirmatory screening analyses (for quarterly reports) will be required to demonstrate that operation is proceeding in a consistent fashion with what has appeared in the comprehensive analysis.

The scope of the quarterly analyses will be agreed upon at permit issuance. As a guide a minimum analysis shall quantify the following parameters:

(a) specific conductivity, mho/cm at 25° C

(b) temperature, C (field and laboratory)

(c) total dissolved solids (TDS), mg/liter

(d) chloride, mg/liter

(e) pH

(f) dissolved organic carbon, mg/liter

(g) total organic carbon (TOC)

(h) two principle metals or other designated parameters (ones found in the largest quantities or which best serve as indicators), as designated by the State, in mg/liter.

2.1.5. Specific report on departures from norm. When monitoring shows that the concentration of a chemical species has increased above baseline levels by a statistically significant amount, i.e., as indicated for example by the Student's single-tailed test at the 95% confidence level (Appendix B), the facility owner/operator must:

(a) notify the Louisiana Department of Natural Resources within 48 hours by telephone and in writing within 7 days,

(b) undertake confirmatory analyses

(c) determine the cause of the increase, e.g., the result of a spill, a design failure, an improper operating procedure, etc. and initiate corrective action,

(d) determine the extent of the groundwater contamination.

2.2. DESCRIPTION OF MONITORING SYSTEMS

Monitoring syst ms prescribed in the Hazardous Waste Management Program include those for = Groundwater, Leachate, Surface Water, Air and Soil. Nominal expectations for each of these follow.

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2.2.1. Groundwater Monitor Wells: Evaluation of pollutant build-up in groundwater, and migration patterns within and beneath the disposal site and in the surrounding area require several strategically located stations with samples concurrently collected and analyzed.

The appropriate number of sampling points will be directed by the expected variability in each parameter and the degree of monitoring accuracy desired. Sampling point distribution and procedures will depend on the geologic, hydrologic, and chemical complexities likely to be encountered. Under ideal conditions, where the underlying earth materials are fairly homogeneous, impermeable, and uniformly sloping in one direction, four sampling points are recommended. Three of these points should be equally spaced on a line through the center of the disposal area (for relatively small areas) and extending from the area of highest water table elevation to the lowest water table elevation on the property (see Figure A-1) with the center well located downgradient positioned immediately adjacent to the active portion of the facility. Larger disposal areas will require additional point/wells for adequate sampling as determined by State staff. The wells should be located to intercept contamination at the earliest possible occurrence. Wells locations and completion depths must be selected to assure that probable contaminant flow paths are monitored.

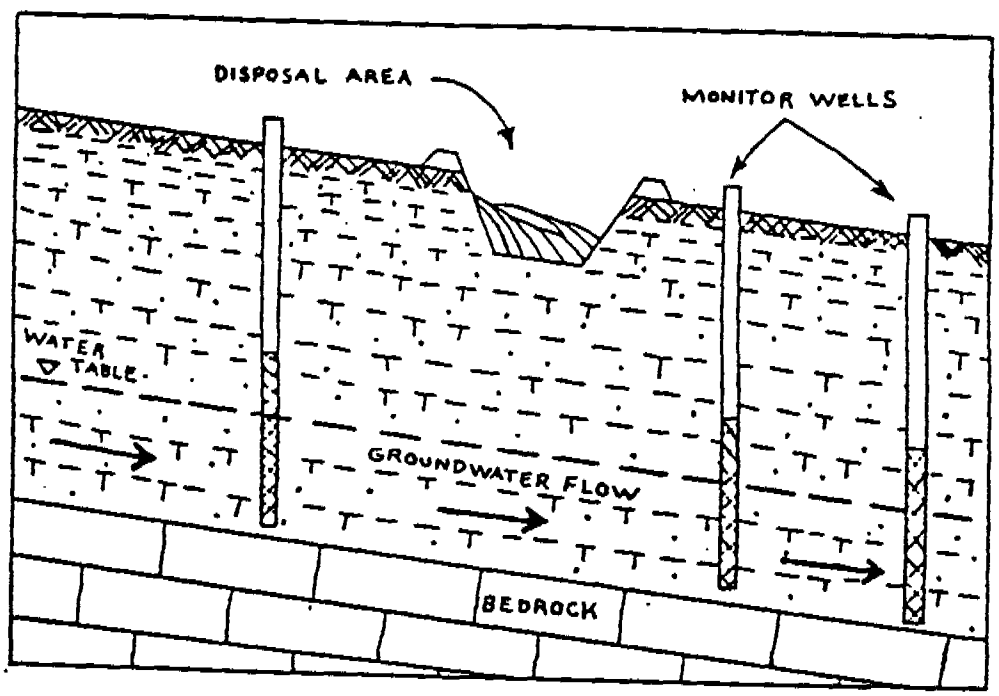

Figure A-1

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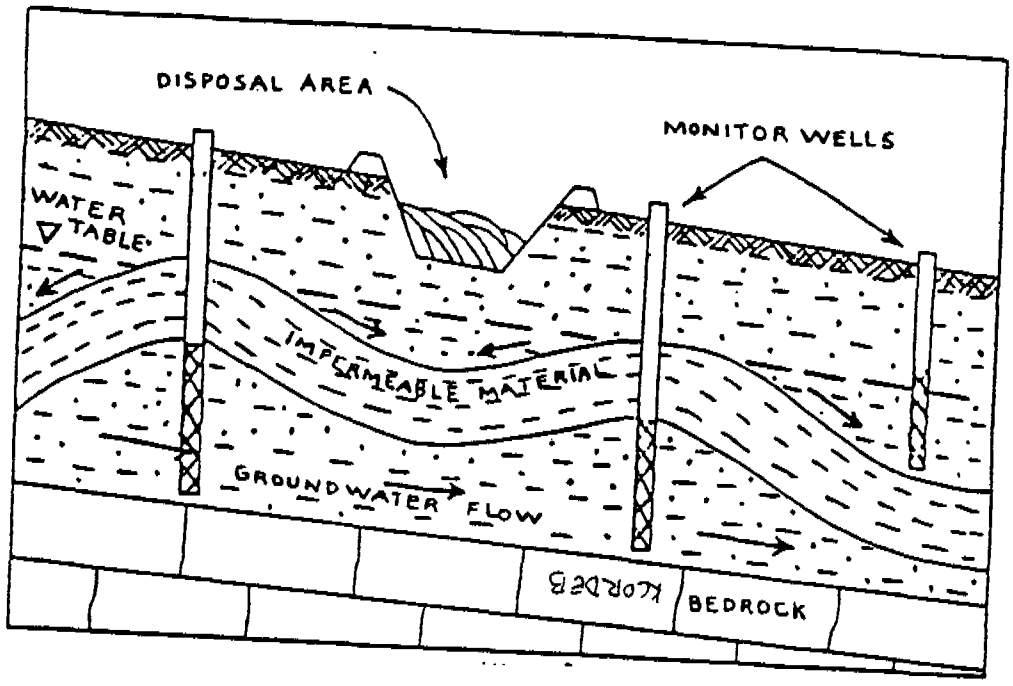

FIGURE A-2

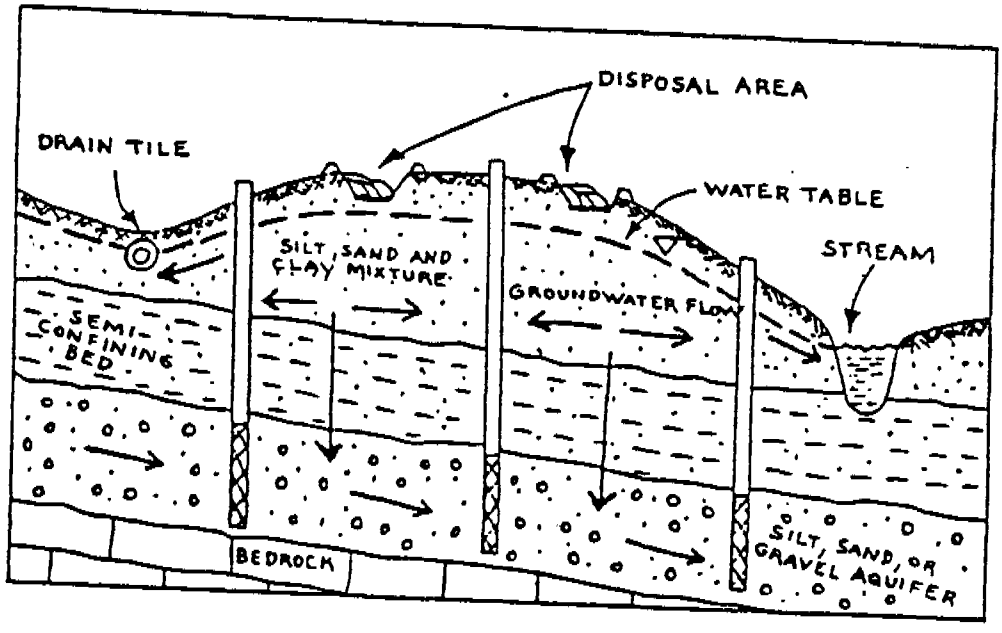

FIGURE A-3

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In many cases earth materials may not be homogenous and flow paths of groundwater through any given profile may be complex. The upper and basal surfaces of intervening strata may be warped in such a manner so as to influence the direction of groundwater flow and resultant vertical migration patterns of leachate movement (see Figure A-2).

In many existing land disposal sites, only the lower, more permeable portions of the unconsolidated earth material above bedrock are tapped by monitoring wells, even though overlying water-bearing zones are known to be present. Under these conditions (see Figure A-3) a major portion of groundwater pollution derived from the disposal sites may flow undetected through these overlying beds to some nearby natural or man-made drainage course.

A similar situation can occur in areas underlain by only one primary water-bearing zone if too few monitoring wells are installed, or if wells installed tap only the uppermost part of the zone of saturation. In situations where more than one water-carrying stratum is present in the earth material section, each individual water-bearing unit should be monitored by properly spaced, 3-station lines (see Figure A-4). Wells may be constructed to draw samples from a single depth only if it can be demonstrated that it is the depth where contamination is likely to occur.

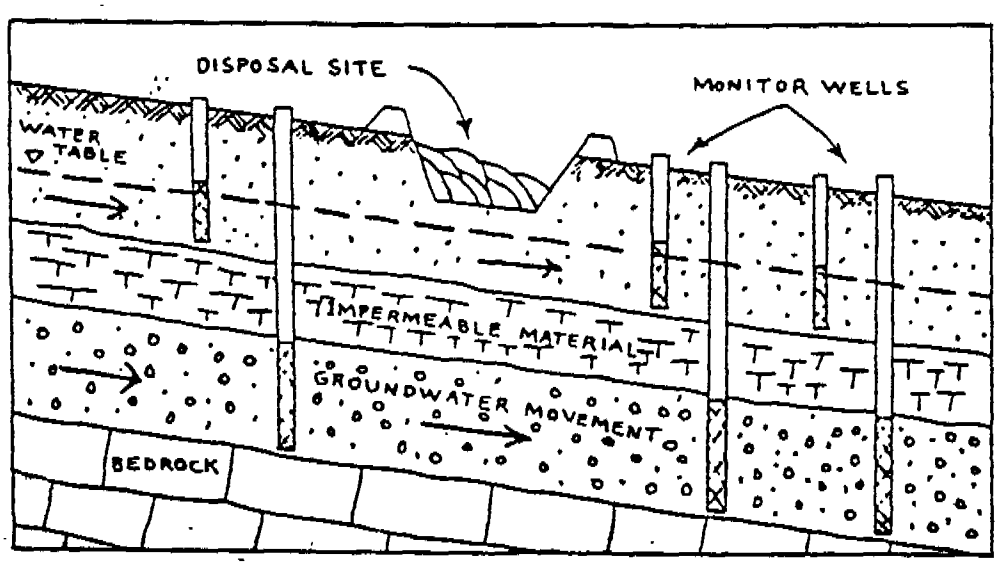

Figure A-4

CCR 000037447

All monitor wells should be cased and the annular space between the "monitor zone" (zone of saturation) and the surface should be completely backfilled or plugged with impermeable material in order to prevent percolation of surface water into the well bore and to prevent inter-aquifer water exchange. Well opening at the surface should have a removeable cap to provide access and to prevent entrance of rainfall or stormwater run-off. Well casing should be of sufficient diameter so as to permit use of a submersible pump for obtaining samples for analysis, if desirable, but portable pumps may also be used to obtain samples. When practical, the well should be pumped to remove the volume of liquid initially contained in the well prior to obtaining a sample for analysis. See Figure A-5 for the typical monitor well detail.

2.2.2. Leachate Collection Monitoring Systems: A leachate collection monitoring system should be installed beneath any pit, pond, or other facility receiving hazardous waste which employs an earthen or artificial liner as an impervious barrier. Acceptable leachate collection monitoring/collection systems include, but are not limited to the following basic designs:

1. "Simple Leachate Collection" - This system consists of a gravity flow drainfield installed under the waste disposal facility liner. This design is recommended for use under the following circumstances:
   a. when liquid, semi-solid, or leachable solid wastes are placed in a lined pit excavated into a relatively thick, unsaturated, homogenous layer of low permeability soil; and
   b. when a minimum of ten feet of relatively impermeable soil separates the bottom of the disposal facility from the groundwater table at its highest seasonal fluctuation (see Figure A-6).
2. "Compound Leachate Collection" - This system consists of a gravity flow drainfield installed under the waste disposal facility liner and above a secondary installed liner. This design is recommended for use under the following circumstances:
   a. when liquid, semi-liquid, or leachable solid wastes are placed in a lined pit excavated into relatively permeable soils; and
   b. when less than ten feet of relatively impermeable soil separates the bottom of the disposal facility from the groundwater table at its highest seasonal fluctuation (see Figure A-7).

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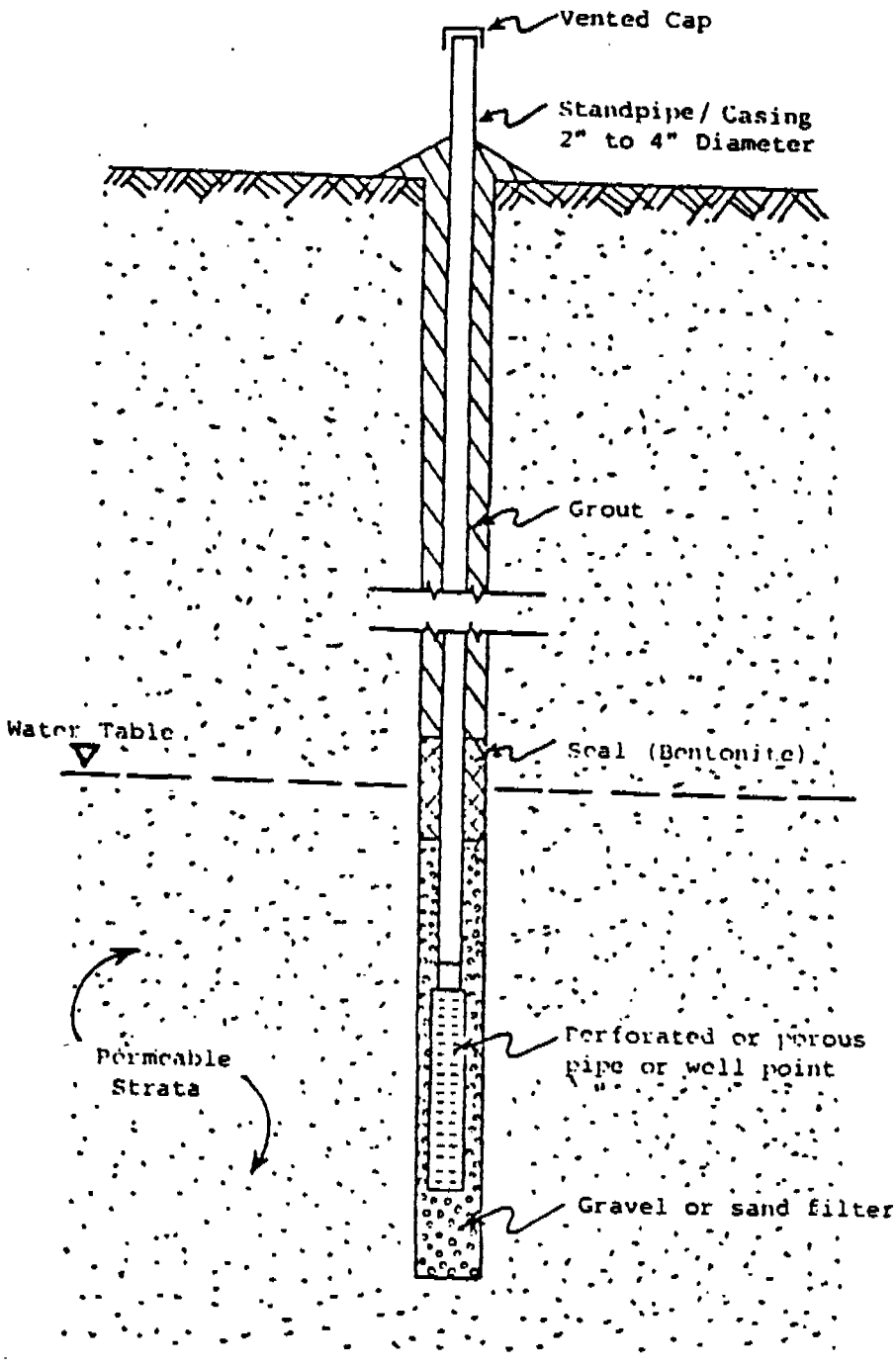

Figure A-5 - MONITOR WELL (Not to scale)

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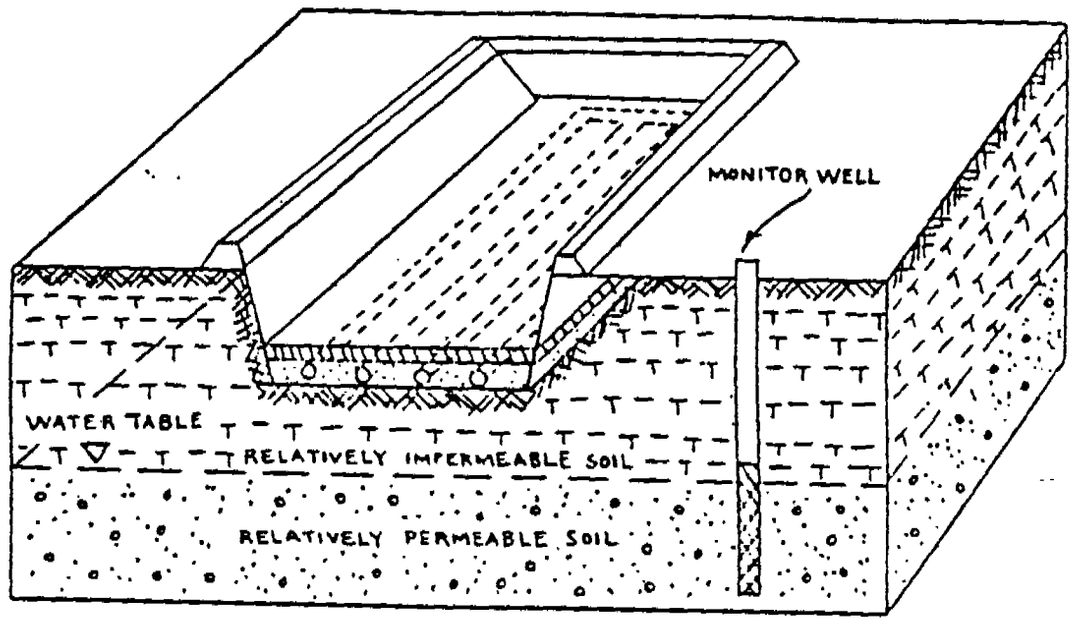

Figure A-6

3. "Suction Manometers" - This system consists of a network of porous "stones" connected by hoses/tubing to a vacuum pump. The porous "stones" or suction manometers are normally installed along the sides and under the bottom of the waste disposal facility liner. This type of system can be used in a variety of situations but works best when installed in relatively permeable unsaturated soil immediately adjacent to the disposal facility's bottom and/or sides. The suction manometer system functions primarily as a leak detection device and is generally superior to monitor wells for early detection of leachates escaping from a disposal facility. One drawback to this type of system is that it is somewhat limited with respect to the volume of leachate that could actually be collected for treatment or return to the disposal facility in the event of a leak of significant volume.

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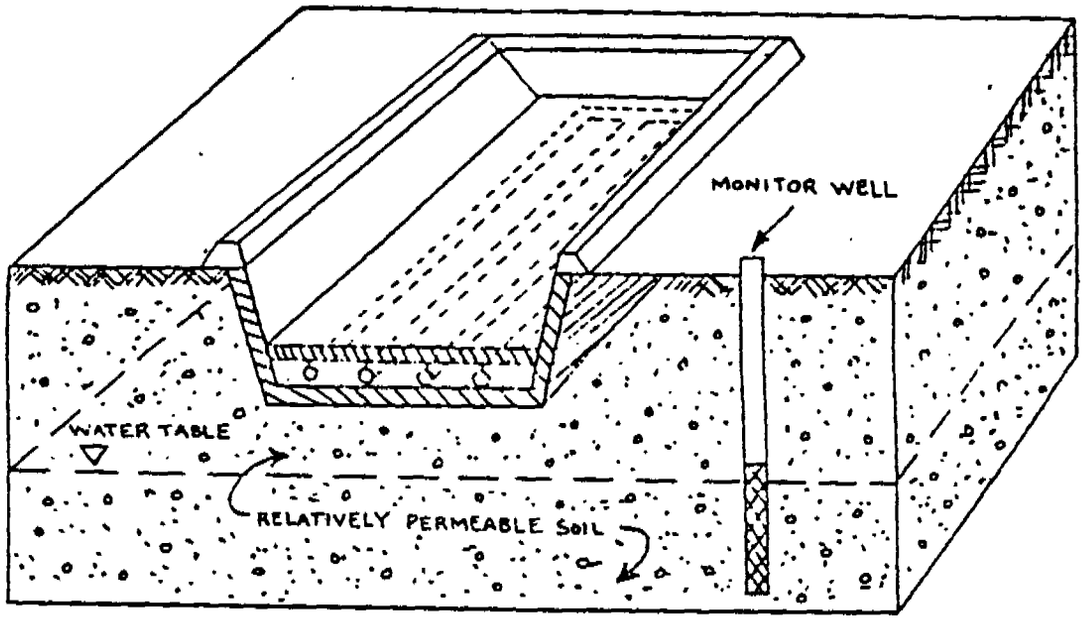

Figure A-7

Sampling should be effected at the low point in each system described above and all systems should be designed to ensure that leachate from all contents will percolate to the low point. Provision for pumping out collected leachate must be made. Leachate collection systems should be monitored for quantity and quality of leachate produced on a routine basis as defined in the following section. The leachate should be either treated to acceptable quality for discharge in accordance with effluent discharge permit limitations disposed of by another method, or recycled to the facility producing the leachate.

A leachate monitoring is not needed if the facility owner/operator can demonstrate that an alternative monitoring technique will detect leaks as effectively as a leachate monitoring system. It is recommended, however, that where geologic and hydrologic conditions warrant it, disposal sites accepting "hazardous wastes" employ both groundwater monitor wells and leachate collection systems in order to minimize the chance of pollutants as rapidly as possible in the event that they are leached from the disposal facility. Under no circumstances should a monitoring/leachate collection system be used in lieu of a proper lining where it has been established that a lining is necessary to protect the ground and surface waters in the vicinity of the disposal site.

2.2.3. Surface Water Monitoring: Surface water monitoring is required as a routing component of a total monitoring network. The proximity of a disposal site to surface water and drainage patterns will determine the degree of surface water monitoring necessary.

CCR 000037451

Selection f surfa e water sampling stations, equipment, and procedures should follow a methodical approach similar to that described for groundwater monitoring. Each surface water monitoring item should be evaluated in terms of compatibility or possible contamination with the constituents to be analyzed.

Surface sampling stations should be located in areas which represent the greatest potential for contamination. These points can be determined after examining the pathways available for leachates to enter a surface water body. Consideration should also be given to selecting stations which can provide consistent samples throughout the monitoring program. Flow patterns and seasonal variations should be addressed when applicable.

Sampling equipment and procedures can range from continuous or intermediate automated samplers to manual collection. Manual sampling is alm st always considered to be adequate.

Indicator parameters and analytical methods used for surface water samples should be consistent with selected procedures for groundwater sample testing.

The effects of surface water mixing and interference with contaminants should be considered.

2.2.4. Air Monitoring: Installed, or available portable air monitoring devices are required at all sites involving: incineration, landfill, or treatment facilities. An installed air monitoring system (triangular grid) with continuous recording is required at all commercial sites.

Sampling devices should be located in whatever direction structures exist. Typically, sampling devices may be located near the property boundary and off-site on the landfill side of structures in pathways most susceptible to gas migration.

The generation and rate of gas movement within disposal sites may also require monitoring. Samples should be taken the same time water samples are taken.

More specific guidelines for air monitoring are currently under preparation.

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2.2.5. Soil Monitoring: Soil monitoring is required for landfarm disposal sites.

(a) background soil conditions should be determined by taking one soil core per acre in the area to be treated. The depth of the soil core should be three (3) times the depth of the zone of incorportion or 30 centimeters (12 inches), whichever is greater. The bottom one-third of the soil core should be quantitatively analyzed for those constituents known or expected to be in the waste which make it hazardous. At new facilities, soil cores sh uld be taken and analyzed prior to beginning opertion. At existing facilities, background soil cores should be taken and analyzed within six months after the effective date of the Louisiana Hazardous Waste Management Plan Rules and Regulations.

(b) soil conditions in the treated area of the landfarm should be determined by taking one soil core per acre semi-annually. The depth of the soil core should be three (3) times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater. The bottom one-third of the soil core should be quantitatively analyzed for those constituents in the waste which make it hazardous.

NOTE: Soil monitoring may be conducted by taking less than one soil core per acre and/or by monitoring less frequently than semi-annually, provided the owner/operator can demonstrate to the Department that hazardous constituents, especially heavy metals, will be detected before vertically migrating a distance that exceeds three (3) times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(c) If soil monitoring shows that the concentration of a hazardous constituent in the bottom one-third of the soil core has significantly exceeded the background levels, the owner/operator should:

(i) notify the Louisiana Department of Natural Resources within seven (7) days;

(ii) determine, by soil monitoring, the area extent of vertical contaminant migration in the soil; and

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(iii) discontinue all landfarming in the contaminated area, as determin d in (ii), until corrective measures can be taken.

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PART B:

PART B: PROGRAM ENFORCEMENT GUIDELINES

This section presents a summary of sampling and analytical procedures deemed by the Department to be acceptable in the conduct of The Louisiana Hazardous Wastes Management Program. Specific attention is also given to documentation and record maintenance responsibilities. These notes reflect the objectives of the Department of Natural Resources' staff and should be used as a point of departure in requests for consideration of alternative good procedures and practices. They are addressed to Department staff, industrial personnel and service laboratories.

B.1. SAMPLING PROCEDURES; CHAIN OF CUSTODY; TECHNICAL STANDARDS; COLLECTION

1.1. Recordkeeping and Reporting: Operators of facilities shall forward two copies of the monitoring data specified in Section 2.1, Part A, of these guidelines to the Louisiana Department of Natural Resources, Office of Environmental Affairs, Baton Rouge 70804 (attention of Enforcement Section, Hazardous Wastes Division). A uniform tabular format should be followed in which samples from each location are described on the horizonal axis with parameter concentrations for each presented on the vertical axis. Those parameters exceeding background standards are to be prominently noted. Table B-1 illustrates this format.

Permanent logs should be kept indicating the date, time, method, water level, and other pertinent conditions existing at the time of sampling in the addition to statistics presented in required reports. Operators of facilities should retain records of monitoring activities and results, including all original strip chart recordings for instrumentation, calibration and maintenance of records for a minimum of 3 years.

1.2. SAMPLING PROTOCOLS

Effective program enforcement depends upon access to reliable scientific evidence of the environmental effects of disposal operations. There will be even more need for sampling and testing in those cases when the history of the site is not completely documented. The analytical procedures of Part B-2 of these guidelines can yield results which are only as reliable as the manner of sampling from the site and great care must be taken in collecting and caring for such samples between the field and the laboratory. Because of the time and expense associated with the sampling process, special care should be taken to:

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ANALYTICAL REPORT

TABLE B-1

Service to: _____

Address: _____

_____

Attention: _____

Title: _____

Sample Type: Grab ☐ Comp ☐

Preserved: ☐ Yes ☐ No

Date Collected (1) _____ Time: _____

Date Collected (2) _____ Time: _____

Date Received: _____ Time: _____

Collected By: _____ Brought In: EML ☐ Client ☐

File No. _____ Report No. _____

Invoice No. _____ Date _____

P.O. No. _____ RPD _____

MISCELLANEOUS CHARGES:

1. Total Miles _____ at _____ c/mile _____
2. Labor Time _____ at _____ /hr. _____
3. Shipping Charges (bus) . . . . . _____

Logged In By: _____ Comments: _____

_____

PARAMETER	† Pg. Ref.	SAMPLE NO. 1 EML # and Source: Conc.	lbs. per day	Date Begun	Time Begun	Date Completed	Time Completed	Analyst	✓	SAMPLE NO. 2 EML # and Source: Conc.	lbs. per day	Date Begun	Time Begun	Date Completed	Time Completed	Analyst
cidity	273															
lkalinity-Bicarbonate	278															
-Carbonate	278															
-Total	278															
oliform-Fecal	937															
-Total	935															
ecal Strep	942															
OD5	543															
oride	304															
OD	550															
nide, T.	361															
w (MGD)																
luorides	391															
ardness	202															
itrogen-Ammonia	165															
-Kjeldahl	175															
-Nitrate	427															
-Nitrite	434															
-Organic	437															
-Total																
il & Grease	515															
H	460															
henols	574															
hosphates-Total	481															
-Ortho	481															
olids-Total	95															
-Total Diss.	94															
-Total Susp.	92															
-Volatile Diss.	96															
-Volatile Susp.	95															
-Fixed Diss.	95															
-Fixed Susp.	95															
pecific Cond.	71															
ulfur-Sulfate	496															
-Sulfide	505															
-Sulfite	508															
	532															
(NTU)	132															
inc	148															

CCR 000037457

* Indicates out of permit compliance (Requires

1. Plan the sampling procedure before initiating it,
2. Avoid contamination and deterioration of the samples once obtained, and
3. Protect the integrity of the samples both technically and legally so as to assure their being truly representative of the actual site conditions.

Guidelines are accordingly presented now for Planning the Scope of a Sampling Procedure, for Technical Standards for Sample Gathering, and for the Management of Chain-of-Custody including an outline of the requisite supporting records. Supplementary guidelines are also presented in EPA 600/2-80-018 (January, 1980), "Samplers and Sampling Procedures for Hazardous Waste Streams."

1.3. PLANNING THE SCOPE OF A SAMPLING PROCEDURE

Efficient collection of a reliable set of samples can be supported by the following planning procedure to be accomplished and documented before proceeding to the site:

1. Careful definition of location, access and regional geography.
2. Assembly of a roster of responsible personnel at site, preliminary contact established with them and identification of other resource persons and records.
3. Collection and review of relevant state agency records (active permits) and identification of agents with earlier site experience.

1.3.1. SAMPLING LOGISTICS

1. Number of Samples To Be Taken: The number of samples naturally depends on the information desired. When gathering evidence for possible legal use, duplicate samples are usually collected. At least two identical samples are desirable: one sample is given to the company or organization responsible for the wastes; the second sample is submitted to the state laboratory for analysis. Subdividing a waste sample at the site is not recommended. A laboratory environment is desirable to avoid contamination and to insure personnel safety. The sample, representative of the main body of waste, must be adequate in size for all needs including laboratory analyses or splitting with other organizations.

For most hazardous waste sites a sample should be collected in a 2 1/2 gallon glass container, properly prepared using a teflon seal. One 2 1/2 gallon sample is gen rally sufficient for a variety of laboratory analyses. Table B-2. lists the recommended number of samples for different types of wastes. If only one parameter (such as Phenol) is to be analyzed, Table B-3. should be consulted for the proper container and sample size.

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All sample containers should be filled to overflowing before capping to reduce the loss of volatile components and to reduce possible oxidation.

2. Container Wash Procedures: It is critical that sampling containers and their caps be clean. The EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories (EPA 600/4-79-019) gives special instructions for the cleaning of bottles to be used for organic analysis. The bottles should be rinsed successively with:

1. Chromic acid cleaning solution
2. Tap water
3. Distilled water
4. Several rinses of redistilled solvent such as methylene chloride, ac tone, hexane, petroleum ether, and chloroform. Any solvents used in the analytical extraction should be used to prerinse the collection container.

Top liners are cleaned in the same manner as collection bottles and stored in a sealed container. Bottle caps are washed with detergent, then tap water, distilled water, and solvent.

3. Type of Sample: Grab or Composite: A grab sample is one taken from only one point at one particular time. Widemouth sampling jars are preferred to facilitate rapid collection; the sample volume depends on analytical work to follow. Grab samples are required if parameters such as dissolved gases, residual chlorine, sulfides, or pH are to be analyzed. These require immediate preservation and sealing in accordance with Table B-3.

A composite sample is a mixture of individual samples collected "over time" or "over space". A composite can be very useful if care is taken to make sure the sample is representative of the entire waste. In all compositing, special attention must be given to the possibility of mixing incompatible substances. (Table A-1. lists incompatible wastes and the results of mixing.)

If a "flow" is involved the sampling should be proportional to the flow rate. A good ratio is one milliliter sample for each gallon per minute of flow. Automatic liquid samplers are available which composite samples on the basis of flow or time.

A mixture of samples taken at approximately the same time from different points is an integrated-composite. Sample:

Composite-Flow: Sample aliquots are proportional to waste flow.

Composite-Time: Fixed sample aliquots collected at predetermined fixed intervals.

Integrated: Fixed sample aliquots collected from different points at approximately the same time.

All details on the compositing technique used should be noted at the time of collection. The holding times given in Table B-3. should be observed. The holding time begins when the first aliquot of a composite sample is collected. The compositing time should not exceed the time available before analysis should be initiated. The overall composite volume should be sufficient for the analytical work required.

A grab sample is preferred when:

1. The waste characteristics are relatively constant throughout the entire lot. For such wastes, an occasional grab sample is adequate rather than a lengthy complex sampling program.

2. The waste does not flow continuously such as intermittently dry discharge outlets or well-mixed samples from dumped contaminated process tanks. A grab sample is sufficient to determine the characteristics of the hazardous wastes.

3. A composite sample may obscure extreme variables in the waste. A classic example is pH variation. A composited sample may be neutral but individual grab samples exhibit a wide range of pH's.

4. Incompatible hazardous wastes are known present.

4. Selection of Sampler: Hazardous wastes are usually complex, multiphasic mixtures of liquids, semi-solids, sludges, or solids. The liquid and semi-solid mixtures vary greatly in viscosity, corrosivity, volatibility, explosivity, or flammability. The solid wastes can range from powders and granules to large blocks or lumps. The wastes are contained in drums, barrels, sacks, bins, vacuum trucks, ponds, and other containers. No single type of sampler can, therefore, be used to collect representative samples of the different types of wastes. Table B-2. lists most waste types and the corresponding sampler to be used. A description of each sampler and its utilization is given in Section 1.3.3. of this guide.

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TABLE B-2.

RECOMMENDED
SAMPLER SELECTION AND SAMPLE NUMBER

Waste Type	Sampler	No. of Samples	Limitations
Liquids, sludges, and slurries in drums, vacuum trucks, barrels, and similar containers	Coliwasa	1	Not for containers > 1.5 m deep.
	a) Plastic	1	Not for wastes containing ketones, nitrobenzene, dimethylformamide, mesityl oxide, or tetrahydrofuran.
	b) Glass	1	Not for wastes containing hydrofluoric acid and concentrated alkali solutions.
Liquids and sludges in ponds, pits, or lagoons	Pond sampler	1 composite (surface, middle, near bottom)	Cannot be used to collect samples beyond 3.5 m. Dip and retrieve sampler slowly to avoid bending the handle.
Powdered or granular solids in bags, drums, barrels, and similar containers	a) Grain sampler	1 composite (3-5 points)	Limited application for sampling moist and sticky solids and when the diameter of the solids is greater than 0.6 cm.
	b) Sample trier	1 composite (3-5 points)	May incur difficulty in retaining core sample of very dry granular materials during sampling.
Dry wastes in shallow containers and suface soil	Trowel or scoop	2-20 points May composite	Not applicable to sampling deeper than 8 cm. Difficult to obtain reproducible mass of samples.
Waste piles	Waste pile sampler	2-20 points May composite	Not applicable to sampling solid wastes with dimensions greater than ½ the diameter of the sampling tube.
Soil deeper than 8 cm	a) Soil auger	1	Does not collect undisturbed core sample. Difficult to use on stony or rocky or very wet soil.
Wastes in storage tanks	Weighted bottle sampler	1 composite (surface, middle, near bottom)	May be difficult to use on very viscous liquids.

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TABLE B-3.

RECOMMENDED CONTAINERS, PRESERVATIVES, AND HOLDING TIMES FOR ANALYTICAL PARAMETERS*

Measurement	Vol. Req. (ml)	Container[2]	Preservative	Holding Time[3]
Priority Pollutants	2½ gal.	G	Cool, 4°C	24 hours
Asbestos	1 l.	P	None	-
Volative Organics	100 ml.	G(serum vile)	Cool, 4°C	24 hours
Physical Properties				
Color	50	P,G	Cool, 4°C	24 Hrs.
Conductance	100	P,G	Cool, 4°C	24 Hrs.[4]
Hardness	100	P,G	Cool, 4°C HNO_3 to pH<2	6 Mos.[5]
Odor	200	G only	Cool, 4°C	24 Hrs.
pH	25	P,G	Det. on site	6 Hrs.
Residue				
Filterable	100	P,G	Cool, 4°C	7 Days
Non-Filterable	100	P,G	Cool, 4°C	7 Days
Total	100	P,G	Cool, 4°C	7 Days
Volatile	100	P,G	Cool, 4°C	7 Days
Settleable Matter	1000	P,G	None Req.	24 Hrs.
Temperature	1000	P,G	Det. on site	No Holding
Turbidity	100	P,G	Cool, 4°C	7 Days
Metals				
Dissolved	200	P,G	Filter on site HNO_3 to pH<2	6 Mos.[5]
Suspended	200		Filter on site	6 Mos.
Total	100	P,G	HNO_3 to pH<2	6 Mos.[5]

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TABLE B-3. (Continued)

Measurement	Vol. Req. (ml)	Container[2]	Preservative	Holding Time[3]
Mercury				
Dissolved	100	P,G	Filter on site HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)
Total	100	P,G	HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)
Inorganics, Non-Metallics				
Acidity	100	P,G	None Req	24 Hrs.
Alkalinity	100	P,G	Cool, 4°C	24 Hrs.
Bromide	100	P,G	Cool, 4°C	24 Hrs.
Chloride	50	P,G	None Req.	7 Days
Chlorine	200	P,G	Det. on site	No Holding
Cyanides	500	P,G	Cool, 4°C NaOH to pH 12	24 Hrs.
Fluoride	300	P,G	None Req.	7 Days
Iodide	100	P,G	Cool, 4°C	24 Hrs.
Nitrogen				
Ammonia	400	P,G	Cool,4°C H_2SO_4 to pH < 2	24 Hrs.
Kjeldahl, Total	500	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.[6]
Nitrate plus Nitrite	100	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.[6]
Nitrate	100	P,G	Cool, 4°C	24 Hrs.
Nitrite	50	P,G	Cool, 4°C	48 Hrs.

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TABLE B-3. (Continued)

Measurement	Vol. Req. (ml)	Container[2]	Preservative	Holding Time[3]
Dissolved Oxygen				
Probe	300	G only	Det. on site	No Holding
Winkler	300	G only	Fix on site	4–8 Hours
Phosphorus				
Ortho-phosphate, Dissolved	50	P,G	Filter on site Cool, 4°C	24 Hrs.
Hydrolyzable	50	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.[4]
Total	50	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.[4]
Total, Dissolved	50	P,G	Filter on site Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.[4]
Silica	50	P only	Cool, 4°C	7 Days
Sulfate	50	P,G	Cool, 4°C	7 Days
Sulfide	500	P,G	2 ml zinc acetate	24 Hrs.
Sulfite	50	P,G	Det. on site	No Holding
Organics				
BOD	1000	P,G	Cool, 4°C	24 Hrs.
COD	50	P,G	H_2SO_4 to pH < 2	7 Days[4]
Oil & Grease	1000	G only	Cool, 4°C H_2SO_4 or HCl to pH < 2	24 Hrs.
Organic carbon	25	P,G	Cool, 4°C H_2SO_4 or HCl to pH < 2	24 Hrs.
Phenolics	500	G only	Cool, 4°C H_3PO_4 to pH < 4 1.0 g $CuSO_4$/l	24 Hrs.
MBAS	250	P,G	Cool, 4°C	24 Hrs.

CCR 000037464

TABLE B-3. (Contineud)

Measurement	Vol. Req. (ml)	Container[2]	Preservative	Holding Time[3]
NTA	50	P,G	Cool, 4°C	24 Hrs.

1. More specific instructions for preservation and sampling are found with each procedure as detailed in this manual. A general discussion on sampling water and industrial wastewater may be found in ASTM, Part 31, p. 72–82 (1976) Method D-3370.

2. Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.

3. It should be pointed out that holding times listed above are recommended for properly preserved samples based on currently available data. It is recognized that for some sample types, extension of these times may be possible while for other types, these times may be too long. Where shipping regulations prevent the use of the proper preservation technique or the holding time is exceeded, such as the case of a 24-hour composite, the final reported data for these samples should indicate the specific variance

4. If the sample is stabilized by cooling, it should be warmed to 25°C for reading, or temperature correction made and results reported at 25°C.

5. Where HNO_3 cannot be used because of shipping restrictions, the sample may be initially preserved by icing and immediately shipped to the laboratory. Upon receipt in the laboratory, the sample must be acidified to a pH <2 with HNO_3 (normally 3 ml 1:1 HNO_3/liter is sufficient). At the time of analysis, the sample container should be thoroughly rinsed with 1:1 HNO_3 and the washings added to the sample (volume correction may be required).

6. Data obtained from National Enforcement Investigations Center-Denver, Colorado, support a four-week holding time for this parameter in Sewerage Systems. (SIC 4952).

*Adapted from the EPA "Recommendation for Sampling and Preservation of Samples According to Measurement"

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1.3.2. Safety in Drawing Samples from Hazardous Waste Containers: The foll wing detailed procedures are recommended for sampling the various types of hazardous wastes in different types of containers:

1. Sampling a Drum

The EPA has recommended that drums should not be opened unnecessarily until completely safe methods have been developed and tested. Current research is being conducted in the use of remote opening devices.

Drums containing liquid wastes can be under pressure or vacuum. A bulging drum usually indicates that it is under high pressure and should not be sampled until the pressure can be safely relieved. A heavily corroded or rusted drum can readily rupture and spill its contents when disturbed and should only be sampled with extreme caution. Opening the bung of a drum can produce a spark that might detonate an explosive gas mixture in the drum. These situations are difficult to predict. The use of full protective sampling equipment cannot be over-emphasized when sampling a drum. When the EPA publishes recommended safe procedures for sampling drums, this sampling guide will be updated.

2. Sampling a Vacuum Truck

In sampling a vacuum truck, the collector must climb onto the truck and walk along a narrow catwalk. In some trucks, one must climb access rungs to the tank hatch. These situations present problems to the sample collector who must wear protective sampling gear. Preferably, two persons should perform the sampling: one person will do the actual sampling, and the other stands ready with the sample container to aid in any problems. Sampling should be conducted only when a breeze is present to disperse any concentration of gases. The sample collector positions himself to collect samples only after the truck driver has opened the tank hatch. The tank is usually under pressure or vacuum, and the driver should open the hatch slowly to release pressure or to break the vacuum. The following instructions are recommended.

1. Let the truck driver vent the tank prior to opening the hatch of a tank under positive pressure.

2. Using protective sampling gear, assume a stable stance on the tank catwalk or access rung to the hatch.

3. Collect a sample through the hatch opening with a Coliwasa.

4. If the tank truck is not horizontal, take one additional sample from the rear and the front clean-out hatches and combine all three samples in th same sample container.

5. When necessary, carefully take a sediment sampl from the tank through the drain spigot.

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3. Sampling Barrels, Fiberdrums, Cans, Bags, or Sacks Containing Powder or Granular Waste

The proper protective respirator, in addition to other protective gear, must be worn when sampling dry powdered or granular wastes. These wastes tend to generate airborne particles when the containers are disturbed. The containers must be opened slowly. The barrels, fiberdrums, and cans should be positioned upright. If possible, sample the sacks or bags in the position in which they are found. Standing sacks or bags upright might cause them to rupture. Collect a composite sample from the container with a grain sampler or sampler trier.

4. Sampling a Pond

Storage or evaporation ponds for hazardous wastes vary greatly in size. It is difficult to collect representative samples from the large ponds without incurring great expense and assuming excessive risks. Any samples desired beyond 3.5 meters from the bank may require the use of a boat, which is very risky, or the use of a crane. The information desired must be weighed against the risk and expense in collecting the samples. See Tables B-1. and B-4. for number and locations of sampling points.

5. Sampling Soil

The standard techniques of soil sampling are numerous. The procedures outlined below are adapted from these techniques. The procedures are consistent with hazardous waste management objectives of collecting soil samples to determine the residue level in the soil. There are elaborate, statistically designed patterns for sampling soil. If a large area is to be sampled the statistical approach should be used to obtain the most representative sample. If one desires to use these patterns, a good statistics book should be consulted. In the following procedures, soil samples are taken in a grid pattern over the entire site to ensure a uniform coverage of the site.

1. Divide the area into an imaginary grid, 1 grid for each sample to be collected.
2. Sample each grid and combine the samples into one composite sample.
3. To 8 cm deep, collect samples with a scoop.
4. To sample beyond 8 cm deep, collect samples with a soil auger.

6. Sampling Waste Piles

Waste piles can range from a small heap to a large aggregate of wastes. The wastes are predominantly solids and can be a mixture of powders, granules, and chunks 1 inch

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(2.5 cm in diameter or larger. A number of core samples have to be taken at different angles and composited in order to obtain a sample which, in analysis, will give average values for the hazardous components in the waste pile.

1. Determine the sampling points.
2. Collect a composite sample with a waste pile sampler.

7. Sampling a Storage Tank

The collection of liquid samplers in storage tanks is extensively discussed in the ASTM Procedures. The procedure used here is adapted from one of the ASTM methods.

Sampling a storage tank requires manual dexterity. Usually it requires climbing to the top of the tank through a narrow vertical or spiral stairway while wearing protective equipment and carrying sampling paraphernalia. At least two persons must perform the sampling; one to collect the actual samples and the other to stand back, usually at the head of the stairway, to assist or to call for help in case of problems. The sample collectors must be accompanied by a representative of the company who must open the sampling access, usually on the tank roof. The tank should not be opened in a "no wind" condition. Fumes can collect to toxic levels around the sample access point.

1. Collect one sample each from the upper, middle, and lower sections of the tank contents with a weighted bottle sampler.
2. Combine the samples in one container and submit it as a composite sample.
3. The sampling bottle should be replaced with a clean bottle for each sample site.

CCR 000037468

Table B-4.

SAMPLING POINTS FOR WASTE CONTAINERS

Container	Sampling Point
Drum, bung on one end*	Withdraw sample through the bung opening.
Drum, bung on side*	Lay drum on side with bung up. Withdraw sample through the bung opening.
Barrel, fiberdrum, buckets, sacks, bags	Withdraw samples through the top of barrel, fiberdrums, buckets, and similar containers. Withdraw samples through fill openings of bags and sacks. Sample through the center of the containers and to different points diagonally opposite the point of entry.
Vacuum truck and similar containers	Withdraw sample through open hatch. Sampl all other hatches.
Pond, pit, or lagoon	Divide surface area into an imaginary grid.[a] Take three samples if possible; one at the surface, one at mid-depth, and one near the bottom. Repeat the sampling at each grid over the entire pond or site.
Waste pile	Withdraw samples through at least three differ nt points near the top of the pile to points diagonally opposite the point of entry.
Storage tank	Sample from the top through the sampling hole. Withdraw three samples; one at the top, one at mid-depth, and one near the bottom.
Soil	Divide the surface area into an imaginary grid.[a] Sample each grid.

* THE EPA STATES THAT DRUMS ARE NOT TO BE OPENED EXCEPT BY REMOTE DEVICES.

[a] The number of grids is determined by the desired number of samples to be collected which when combined should give a representative sample of the wastes.

CCR 000037469

1.3.3. Sampling Devices

1. Solid Waste Samplers

There are a number of available tools used in sampling solid substances. The most suitable for sampling solid hazardous wastes are the grain sampler, sampling trier, and the trowel or scoop.

a. Grain Sampler: The grain sampler, Figure B-5., consists of two slotted telescoping tubes, usually made of brass or stainless steel. The outer tube has a conical pointed tip on one end which permits the sampler to penetrate the matrial being sampled. The sampler is opened and closed by rotating the inner tube. Grain samplers are generally 61 to 100 cm long 1.27 to 2.54 cm in diameter. They may be purchased from laboratory supply houses.

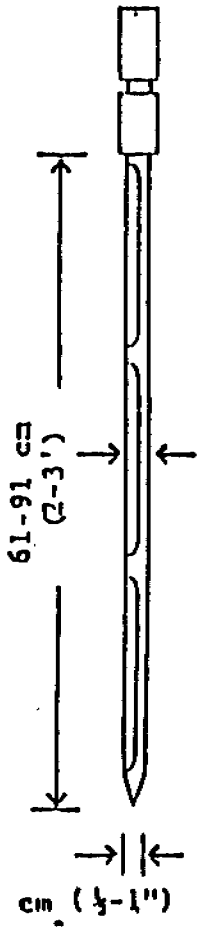
Utilization: The grain sampler is used for sampling powdered or granular waste materials in bags, fiberdrums, sacks or similar containers. This sampler is most useful when the solids are no greater than 0.6 cm ($\frac{1}{4}$) in diameter.

Procedure:

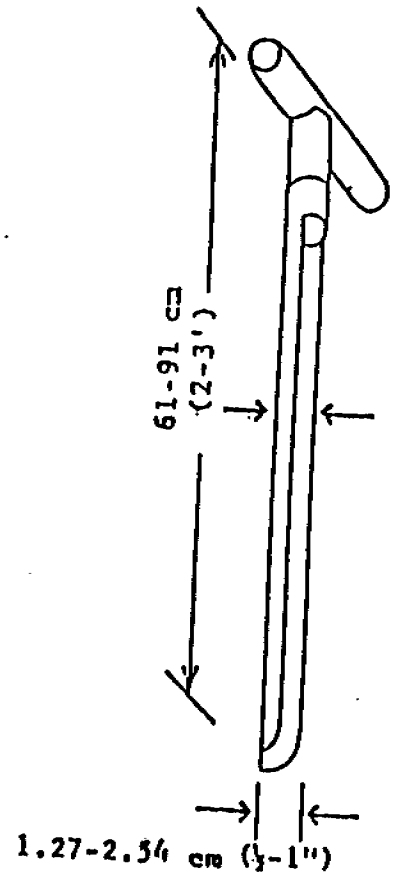
1. While in the closed position, insert the sampler into the granular or powdered waste from a point near a top edge or corner, through the center, to a point diagonally opposite the point of entry.
2. Rotate the inner tube of the sampler into the open position.
3. Wiggle the sampler a few times to allow materials to enter the open slots.
4. Place the sampler in the closed position and withdraw.
5. Place the sampler in a horizontal position with the slots facing upward.
6. Rotate and slide the outer tube out from the inner tube.
7. Transfer the collected sample in the inner tube into a suitable container.
8. Collect two or more core samples at different points and combine the samples in the same container.
9. Cap the sample container; attach label and seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.
10. Clean, or store the sampler in plastic bag for subsequent cleaning.
11. Deliver the sample to the laboratory for analysis.

CCR 000037470

TABLE B-5



Grain Sampler



Sample Trier

CCR 00003747

b. Sampling Trier: A typical sampling trier is a long tube with a slot that extends almost its entire length. The tip and edges of the tube slot are sharpened to allow the trier to cut a core of the material to be sampled when rotated after insertion into the material. Sampling triers are usually made of stainless steel with wooden handles. They are about 61 to 100 cm long and 1.27 to 2.54 cm in diameter. A sampling trier can be purchased from laboratory supply houses.

Utilization: The trier's use is similar to that of a grain sampler as discussed above. It is preferred when the powdered or granular material to be sampled is moist or sticky.

In addition, the sample trier can be used to obtain soft or loosened soil samples up to a depth of 60 cm as outlined below.

Procedure:

1. Insert the trier into the waste material at a 0^{o} to 45^{o} angle from horizontal. This orientation minimizes the spillage of sample from the sampler.
2. Rotate the trier once or twice in order to cut a core of material.
3. Slowly withdraw the trier making sure that the slot is facing upward.
4. Transfer the sample into a suitable container with the aid of a spatula and/or brush.
5. Repeat the sampling at different points two or more times and combine the samples in the sample container.
6. Cap the sample container; attach the label and seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.
7. Wipe the sampler clean, or store it in a plastic bag for subsequent cleaning.
8. Deliver the sample to the laboratory for analysis.

c. Trowel or Scoop: A garden-variety trowel looks like a small shovel. The blade is usually about 7 X 13 cm with a sharp tip. The laboratory scoop is similar to the trowel, except that the blade is usually more curved and has a closed upper end to permit the containment of material. Scoops come in different sizes and makes. Stainless steel or polypropylene scoops with 7 X 15 cm blades are preferred. A trowel can be bought from hardware stores; the scoop can be bought from laboratory supply houses.

CCR 000037472

Utilization: An ordinary zinc-plated garden trowel can be used in some cases to sample dr, granular or powdered materials in bins or other shallow containers. The laboratory scoop, however, is superior. It is usually made of a corrosive-resistant material, thus lessening the probability of sample contamination.

The trowel or scoop can also be used in collecting top surface soil samples.

Procedure:

1. At regular intervals take small equal portions of sample from the surface or near the surface of the material.
2. Combine the samples in a suitable container.
3. Cap the container; attach the label and seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.
4. Deliver the sample to the laboratory for analysis.

d. Soil Auger: The auger consists of a hard, metal, central shaft and sharpened spiral blades. When the tool is rotated clockwise by its wooden T-handle, it cuts the soil as it moves forward and discharges most of the loose soil upward. The cutting diameter is about 5 cm. The overall length is about 1 m (40 inches) with graduations every 15.2 cm (6 inches); the length can be increased to 2 m. This tool can be purchased from hardware or farm implement stores.

Utilization: The auger is particularly useful in collecting soil samples at depths greater than 8 cm. This sampler destroys the structure of cohesive soil and does not distinguish between samples collected near the surface or at greater depths. It is not recommended, therefore, when an undisturbed soil sample is desired.

Procedure:

1. Select the sampling point and remove unnecessary rocks, twigs, and other non-soil materials.
2. Install the sampler's wooden T-handle in its socket.
3. Bore a hole through the middle of an aluminum pie pan large enough to allow the blades of the auger to pass through. The pan will be used to catch the sample brought to the surface by the auger.
4. Spot the pan against the select d sampling point.

CCR 000037473

5. Begin augering through the hole in the pan until the desired sampling depth is reached.

6. Pull back the auger and transfer the sample collected in the catch pan and sample adhering to the auger to a suitable container. Spoon out the rest of the loosened sample with a sample trier.

7. Repeat the sampling at different points and combine the samples in the same container as in Step 6.

8. Cap the sample container; attach label and seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.

9. Brush-off and wipe the sampler clean, or store it in a plastic bag for subsequent cleaning.

10. Deliver the sample to the laboratory for analysis.

2. Liquid Samplers

Among the most common liquid samplers are the pond sampler, the weighted bottle sampler, the wastewater pump, and the Coliwasa. Some of these samplers may be fabricated and some may be purchased from various scientific supply houses.

a. Pond Sampler: The pond sampler consists of an adjustable clamp attached to the end of a 2 or 3 piece telescoping aluminum tube which serves as the handle. The clamp is used to secure a sampling beaker. The sampler is not commercially available, but it is easily and inexpensively fabricated. The tubes can be readily purchased from most hardware or swimming pool supply stores. The adjustable clamp and sampling beaker can be obtained from most laboratory supply houses. The suggested materials required to fabricate the sampler are as follows:

CCR 000037474

BASIC PARTS OF A POND SAMPLER

Quantity	Item	Supplier & Approximate Cost (1979)
1	Clamp, adjustable, 6.4 to 8.9 cm (2½ to 3½") for 250 to 600 ml beakers	Laboratory supply houses $7.00
1	Tube, aluminum, heavy duty, telescoping extends 2.5 to 4.5 m with joint cam locking mechanism. Pole diameters 2.54 cm (1") I.D. and 3.18 cm (1¼") I.D.	Olympic Swimming Pool Co. $16.24 807 Buena Vista Street Alameda, CA 94501 or other general swimming pool supply houses.
1	Beaker, polypropylene 250 ml or widemouth quart glass jars.	Laboratory supply houses $1.00
1	Bolts, 2½ X ¼", NC	Hardware stores - 5¢ each
1	Nuts, ¼", NC	Hardware stores - 5¢ each

Utilization: The sampler is used to collect liquid waste samples fr m disposal ponds, pits, lagoons, and similar reservoirs. Grab samples can be obtained as far as 3.5 m from the edge of the ponds and at different depths. Very viscous liquids should be sampled slowly or the tubular aluminum handle may bow.

Procedure:

1. Assemble the pond sampler. Make sure that the sampling beaker and the bolts and nuts that secure the clamp to the pole are tightened properly.
2. While wearing proper protective gear, take grab samples from the pond at different distances and depths.
3. Combine the samples in one suitable container.
4. Cap the container; label and affix the seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.
5. Dismantle the sampler; wipe the parts with clean towels or rags and store them in plastic bags for subsequent cleaning.
6. Deliver the sample to the laboratory for analysis.

CCR 000037475

b. Weighted Bottle Sampler: This sampler consists of a bottl , usually glass, a weight sinker, a bottle stopper, and a line which is used to open the bottle and to lower or raise the sampler during sampling. There are variations of this sampler as illustrated in the ASTM Methods D 279[8] and 300[9]. The ASTM sampler with a metallic bottle basket which also serves as weight sinker is preferred. It can either be fabricated or purchased.

Utilization: The weighted bottle sampler can be used to sample liquids in storage tanks, wells, sumps, or other containers that cannot be adequately sampled with a Coliwasa. The sampler cannot be used to collect liquids which are incompatible or which may react chemically with the weight sinker and line.

Procedure:

1. Assemble the weighted bottle sampler.
2. While using protective sampling equipment, lower the sampler to the proper depths to collect the following samples:
   a) upper sample - middle of upper 1/3 of tank contents.
   b) middle sample - middle of tank contents.
   c) lower sample - near bottom of tank contents.
3. Pull out the bottle stopper with a sharp jerk of the sampler line.
4. Allow the bottle to fill completely as evidenced by the cessation of air bubbles.
5. Raise the sampler and retrieve and cap the bottle. Wipe-off the outside of the bottle with a towel or rag to avoid contamination. Combine the three samples into one composite sample.
6. A clean catch bottle should be used for collecting each sample.
7. Label the samples collected; affix seal, fill out sample analysis request sheet and chain-of-custody record; record in the field log book.
8. Clean on-site, or store contaminated sampler in a plastic bag for subsequent cleaning.
9. Deliver the sample to the laboratory for analysis.

CCR 000037476

c. Wastewater Sampling Pump: This sampl r consists of a pump, a control panel, and an insulated container used to hold up to 2½ gallons of sample on ice. This kind of sar-pler is available from several companies in a variety of styles.

Utilization: The pump can be used to sample most aqueous solutions. Best use is made at monitor wells, wastewater effluents, and hazardous waste pits.

Procedure: The manufacturer's instruction manual should be studi d for each model of pump used. General procedures are outlined here. The pumps consist of a section of silicon tubing within which the sample is forced through by two revolving rollers. A length of tygon tube of sufficient length to collect the sample is attached to the suction end of the pump. The tygon tubing should be changed with each new sample; the pump tubing should be changed between each different survey.

One gallon of blank water is to be used. One third of the blank water is to be pumped through the tygon and pump tubing and not collected. The remaining two thirds of the blank water is to be collected in a properly prepared one (1) gallon container and to be shipped along with the sample to the laboratory. Contaminates found in the blank water indicate contamination within the collection system and will be deducted from that found in the sample. The testing laboratory should furnish the blank distilled/deionized water.

After collecting the blank, the sample should be collected immediately. The sample container and amount should be determined by Table 7. If a variety of tests are to be run, the use of a 2½ gallon sample container properly prepared is recommended. When collecting the blank and the sample, never contaminate the container or lid by touching the inside or setting the lid down. Cleanliness is of the utmost importance as a sample contaminated by the field personnel is of no use.

1. Assemble the wastewater sampling pump; attach new tygon collection tubing. Change silicon pump tubing if indicated.

2. Pump 1/3 gallon of blank water through pump and into a s parate discard container. (Do not contaminate sampling area with blank water.)

3. Pump remaining 2/3 gallon blank water into a clean, labeled, one gallon container; cap the container. (Go to Step 5)

CCR 000037477

4. Begin pumping sample into the clean 2½ gallon sample container utilizing a grab, composite-tim , composite-flow, or integrated-composite sampling system.

5. After pumping sample, cap the container using a teflon-lined lid. Label and affix the seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.

6. Refrigerate sample.

7. Dismantle sampler.

8. Deliver sample to the laboratory for analysis.

d. Coliwasa: (Table B-6.): This sampler consists of a plastic or glass tube with a stopper in the end of it. The stopper can be opened and closed, allowing the sample to enter, by use of a stopper rod. Use of plastic or glass is dictated by the type of sample to be collected.

Utilization: The Coliwasa is used to collect aqueous samples up to five feet in depth. Its narrow dimensions make it ideal for sampling drums, tanks, and waste carrier trucks. The simplicity of design and small expense make the Coliwasa expendable when contaminated.

Procedure: A clean Coliwasa is used for each sample.

1. With the stopper in the open position, lower the Coliwasa into the aqueous material.

2. Close the stopper and withdraw the sampler.

3. Empty the sample into a clean suitable container.

4. Cap the container; label and affix the seal; record in field log book; and complete sample analysis request sheet and chain-of-custody record.

5. Preserve or refrigerate sample.

6. Deliver sample to laboratory for analysis.

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CCR 000037479

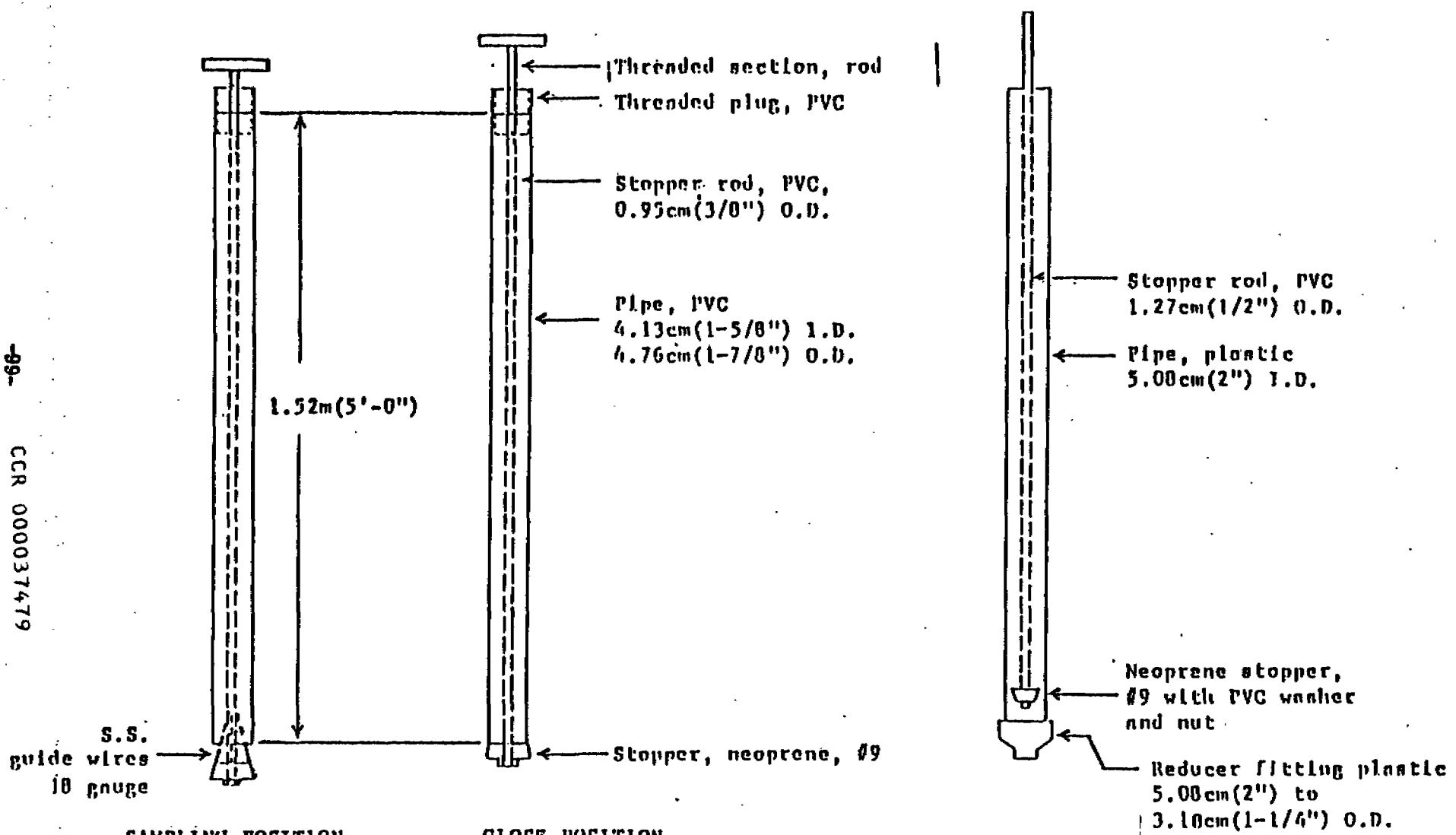

TABLE B-6.

Coliwasa

3. Definition of sampling goals including specification of the types and extent of samples being sought and their intended use.

4. Specification of equipment to be used including a record of calibration and check-out (Table B-7). Designation of materials requirements for containers and apparatus should be made from the standard list presented in Table B-2.

5. Collection and testing of required service equipment for the site visit including containers, blanks, utilities and batteries.

6. Review of the nature of potential hazards and advice to sampling team on appropriate safety precautions.

1.3.4. Preservation and Storage of Samples

Ideally hazardous waste samples should be analyzed immediately after collection for maximum reliability of the analytical results. Specific attention should be given to the following:

1. In a matter of minutes, sulfides and cyanides may be oxidized or evolve as gases;

2. Hexavalent chromium may slowly be reduced to the trivalent state.

3. Certain cations may be partly lost due to adsorption to the container walls.

4. Growth of microorganisms may also cause changes to certain constituents of the sample.

5. Volatile compounds may be rapidly lost.

Changes may be slowed or prevented by refrigeration at 4° to 6° C and/or by the addition of preservatives according to Table B-8. (Refrigeration may deter the evolution of volatile components and acid gases such as hydrogen sulfides and hydrogen cyanides, but it also introduces the uncertainty that some salts may precipitate at lower temperatures. The addition of preservatives may retard biochemical changes but may convert some constituents to stable hydroxides, salts, or compounds. In subsequent analysis, the results may not reflect the original identity of the components.) These methods of preservation or stabilization are therefore, not

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TABLE B-7.

HAZARDOUS WASTE SITE EQUIPMENT

DATE_____

SITES: (1)_____
(2)_____
(3)_____
(4)_____

Water Sampling Equipment

_____ Conductivity Meter
_____ pH meter
_____ O_2 meter
_____ Composite sampler ISCO Model 1680 w/batteries, charger & tygon tubing
_____ Sampler (pole)
_____ glass jars
a. 2½ gal. (pesticide clear)
b. quart
Container Case for:

_____ Heavy Metals
_____ O ≠ G
_____ COD
_____ Phenols
_____ Sulfide
_____ Pesticide
_____ Asbestos-containers (plastic)
_____ Plastic jugs
_____ Fecal cups
_____ Volatile Organic Bottles w/crimper
_____ Thermometer
_____ Blank Water (deronized distilled) for flushing
_____ Blank Water Standard

Protective Devices

_____ Hard Hats
_____ Goggles
_____ Respirators
_____ ScottAirPak
_____ Gloves
_____ Coveralls
_____ Hip Waders
_____ First Aid Kit
_____ Flush Bottle (eye)
_____ Plastic rainsuits

Air Sampling Equipment

_____ 2 Air sampling pumps
_____ Charcoal tubes
_____ 2 Fritted bubblers
_____ x/1%NAOH, DIST H_2O
_____ MSA test kit w/tube for:
_____ Benzene
_____ Hydrogen Sulfide
_____ Vinyl Chloride
_____ Carbon Monoxide
_____ Explosimeter & Probe
_____ Sampler bottles (glass)
_____ Radac Instrument

Soil Sampling Equipment

_____ Hand auger & extensi
_____ Sample containers
_____ 100 fr. rollup tape
_____ Clipboard
_____ Grid line paper
_____ Hand compass

Miscellaneous

_____ Machette
_____ Shovel
_____ Bucket w/line
_____ Paper towels & toilet tissue
_____ Plastic disposal gloves
_____ Credit card
_____ Map-Louisiana
_____ Name tags & cards
_____ Water proof pen
_____ Container tags
_____ EML analytical report forms
_____ Walkie talkie
_____ Camera, Polaroid
_____ Film, 2 packs at least
_____ Flashlite
_____ Consulting sheet & clipboard
_____ Pocket calculator
_____ Chain of custody forms

CCR 000037481

TABLE B-8.

Preservative	Action	Applicable to:
$HgCl_2$	Inhibits bacteria	Nitrogen forms, Phosphorus forms
Acid (HNO_3)	Dissolves metals prevents precipitation	Metals
Acid (H_2SO_4)	Inhibits bacteria	Organic samples (COD, oil & grease organic carbon), Nitrogen-phosphorus forms
	Forms salts with organic bases	Ammonia, amines
Alkali (NAOH)	Forms salts with volatile compounds	Cyanides, organic acids
Refrigeration	Inhibits bacteria Retards chemical reactions	Acidity-Alkalinity, organic P, organic N, carbon, etc., biological organisms (coliform, etc.)

CCR 000037482

recommended for hazardous wastes samples unless attention is to be given to only one or two components where the effect of the preservative is specifically known. Recommended preservatives for various constituents are given in Tables B-11 and B-15. along with appropriate holding times.

1.3.5. Sample Integrity

1. Chain-of-Custody Procedure:

a. The agency and permittee must both be in a position to demonstrate the reliability of evidence by proving the chain of possession and custody of samples for which analytical test results are presented.

Procedures are presented to create an accurate written record that can be used to trace the possession of the sample from the moment of its collection through its introduction into evidence. A sample is in custody if it is in any one of the following states:

1. In actual physical possession.
2. In view, after being in physical possession.
3. In physical possession and locked so that no one can tamper with it.
4. In a secured area, restricted to authorized personnel.

b. All personnel involved should receive copies of custody plans prior to the study of a pollution or hazardous waste case. Prestudy briefings should then be held to apprise participants of the objectives, sample locations, and chain-of-custody procedures to be followed. After the chain-of-custody samples are collected, a briefing should be held in the field to verify the adherence to the chain-of-custody procedures and to determine whether additional samples are required. Table B-9. summarizes these procedur s.

c. Chain-of-Custody Record: To establish documentation necessary to trace sample possession from the time of collection, a chain-of-custody record must be completed and must accompany every sample. This record becomes especially important if the sample is going to be introduced as evidence in litigation. An example of a chain-of-custody receipt is illustrated in Table B-10.

d. Sample Delivery to the Laboratory: The sample is delivered to the laboratory for analysis as soon as practical, usually the same day as the sampling. Preferably the sample is delivered in person. The sample must be accompanied by the chain-of-custody record and by a sample analysis request sheet. The sample is deliver d to the person in the laboratory authorized to receive samples; this laboratory person is often referred to as sample custodian.

CCR 000037483

TABLE B- 6.

FIELD INSPECTION AND ANALYSIS PROTOCOL

1. Predeployment

   Equipment: Safety
   Sampling
   Miscellaneous

   Equipment: (see attached list)

   Sampling:

   Water
   Air
   Soils
   Miscellaneous

2. Arrival Protocol:

   Advance notice of arrival
   Preinspection conference - Topics discussed:
   a. Sampling site locations (map)
   b. Sampling procedure
   c. Analytical tests methods
   d. Approval for taking photos
   e. Compliance with plant safety requirements

3. On site sampling procedures:
   a. Duplicate split samples
   b. Chain of custody receipting
   c. Security of samples (placed in secure ice chest in van)
   d. Numbering of samples

4. Departure Protocol:
   a. Predeparture conference
   b. Dispensing of Chain of Custody Receipts for each sample site
   c. Return of any plant-issued safety items
   d. Approval of photos taken

5. Enroute precautions:
   a. Insure that samples are iced and others properly preserved.
   b. Insure security of samples
   c. Assurance that sample chest is visible and/or secure with lock

6. Arrival procedures:
   a. Log in samples in appropriate book with DNR number
   b. Commence immediate analysis on samples with a short holding time
   c. Place remaining samples in secure storage containers for subsequent analysis
   d. Insure that approved EPA analytical procedures are used in testing of samples

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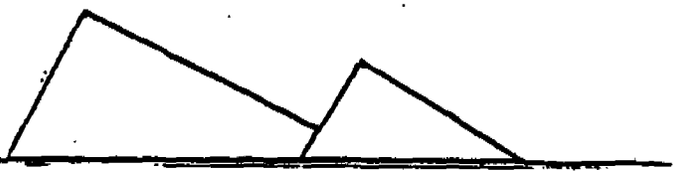

DEPARTMENT OF NATURAL RESOURCES

CHAIN OF CUSTODY RECEIPT

SAMPLING DATA

Project: _____ Type: ☐ Grab ☐ Comp. ☐ Other _____

Source: _____

Sampled by: _____ Date _____ Time _____ No. of Samples _____

Witnessed by: _____ DNR Witness: _____

SAMPLE DISPOSITION ☐ Laboratory Lab Sample No. _____

☐ Site Owner No. of Samples _____

☐ Other _____

CONTAINER TYPE: ☐ Glass ☐ Plastic ☐ Other _____ PRESERVED: ☐ YES ☐ NO

TABLE B-10.

CCR 000037485

e. Shipping of Samples: When a sample is shipped to the laborat ry, it must be packaged in a proper shipping container to avoid leak .ge and/or breakage. A cardboard box that will provide at least 10 cm of tight packing around the sample container must be used. Acceptable packing materials include sawdust, crumpled newspapers, vermiculite, polyurethane chips, and others. Provision must be made to maintain refrigeration when appropriate.

2. Labeling of Samples

The sample tag shown in Table B-11. is used to identify each sample from the time it is collected until the final report from the laboratory is received. Incomplete information may lead to confusion as to sample source, thus making any testing invalid. The following information is the minimum to be included on sample tags:

1. Agency name (client)
2. Agency address
3. Sample source
4. Samplers' name
5. Date and time shipped
6. Whether Composite or Grab

The sample source or identification number should also be indicated on the sample container by marker.

3. Sample Seals

Sample seals are used to preserve the integrity of the sample from the time of collection until it is opened in the laboratory. Gummed paper seals can be used as official sample seals. The paper seal must carry information such as:

Collector's name

Date and time of sampling

The seal must be attached in such a way that it is necessary to break it in order to open the sample container. An example of a sample seal is shown in Table B-12.

4. Field Log Book

All information pertinent to a field survey and/or sampling should be recorded in a log book by the agency and by the agent of the site owner. The book is a bound one, preferably with 21.6 X 27.9 cm (8½ X 11") pages numbered consecutively. Entries in the log book must include at least the following:

CCR 000037486

TABLE B-11.

XYZ Laboratories, Anywhere, LA.

Submitted by: _____

Address: _____

Sample Source: _____

Sampled By: _____

Date Sampled: _____ Time _____

Sample Type: Grab or Comp. Flow Rate _____ MGD
(Please circle one)

SAMPLE LABELING TAG

TABLE B-12.

LOUISIANA DEPARTMENT OF NATURAL RESOURCES	
Name	Date of Sampling
Identification of Site	Time of Sampling

SAMPLE SEAL

CCR 000037487

Purpose of sampling (e.g., surveillance, etc.)
Location of sampling (.g., hauler, disposal site, etc.) and address
Name and address of field contact
Producer of waste and address
Typ of process (if known) producing waste
Type of waste (e.g., sludge, wastewater, etc.)
Declared waste components and concentrations
Number and volume of samples taken
Description of sampling point
Date and time of collection
Collector's sample identification number(s)
Sample distribution (e.g., laboratory, hauler, etc.)
References such as maps or photographs taken of the sampling site
Any field measurements made such as pH, flammability, explosivity, etc.

Field Observations: Sampling situations vary widely. No general rule can be given as to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information so that someone may reconstruct the entire sampling situation from the field log without reliance on the collector's memory.

The log book must be protected and kept in a safe place.

5. Analytical Report

An analytical report of the scope presented in Table B-1. should be presented connecting analytical results with relevant sampling statistics.

CCR 000037488

B.2. ANALYTICAL CITATIONS

2.1. General Laboratory Practices: All laboratories are expected to subscribe to the practices outlined in the EPA Analytical Quality Control Manual (EPA-600/4-79-019)except where specific variance is requested. The Table of Contents of this manual is presented as Appendix B-1. Controls aim to promote early recognition, prevention, and corrections of factors leading to breakdowns in the validity of data. Two other useful sources which describe laboratory quality control and which should be consulted as secondary standards are the following:

1) Annon., 1979 Annual Book of ASTM Standards - Part 31 - Water, American Society for Testing and Materials, Philadelphia, Pa. (1979).

2) Annon., Standard Methods for the Examination of Water and Wastewater, 14th Edition American Public Health Association, Washington, D.C. (1976).

As noted, any variations from the practices elucidated in the above three sources should first meet with the approval of the Department of Natural Resources. Note is also taken at this time of the soon-to-be released EPA document, SW-846, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods".

2.2. Analytical Techniques: A listing of approved analytical techniques for pertinent waste characteristics is shown in Tables B-21 and B-22. Table B-21.describes the required volume, the essential instrumentation, reliability of analysis, and applicable range for each parameter. The material in the table is for wastewater, sludges, soils, and plant tissues. This list is augmented by the approved analyses for wastes and waters given in Table B-22 (taken from the Federal Register submitted by EPA on December 1, 1976). For updated or revised techniques for organics, metals, etc. the Federal Register and the new EPA document, SW-846, should be used as a continuing reference. Description of preservation and sampling methods is presented in Section 1 of these guidelines.

A listing of relevant sources for specific analytical techniques is given below:

1. Annon., Methods for Chemical Analysis of Waters and Wastes, Environ. Monitoring and Support Laboratory, ORD, USEPA, Cinn., Ohio, EPA 600-4-79-020, 1979.

CCR 000037489

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CCR 000037490

Analytical methods are a rapidly changing art. The procedures presented here should be viewed as guidelines. Permittees are invited to offer alternatives of equivalent or superior quality for Department approval at application or at any subsequent time prior to reliance upon said method as the basis for compliance.

CCR 000037491

Table B.-21. Analytical Techniques

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
I. GROUNDWATER, SURFACE WATER, AND DILUTE SLUDGES, WASTEWATERS				
A. PHYSICAL INDICATORS				
Temperature	1,000	Thermometer	Depends	Depends
Total Suspended Solids	50-1,000	Steam Bath, Drying Oven, Filtration Setup, Analytical Balance	± 10%	4-20,000
Total Dissolved Solids	100-20,000	Steam Bath, Drying Oven Analytical Balance	± 5%	10-20,000
Total Volatile Suspended Solids	50-100	Steam Bath, Drying Oven, Analytical Balance Muffle Furnace	± 10%	10-170
Hardness	50-100	Titration Setup, Reagents, Indicators	± 15%	10-400
pH	10 to 20	pH Meter	±1.5%	0-14 (S.U.)
Color	50	Spectrophotometer Reactor tubes	-	5-70
Conductance	100-1,000	Conductivity Meter	± 8.6	0-112,000
Odor	200	-	-	-
Total Solids	100-20,000	Steam Bath, Drying Oven, Analytical Balance, Muffle Furnace	± 5%	10-20,000
Settleable Solids	1,000	Imhoff	-	-
Turbidity	100-1,000	Turbidity Meter	± 5%	0.02-40 JTU [redacted] NTU

CCR 000037492

Table B.-21.(Continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
		3. Nutrient Indicators		
Total Phosphorus	50-100	Digestion Apparatus	± 10%	0.01-6
Inorganic Phosphorus	100-200	Spectrophotometer	± 30%	0.01-6
Total Kjeldahl Nitrogen	500	Kjeldahl Setup, Spectrophotometer	± 3%	1.25
Nitrate-Nitrite Nitrogen	50-100	Spectrophotometer	± 10%	0.05-10
Potassium	100-1,000	Atomic Absorption or Spectrophotometer	AA ± 10% S-20 ± 16%	0.005-2 DA-01-2
		4. Trace Metals		
Chromium (total and hexavalent)	100-1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 25% S-20 ± 3%	0.01-2000 DA-0.5-10 F-.005-.1
Copper	200 to 4,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 10%	0.005-10 DA-0.2-5 F-.005-0.1
Nickel	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 13% S-20 ± 25%	0.02-20 DA-0.3-5 F-0.005-0.1
Zinc	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 8% S-20 ± 15%	0.005-10,000 DA-0.3-5 F-0.0002-0.004
Mercury	100 to 1,000	Digestion Equipment, Spectrophotometer Atomic Absorption	AA ± 10% S-20 ± 15%	0.0002-10 DA-0.02-5 Flameless

CCR 000037493

Table B.-21. (Continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
		B. CHEMICAL INDICATORS		
		1. Major Solids Constituents		
Chloride	25 to 100	Specific ion Probe, Titration Setup	± 4%	1-250
Sulfate	100 to 1,000	Turbometric and/or Analysis	± 10%	1-40
Calcium	100 to 1,000	Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 10%	0.003-200 DA-0.2-7
Sodium	100 to 1,000	Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 10%	0.001-100
Iron	100-1,000	Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 10%	0.004-20 DA-0.3-5 F-0.005-0.1
Magnesium	100 to 1,000	Spectrophotometer or Atomic Absorption	AA ± 10%	0.004-200 DA-0.02-0.5 F-0.005-0.1
		2. Carbonaceous Constituents		
Biochemical Oxygen Demand	100-500	Incubator, Titration Assembly, D.O. Meter	± 20%	Varied
Chemical Oxygen Demand	50-100	Digestion Apparatus, Titration Assembly	± 10%	5-2,000
Total Organic Carbon	10	Total Organic Carbon Analyzer, or Digestion and Titration Assembly	± 5 to 10%	1-140

CCR 000037494

Table B. -21. (continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
Manganese	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 7% S-20 ± 15%	0.0002-10 DA-0.1-3 F-0.001-0.03
Cadmium	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 20% S-20 ± 25%	0.001-55 DA-0.0005-0.01 F-0.0005-0.01
Arsenic	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 15%	0.05-100 DA-0.5--5 Flameless
Cobalt	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 15%	0.03-10 DA-1-20 F-0.005-24
Lead	100 to 4,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 20%	0.05-10 F-0.005-0.1
Silver	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 20%	0.01-4 DA-0.1-4 F-0.001-0.025
Boron	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	S-20 ± 25%	0.1-10
Molybdenum	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 20%	0.1-20 DA-1-40 F-0.003-0.06
Selenium	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	AA ± 10% S-20 ± 25%	0.002-0.02 DA-0.002-0.02 F-0.005-0.1

CCR 000037495

Table B.-21.(continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
Thalium	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	-	0.005-20 DA-1.20 F-0.005-0.1
Antimony	100 to 1,000	Digestion Equipment, Spectrophotometer or Atomic Absorption	-	0.02-40 DA-1-40 F-0.02-0.3
		C. BIOLOGICAL INDICATORS 1. Pathogenic Indicators		
Fecal Strep. Fecal Coliform Salmonella Ascaris ova	100	Incubator Millipore Filtering apparatus Microscope Selinite broth (enrichment broth for salmonella)	± 8%	0-10^{12} Organisms Organisms Organisms
		II. SLUDGES, SOILS,* AND PLANT TISSUES A. Physical Indicators		
Bulk Density	5-50	Drying Oven and Sampler	± 10%	-
Moisture Content	5-50	Drying Oven,	± 10%	-
Porosity	5-50	Drying Oven	± 25%	-
Cation Exchange Capacity	10-20	-	± 25%	-
Water Capacity	5 to 10	Weighable Pressure Cell and Analytical Balance	-	-
Particle Fraction and particle analysis	10 to 20	Seiving Equipment, Hydrometer, and Analytical Balance	-	

CCR 000037496

Table B. -21. (continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
Total Suspended Solids	50-1,000	Steam Bath, Drying Oven, Filteration Setup, Analytical Balance	± 10%	20-20,000
Total Volatile Suspended Solids	50-100	Steam Bath, Drying Oven, Filteration Setup, Analytical Balance	± 10%	10-170
pH	10-20	pH Meter	±1.5%	-
		B. CHEMICAL INDICATORS		
		1. Major Solids Constituents		
Inorganic Sulfur	10	Total Sulfur-Organic Sulfur Oxidize and Analyze for Sulfate	± 2%	1-20,000
Chloride	.5-10	Potentiometer or Titration Method (Mohr titration)	± 2%	1-20,000
Sodium	2	Analytical Balance	± 2%	1-20,000
Calcium	0.5-10	Spectrophotometer	± 2%	20-10,000
Magnesium	0.5-10	Spectrophotometer	± 2%	20-10,000
Iron	0.5-1.0	Spectrophotometer	±4.1%	10,000-50,000
		2. Carbonaceous Constituents		
Organic Carbon	0.5-1.0	Titration Equipment, Spectrophotometer	± 20%	500-30,000
		3. Nutrient Indicators		
Nitrate-Nitrite Nitrogen	50-100	Spectrophotometer	± 10%	0.2-4
Total Kjeldahl Nitrogen	10-100	Kjeldahl Setup, Spectrophotometer	± 3%	25-1,500

CCR 000037497

Table B.-21. (continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Application Range mg/liter
Organic Phosphorous	1-3	Digestion Equipment, and Spectrophotometer	± 15%	25-600
Total Phosphorous	2-5	Digestion Equipment, and Spectrophotometer	± 5%	300-3,000
Potassium	.5-1	Muffle Furnace, Spectrophotometer	± 4%	500-25,000
		4. Trace Metals (totals)		
Zinc	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 3%	<1-1,500
Copper	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 5%	2-1,000
Cadmium	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 5%	.1-500
Nickel	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 10%	.2-200
Cobalt	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 5%	0.01-40
Mercury	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 5%	5-1,000
Lead	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 10%	1-[illegible]0

CCR 000037498

Table B.-21. (continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Application Range mg/liter
Chromium	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 3%	0.1-2,000
Antimony	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	-	-
Silver	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 10%	0.3-100
Arsenic	0.1-1	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 8%	1-10
Thalium	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	-	-
Boron	0.2-20	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 3%	3-200
Molybdenum	1-2	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 10%	.2-5
Selenium	1-5	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 10%	.2-5
Manganese	1-10	Digestion Equipment, Spectrophotometer or Atomic Absorption	± 2%	.1-3

CCR 000037499

Table B.- 21.(continued)

Parameter	Volume of Sample (ml)	Essential Instrumentation	Reliability (Coefficient of variation)	Applicable Range mg/liter
		5. Organic Pesticides		
Polychlorinated Biphenyls	1-2	Gas Liquid Chromatography and Electron Capture Detector	± 17%	> 0.01
Dieldrin	1-2	Gas Liquid Chromatography and Electron Capture Detector	± 10%	> 0.01
		C. BIOLOGICAL INDICATORS 1. Pathogenic Indicators		
Fecal Strep. Fecal Coliform Salmonella Ascaris ova	100	Incubator Millipore Filtering apparatus Microscope Selinite broth (enrichment broth for salmonella)	± 10%	0.10^{12} Organisms/cc

CCR 000037500

TABLE B-22

CHEMICAL ANALYSIS TEST METHODS

Tables 1, 2 and 3 specify the appropriate analytical procedures, described in "Test Methods for Evaluating Solid Waste" (SW-846), which should be used in determining whether the waste in question contains a given toxic constituent. Table 1 identifies the analytical class and the approved measurement techniques for each organic chemical listed in Appendix VII. Table 2 identifies the corresponding methods for the inorganic species. Table 3 identifies the specific sample preparation and measurement instrument introduction techniques which may be suitable for both the organic and inorganic species as well as the matrices of concern.

Prior to final selection of the analytical method the operator should consult the specific method descriptions in SW-846 for additional guidance on which of the approved methods should be employed for a specific waste analysis situation.

CCR 000037501

TABLE B-22-1

ANALYTICAL CHARACTERISTICS OF ORGANIC CHEMICALS

Compound	Sample Handling Class/Fraction	Non-GC Methods	Measurement Techniques GC/MS	Conventional GC - Detector	
Acetonitrile	Volatile		8.24	8.03	NSD
Acrolein	Volatile		8.24	8.03	NSD
Acrylamide	Volatile		8.24	8.01	FID
Acrylonitrile	Volatile		8.24	8.03	NSD
Benzene	Volatile		8.24	8.02	PID
Benz(a)anthracene	Extractable/BN	8.10(HPLC)	8.25	8.10	FID
Benzo(a)pyrene	Extractable/BN	8.10(HPLC)	8.25	8.10	FID
Benzotrichloride	Extractable/BN		8.25	8.12	ECD
Benzyl chloride	Volatile or Extractable/BN		8.24 8.25	8.01 8.12	HSD ECD
Benz(b)fluoanthene	Extractable/BN	8.10(HPLC)	8.25	8.10	FID
Bis(2-chloroethoxymethane)	Volatile		8.24	8.01	HSD
Bis(2-chloroethyl)ether	Volatile		8.24	8.01	HSD
Bis(2-chloroisopropyl)ether	Volatile		8.24	8.01	HSD
Carbon disulfide	Volatile		8.24	8.01	HSD
Carbon tetrachloride	Volatile		8.24	8.01	HSD

CCR 000037502

TABLE B-22-1 (Continued)

Compound	Sample Handling Class/Fraction	Non-GC Methods	Measurement Techniques GC/MS	Conventional GC - Detector	
Chlordane	Extractable/BN		8.25	8.08	HSD
Chlorinated dibenzodioxins	Extractable/BN		8.25	8.13	ECD
Chlorinated biphenyls	Extractable/BN		8.25	8.08	HSD
Chloroacetaldehyde	Volatile		8.24	8.01	HSD
Chlorobenzene	Volatile		8.24	8.01 8.02	HSD PID
Chloroform	Volatile		8.24	8.01	HSD
Chloromethane	Volatile		8.24	8.01	HSD
2-Chlorophenol	Extractable/BN		8.25	8.04	FID, ECD
Chrysene	Extractable/BN	8.10(HPLC)	8.25	8.10	FID
Creosote	Extractable/BN		8.25[1]	8.10	ECD
Cresol(s)	Extractable/A		8.25	8.04	FID, ECD
Cresylic acid(s)	Extractable/A		8.25	8.04	FID, ECD
Dichlorobenzene(s)	Extractable/BN		8.25	8.01 8.02 8.12	HSD, PID, ECD
Dichloroethane(s)	Volatile		8.24	8.01	HSD
Dichloromethane	Volatile		8.24	8.01	HSD
Dichlorophenoxy-acetic acid	Extractable/A		8.25	8.40	HSD
Dichloropropanol	Extractable/BN		8.25	8.12	ECD

CCR 000037503

TABLE B -1 (Continued)

Compound	Sample Handling Class/Fraction	Non-GC Methods	Measurement Techniques GC/MS	Conventional GC - Detector	
2,4-Dimethylphenol	Extractable/A		8.25	8.04	FID, ECD
Dinitrobenzene	Extractable/BN		8.25	8.09	FID, ECD
4,6-Dinitro-o-cresol	Extractable/A		8.25	8.04	FID, ECD
2,4-Dinitrotoluene	Extractable/BN		8.25	8.09	FID, ECD
Endrin	Extractable/P		8.25	8.08	HSD
Ethyl ether	Volatile		8.24	8.01 8.02	FID FID
Formaldehyde	Volatile		8.24	8.01	FID
Formic acid	Extractable/BN		8.25	8.06	FID
Heptachlor	Extractable/P		8.25	8.06	HSD
Hexachlorobenzene	Extractable/BN		8.25	8.12	ECD
Hexachlorobutadiene	Extractable/BN		8.25	8.12	ECD
Hexachloroethane	Extractable/BN		8.25	8.12	ECD
Hexachlorocyclopentadiene	Extractable/BN		8.25	8.12	ECD
Lindane	Extractable/P		8.25	8.08	HSD
Maleic anhydride	Extractable/BN		8.25	8.06	ECD, FID
Methanol	Volatile		8.24	8.01	FID
Methomyl	Extractable/BN	8.32(HPLC)			
Methyl ethyl ketone	Volatile		8.25	8.01 8.02	FID FID
Methyl isobutyl ketone	Volatile		8.25	8.01 8.02	FID FID

CCR 000037504

TABLE B-22-1 (Continued)

Compound	Sample Handling Class/Fraction	Non-GC Methods	Measurement Techniques GC/MS	Conventional GC - Detector	
Naphthalene	Extractable/BN	8.10(HPLC)	8.25	8.10	FID
Napthoquinone	Extractable/BN		8.25	8.06 8.09	ECD, FID FID
Nitrobenzene	Extractable/BN		8.25	8.09	ECD, FID
4-Nitrophenol	Extractable/A		8.24	8.04	ECD, FID
Paraldehyde (trimer of acetaldehyde)	Volatile		8.24	8.01	FID
Pentachlorophenol	Extractable/A		8.25	8.04	ECD
Phenol	Extractable/A		8.25	8.04	ECD, FID
Phorate	Extractable/BN			8.22	FPD
Phosphorodithioic acid esters	Extractable/BN			8.06 8.09 8.22	ECD, FID ECD, FID FPD
Phthalic anhydride	Extractable/BN		8.25	8.06 8.09	ECD, FID ECD, FID
2-Picoline	Extractable/BN		8.25	8.06 8.09	ECD, FID ECD, FID
Pyridine	Extractable/BN		8.25	8.06 8.09	ECD, FID ECD, FID
T trachlorobenzene(s)	Extractable/BN		8.25	8.12	ECD
Tetrachloroethane(s)	Volatile		8.24	8.01	HSD
Tetrachloroethene	Volatile		8.24	8.01	HSD

CCR 000037505

TABLE B-2. (Continued)

Compound	Sample Handling Class/Fraction	Non-CC Methods	Measurement Techniques GC/MS	Conventional GC - Detector	
Tetrachlorophenol	Extractable/A		8.24	8.04	ECD
Toluene	Volatile		8.24	8.02	PID
Toluenediamine	Extractable/BN	8.05(HPLC)	8.25		
Toluene diisocyanate(s)	Extractable/Nonaqueous		8.25	8.06	FID
Toxaphene	Extractable/P		8.25	8.08	HSD
Trichloroethane	Volatile		8.24	8.01	HSD
Trichloroethene(s)	Volatile		8.24	8.01	HSD
Trichlorofluoromethane	Volatile		8.24	8.01	HSD
Trichlorophenol(s)	Extractable/A		8.25	8.04	HSD
2,4,5-TP(Silvex)	Extractable/A		8.25	8.40	HSD
Trichloropropane	Volatile		8.24	8.01	HSD
Vinyl chloride	Volatile		8.24	8.01	HSD
Vinylidene chloride	Volatile		8.24	8.01	HSD
Xylene	Volatile		8.24	8.02	PID

ECD = Electron capture detector;
FID = Flame ionization detector;
FPD = Flame photometric detector;
HSD = Halide specific detector;
HPLC = High pressure liquid chromatography;
NSD = Nitrogen-specific detector;
PID = Photoionization detector.

1: Analyze for phenanthrene and carbazole; if these are present in a ratio between 1.4:1 and 5:1, creosote should be considered present.

CCR 000037506

TABLE B-22-2

ANALYTICAL CHARACTERISTICS OF INORGANIC SPECIES

Species	Sample Handling Class	Measurement Technique	Method #
Antimony	Digestion	Atomic Absorbtion-Flame/Furnace	8.50
Arsenic	Hydride	Atomic Absorbtion-Flame	8.51
Barium	Digestion	Atomic Absorbtion-Furnace/Flame	8.52
Cadmium	Digestion	Atomic Absorbtion-Furnace/Flame	8.53
Chromium	Digestion	Atomic Absorbtion-Furnace/Flame	8.54
Cyanides	Hydrolysis	Absorption Spectroscopy	8.55
Lead	Digestion	Atomic Absorbtion-Furnace/Flame	8.56
Mercury	Cold Vapor	Atomic Absorbtion	8.57
Nickel	Digestion	Atomic Absorbtion-Furnace/Flame	8.58
Selenium	Hydride Digestion	Atomic Absorbtion-Furnace/Flame	8.59
Silver	Digestion	Atomic Absorbtion-Furnace/Flame	8.60

CCR 000037507

TABLE B-22-3

SAMPLE PREPARATION/SAMPLE INTRODUCTION TECHNIQUES

Sample Handling Class	Physical Characteristics of Waste†		
	Fluid	Paste	Solid
Volatile	Purge & Trap Direct Injection	Purge & Trap Headspace	Headspace
Semivolatile and Nonvolatile	Direct Injection Shake out	Shake out	Shake out Soxhlet Sonication
Inorganic	Direct injection Digestion Hydride	Digestion Hydride	Digestion Hydride

Procedure	Method Number(s)
Digestion	See appropriate procedure for element of interest.
Direct injection	8.80
Headspace	8.82
Hydride	See appropriate procedure for element of interest.
Purge & Trap	8.83
Shake out	8.84
Sonication	8.85
Soxhlet	8.86

† For purposes of this Table, fluid refers to readily pourable liquids, which may or may not contain suspended particles. Paste-like materials, while fluid in the sense of flowability, can be thought of as being thixotropic or plastic in nature, e.g. paints. Solid materials are those wastes which can be handled without a container (i.e., can be piled up without appreciable sagging).

CCR 000037508

2.2.1. Procedures for Organics: Currently, the Effluent Guidelines Division of EPA has listed required analyses for the priority organic pollutants (65 Pollutants which result in 114 specific organic pollutants for 21 industrial categories. The document, entitled "Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants" (commonly known as The Priority Pollutant Protocol) was released in April, 1977. It provides analytical procedures for these 114 organic compounds by gas chromatography - mass spectrometry. This analytical scheme represents a screening approach by defining applies to two classes of compounds, purgeable volatiles and solvent extractable semi-volatiles (amenable to analysis by gas chromatography). These classifications are subdivided into halogenated and non-halogenated purgeables, pesticides, base-neutrals, and acid extracts as listed in Table B-23.

The 114 priority organics are also divided into the 12 categories shown in Table B-24. The applicable analytical techniques are described by EPA in the December 3, 1979, Federal Register and are described in Tables B-25 and B-26, and B-27. These methods will supplement those already approved (1973) for NPDES Programs, (See Table B-28). Of the initial series of eight methods, six are for Pesticides and Herbicides. The other two methods are for PCB's and organochlorine solvents. A colorimetric method (Chloramine-T) for benzidine and its salts and methods for pentachlorophenol will be added and referenced at a later time.

Additional methods that have been proposed or are being considered for proposal a, 304(h) methods include, the GC-MS methods for Purgeables (Method 624) and for Semi-Volatiles (Method 625) for priority pollutants and a direct aqueous injection method for acrolein and acrylonitrile (See Table B-29). As these materials become approved by EPA, they will be considered by the Department of Natural Resources.

Other procedures such as thin layer chromatography, solvent extraction, etc. are currently under review since most of this work is in its initial research stag . Permittees should address this matter with their best discretion and with the approval of the Department of Natural Resources.

CCR 000037509

TABLE B-23 Major Classes or Organic Compounds Considered.

Purgeable Volatile
Halogenated
Non-Halogenated
Solvent Extractable Semi-Volatile
Neutrals
Bases
Acids

CCR 000037510

TABLE B-24 Organic Compound Classes for which Methods are Presented.

Category	Compound[a]
1	Phthalate Esters (6)
2	Haloethers (7)
3	Chlorinated Hydrocarbons (9)
4	Nitrobenzenes (3), Isophorone
5	Nitrosamines (3)
6	(2,3,7,8-TCDD)
7	Benzidines (3)
8	Phenols (11)
9	Polynuclear Aromatics (16)
10	Pesticides and PCB's (21)
	Halocarbons (26)
	Aromatics (3)
12	Acrolein and Acrylonitrile

[a] Numbers in parentheses indicate number of compounds in the category

CCR 000037511

Analytical minimum detection levels for many pesticides already existed in the Federal Register, so it was suggested that those standard methods and detection levels be used to analyze for pesticides and polychlorinated biphenyls (PCB's). However, it is acknowledged that the challenge of chemical analysis of a sample for literally thousands of components is staggering -- especially when these components may be at part per billion levels in a complex sample matrix. The following considerations have been made to make this responsibility a more manageable one:

1. In addressing the 13 metals on the Toxic Pollutants List the term, "....and their compounds," is interpreted to mean "total metals," which includes both inorganic and organometallic compounds.

2. A standard method for analysis of total cyanides was selected and asbestos methodology is deferred until later.

3. The standard EPA pesticide methodologies are recommended for the analysis of pesticides and their metabolites. This typically involves extraction, Florisil column cleanup of the concentrated extract and gas chromatography.

4. Not counting PCB's, toxaphene, and chlordane, there remain 18 groups of organic pollutants each containing 2 to 50 compounds.

Table B-25. summarizes this list and also indicates the relative frequency with which these compounds are being found in industrial wastewaters. The particular screening characterization is thus seen to use the following set of categories:

metals
asbestos
total cyanides
pesticides
compounds extracted under acidic conditions
compounds extracted under alkaline conditions
neutral extractable compounds
total phenols
purgeable compounds

CCR 000037512

Table B-4.B.

EPA list of 129 Priority Pollutants and the relative frequency of these materials in industrial wastewaters

Percent of samples[a]	Number of industrial categories[b]		Percent of samples[a]	Number of industrial categories[b]	
		31 are purgeable organics			
1.2	5	Acrolein	2.1	5	1,2-Dichloropropane
2.7	10	Acrylonitrile	1.0	5	1,3-Dichloropropene
29.1	25	Benzene	34.2	25	Methylene chloride
29.3	28	Toluene	1.9	6	Methyl chloride
16.7	24	Ethylbenzene	0.1	1	Methyl bromide
7.7	14	Carbon tetrachloride	1.9	12	Bromoform
5.0	10	Chlorobenzene	4.3	17	Dichlorobromomethane
6.5	16	1,2-Dichloroethane	6.8	11	Trichlorofluoromethane
10.2	25	1,1,1-Trichloroethane	0.3	4	Dichlorodifluoromethane
1.4	8	1,1-Dichloroethane	2.5	15	Chlorodibromomethane
7.7	17	1,1-Dichloroethylene	10.2	19	Tetrachloroethylene
1.9	12	1,1,2-Trichloroethane	10.5	21	Trichloroethylene
4.2	13	1,1,2,2-Tetrachloroethane	0.2	2	Vinyl chloride
0.4	2	Chloroethane	7.7	18	1,2-trans-Dichloroethylene
1.5	1	2-Chloroethyl vinyl ether	0.1	2	bis(Chloromethyl) ether
40.2	28	Chloroform			
		46 are base/neutral extractable organic compounds			
		1,2-Dichlorobenzene	5.7	11	Fluorene
6.0	9	1,3-Dichlorobenzene	7.2	12	Fluoranthene
		1,4-Dichlorobenzene	5.1	9	Chrysene
0.5	5	Hexachloroethane	7.8	14	Pyrene
0.2	1	Hexachlorobutadiene	10.6	16	Phenanthrene
1.1	7	Hexachlorobenzene			Anthracene
1.0	6	1,2,4-Trichlorobenzene	2.3	6	Benzo(a)anthracene
0.4	3	bis(2-Chloroethoxy) methane	1.6	6	Benzo(b)fluoranthene
10.6	18	Naphthalene	1.8	6	Benzo(k)fluoranthene
0.9	9	2-Chloronaphthalene	3.2	8	Benzo(a)pyrene
1.5	13	Isophorone	0.8	4	Indeno(1,2,3-c,d)pyrene
1.8	9	Nitrobenzene	0.2	4	Dibenzo(a,h)anthracene
1.1	3	2,4-Dinitrotoluene	0.6	7	Benzo(g,h,i)perylene
1.5	9	2,6-Dinitrotoluene	0.1	2	4-Chlorophenyl phenyl ether
0.04	1	4-Bromophenyl phenyl ether	0	0	3,3'-Dichlorobenzidine
41.9	25	bis(2-Ethylhexyl) phthalate	0.2	4	Benzidine
6.4	12	Di-*n*-octyl phthalate	1.1	4	bis(2-Chloroethyl) ether
5.8	15	Dimethyl phthalate	0.8	7	1,2-Diphenylhydrazine
7.6	20	Diethyl phthalate	0.1	1	Hexachlorocyclopentadiene
18.9	23	Di-*n*-butyl phthalate	1.2	5	N-Nitrosodiphenylamine

CCR 000037513

Because of their availability, it was decided to use standard pesticide methodologies for the analysis of pesticides and their metabolites. This usually involves extraction. Florisil column cleanup of the concentrated extract and gas chromatographic.

Table B-4,B. (Continued)

Percent of samples[a]	Number of industrial categories[b]		Percent of samples[a]	Number of industrial categories[b]	
4.5	12	Acenaphthylene	0.1	1	N-Nitrosodimethylamine
4.2	14	Acenaphthene	0.1	2	N-Nitrosodi-*n*-propylamine
8.5	13	Butyl benzyl phthalate	1.4	6	bis(2-Chloroisopropyl) ether
		11 are acid extractable organic compounds			
26.1	25	Phenol	1.9	8	*p*-Chloro-*m*-cresol
2.3	11	2-Nitrophenol	2.3	10	2-Chlorophenol
2.2	9	4-Nitrophenol	3.3	12	2,4-Dichlorophenol
1.8	6	2,4-Dinitrophenol	4.6	12	2,4,6-Trichlorophenol
1.1	6	4,6-Dinitro-o-cresol	5.2	15	2,4-Dimethylphenol
6.9	18	Pentachlorophenol			
		26 are pesticides/PCB's			
0.3	3	α-Endosulfan	0.3	3	Heptachlor
0.4	4	β-Endosulfan	0.1	1	Heptachlor epoxide
0.2	2	Endosulfan sulfate	0.2	4	Chlordane
0.6	4	α-BHC	0.2	2	Toxaphene
0.8	6	β-BHC	0.6	2	Aroclor 1016
0.2	4	δ-BHC	0.5	1	Aroclor 1221
0.5	3	γ-BHC	0.9	2	Aroclor 1232
0.5	5	Aldrin	0.8	3	Aroclor 1242
0.1	3	Dieldrin	0.6	2	Aroclor 1248
0.04	1	4,4'-DDE	0.6	3	Aroclor 1254
0.1	2	4,4'-DDD	0.5	1	Aroclor 1260
0.2	2	4,4'-DDT	—	—	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD)
0.2	3	Endrin			
0.2	2	Endrin aldehyde			
		13 are metals			
18.1	20	Antimony	16.5	20	Mercury
19.9	19	Arsenic	34.7	27	Nickel
14.1	18	Beryllium	18.9	21	Selenium
30.7	25	Cadmium	22.9	25	Silver
53.7	28	Chromium	19.2	19	Thallium
55.5	28	Copper	54.6	28	Zinc
43.8	27	Lead			
		Miscellaneous			
33.4	19	Total cyanides	Not available		Asbestos (fibrous)
			Not available		Total phenols

[a] The percent of samples represents the number of times this compound was found in all samples in which it was analyzed for [illegible], the total as of 31 August 1978. Numbers of samples ranged from 2532 to 2938 with the average being 2617.

[b] A total of 32 industrial categories and subcategories were surveyed for organics and 28 for metals as of 31 August 1978.

Volume [illegible] Apr. 1979 419

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Tentative monitoring phase methods

TABLE B-25.

1	Battelle	Phthalate esters	Extract with CH_2Cl_2	Florisil	Isothermal GC at two different temperatures	5% SP-2401/1.95% OV-1201	ECD
2	Monsanto	7 nitroaromatics	Extract with CH_2Cl_2	Florisil	Temperature programmed GC	3% SP-1000	Electrolytic conductivity
3	Hydroscience	9 chlorinated hydrocarbons	Extract with CH_2Cl_2	Florisil	Isothermal GC at two different temperatures	1.5% OV-1/1.5% OV-225	ECD
4	Battelle	3 nitrobenzenes and isophorone	Extract with CH_2Cl_2; exchange with toluene	Florisil	Isothermal GC	1.5% OV-17/1.95% QF-1	ECD and FID
5	SWRI	3 nitrosamines	Extract with CH_2Cl_2; exchange with hexane	Florisil	Isothermal GC at two different temperatures	Carbowax 20M	Alkali FID
6	Carborundum	TCDD	Extract with CH_2Cl_2	Wash with acid and base; carbon and/or silica column	Isothermal GC		MS
7	Battelle	2 benzidines and diphenylhydrazine[b]	Extract with ethyl acetate at pH 8–9	Wash extract with acid. Make acid wash alkaline & extract with ethyl acetate	HPLC, isocratic elution	Lichrosorb RP-2 reverse phase	Electrochemical
8	Hydroscience	11 phenols	Extract with CH_2Cl_2 at pH 2	1. None for 2 nitrophenols 2. Silica gel of pentafluorobenzyl derivatives of 9 phenols	1. Temperature programmed GC for 2 nitrophenols 2. Isothermal GC for 9 other phenols	1. SP-1240-DA 2. 5% OV-17	1. FID 2. ECD
9	Battelle	16 polynuclear aromatics	Extract with CH_2Cl_2; exchange with cyclohexane	Silica gel; acetonitrile solvent exchange	HPLC, Gradient elution	Perkin-Elmer HC-ODS reverse phase	Fluorescence at two different excitation & emission wavelengths
10	SWRI	25 pesticides	Extract with CH_2Cl_2	Florisil; Collect 3 fractions; Hexane solvent exchange	Isothermal GC	1.5% SP-2250/1.95% SP-2401	ECD
11	Carborundum	26 purgeables[c]	1. Purge and trap using Tenax/silica gel trap or 2. Extract with pentane	None	1. Temperature programmed GC 2. Isothermal GC	1% SP-1000	1. FID for nonhalogenated compounds. Electrolytic conductivity for halogenated compounds 2. ECD with extracts
12	Carborundum	Acrolein, acrylonitrile and CF_2Cl_2	Direct aqueous injection	None	Temperature programmed GC	0.27% Carbowax 1500	FID

[a] The 114 organic priority pollutants are divided into 12 groups; 20 labs will verify the methods before the end of this year.

[b] Diphenylhydrazine is so unstable that method development work has ceased with it.

[c] EPA recommends that chloroethyl vinyl ether (from Group 2), the three dichlorobenzenes (from Group 3) and dichlorodifluoromethane (from Group 12) be moved to this group. This would raise the number of purgeable Priority Pollutants to 31.

CCR 000037515

CCR 000037516

TABLE B-26. Summary of Conditions for Purge and Trap Analyses.* (GC/MS)

Method No.	Parameter	Temp.	Sorbent Trap	Column Packing	Gas Chromatography Temperature (°C)	Detector[a]
601 (F.R. pp. 5)	Halocarbons	Ambient	OV-1, Tenax Silica Gel, Charcoal	Carbopak- +1% SP 1000	45 to 220	OHD
602 (F.R. pp. 5)	Aromatics	Ambient	OV-1, Tenax 1.7% Bentone-34	5% SP 2100 +	50 to 90	PID
603 (F.R. pp. 15)	Acrolein/ Acrylonitrile	85° C	Porpak-N	Chromosorb-101	100 to 140	FID

[a] Detector abbreviations:
OHD - Organohalide detector
PID - Photoionization detector
FID - Flame ionization detector

*Source "EPA Proposed Guidelines Establishing Test Procedures for the Analysis of Pollutants" 44 Federal Register 69464 (Dec. 3, 1979), and Environment Reporter

TABLE B-27. Summary of Methods for Semi-Volatile Organic Priority Pollutants.*

EPA Method No.	Parameter	Method	Cleanup	Column	Gas Chromatography Temperature (°2)	Detector[a]
	Acids					
604 (F.R. pp. 20)	Phenols	GC	Silica gel	1% SP 1240 DA, 5% OV-17	80 to 150, 200	FID, EC (DERIV.)
	Bases					
605 (F.R. pp. 25)	Benzidines	LC	H_2SO_4	Lichrosorb RP-2	Ambient	ED
	Neutrals					
606 (F.R. pp. 27)	Phthlates	GC	Florisil, Alumina	1.5% SP 2250 + 1.95% SP 2401	180 and 220	EC, FID
607 (F.R. pp. 32)	Nitrosamines	GC	10% HCl,	10% Carbowax 20 M + 2% KOH	110 and 220	NPD
608 (F.R. pp. 37)	Pesticides & PCBs	GC	Florisil	1.5% SP 2250 + 1.95% SP 2401	160 and 200	EC
609 (F.R. pp. 46)	Nitroaromatics & Isophorone	GC	Florisil	1.5% OV-17 1.95% QF-1	85 and 145	EC
610 (F.R. pp. 50)	Polynuclear Aromatics	LC GC	Silica gel	HC-ODS Sil-X 3% OV-17	Ambient 100 to 280	UV, Fluoresce FID
611 (F.R. pp. 53)	Haloethers	GC	Florisil	SP 1000	60 to 230	OHD
612 (F.R. pp. 58)	Chlorinated	GC	Florisil	1.5% OV-1 + 2.4% OV-225	75 or 165	EC
613 (F.R. pp. 62)	2,3,7,8-TCDD	GC	N OH, H_2SO_4, Silica gel, Alumina, Charcoal/ Silica gel	1.5% SP 2250 + 1.95% SP 2401	220 210	EC MS

CCR 000037517

TABLE B-27. (Continued)

[a]Detector abbreviations:
- FID - Flame ionization detector
- EC - Electron capture detector
- ED - Electrochemical detector
- NPD - Nitrogen-phosphorus detector
- UV - Ultraviolet detector
- F - Fluorescence detector
- OHD - Organaohalide detector
- MS - Mass spectrometer detector
- TEA - Thermal electron analyzer

CCR 000037518

TABLE B-28. Existing 304 (h) Methods.

EPA Method No.	Parameters Measured
614	Organophosphorus Pesticides
615	Chlorinated Herbicides
616	Benzidine
617	Organochlorine Pesticides & PCBs
618	Chlorinated Solvents
619	Triazine Herbicides
620	O-Aryl Carbamates
621	N-Aryl Carbamates & Ureas

CCR 000037519

TABLE B-29. Additional Methods Being Proposed As 304(h) Methods.

EPA Method No.	Parameters Measured
622	Organophosphorus Pesticides
623	4,4'-Methylene Bis (2-chloroaniline)
624	Purgeables by GC-MS
625	Semi-Volatiles by GC-MS
626	Acrolein & Acrylonitrile by DAIGC[a]
627	Dinitroaniline Pesticides
628	Carbofuran
629	Cyanazine
630	Dithiocarbamates
631	Carbendazim
632	Carbamate and Urea Pesticides
633	Organonitrogen Pesticides

[a]DAIGC - Direct aqueous injection gas chromatography

CCR 000037520

APPENDIX A

SIGNIFICANT WASTEWATER PARAMETERS FOR SELECTED INDUSTRIAL CLASSIFICATIONS

A. ALUMINUM INDUSTRY*

- Suspended Solids
- Free Chlorine
- Fluoride
- Phosphorus
- Oil and Grease
- pH
- Total Dissolved Solids
- Phenol
- Aluminum

B. AUTOMOBILE INDUSTRY*

- Suspended Solids
- Oil and Grease
- BOD_5
- Chromium
- Phosphorus
- Cyanide
- Copper
- Nickel
- Iron
- Zinc
- Phenols
- COD
- Chlorides
- Nitrate
- Ammonia
- Sulfate
- Tin
- Lead
- Cadmium
- Total Dissolved Solids

C. BEET SUGAR PROCESSING INDUSTRY

- BOD_5
- pH
- Suspended Solids
- Setteable Solids
- Total Coliforms
- Oil and Grease
- Toxic Materials
- Alkalinity
- Nitrogen, Total
- Temperature
- Total Dissolved Solids
- Color
- Turbidity
- Foam

D. BEVERAGE INDUSTRY

- BOD_5
- pH
- Suspended Solids
- Setteable Solids
- Total Coliforms
- Oil and Grase
- Toxic Materials
- Nitrogen
- Phosphorus
- Temperature
- Total Dissolved Solids
- Color
- Turbidity
- Foam

E. CANNED AND PRESERVED FRUITS AND VEGETABLES INDUSTRY*

- BOD_5
- COD
- pH
- Suspended Solids
- Color
- Fecal Coliforms
- Phosphorus, Total
- Temperature
- TOC
- Total Dissolved Solids

CCR 000037521

F. CONFINED LIVESTOCK FEEDING INDUSTRY*

BOD_5
COD^5
Total Solids
pH
Fecal Coliforms
Nitrogen
Phosphate
TOC

G. DAIRY INDUSTRY*

BOD_5
COD^5
pH
Suspended Solids
Chlorides
Color
Nitrogen
Phosphorus
Temperature
Total Organic Carbon
Toxicity
Turbidity

H. FERTILIZER INDUSTRY*

Nitrogen Fertilizer Industry

Ammonia
Chloride
Chromium, Total
Dissolved Solids
Nitrate
Sulfate
Suspended Solids
Urea & Other Organic Nitrogen Compounds
Zinc
Calcium
COD
Gas Purification Chemicals
Iron, Total
Oil and Grease
pH
Phosphate
Sodium
Temperature

Phosphate Fertilizer Industry

Calcium
Dissolved Solids
Fluoride
pH
Phosphorus
Suspended Solids
Temperature
Acidity
Aluminum
Arsenic
Iron
Mercury
Nitrogen
Sulfate
Uranium

CCR 000037522

I. FLATGLASS, CEMENT, LIME, GYPSUM AND ASBESTOS INDUSTRIES

Flatglass

COD
pH
Phosphorus
Sulfate
Suspended Solids
Temperature

BOD_5
Chromates
Zinc
Copper
Chromium
Iron
Tin
Silver
Nitrates
Organic and Inorganic Waterbreaking Chemicals
Synthetic Resins
Total Dissolved Solids

Cement, Concrete, Lime and Gypsum

COD
pH
Suspended Solids
Temperature

Alkalinity
Chromates
Phosphates
Zinc
Sulfite
Total Dissolved Solids

Asbestos

Chromates
COD
pH
Suspended Solids

Phosphates
Zinc
Sulfite
Total Dissolved Solids

J. GRAIN MILLING INDUSTRY*

BOD_5
Suspended Solids
Temperature

COD
pH
TOC
Total Dissolved Solids

CCR 000037523

K. INORGANIC CHEMICALS, ALKALIES AND CHLORINE INDUSTRY*

Acidity/Alkalinity
Total Solids
Total Suspended Solids
Total Dissolved Solids
Chlorides
Sulfates
BOD_5
COD^5
TOD
Chlorinated Benzenoids and Polynuclear Aromatics
Phenol
Fluoride
Silicates
Total Phosphorus
Cyanide
Mercury
Chromium
Lead
Titanium
Iron
Aluminum
Boron
Arsenic
Temperature

L. LEATHER TANNING AND FINISHING INDUSTRY*

BOD_5
COD^5
Chromium, Total
Grease
pH
Suspended Solids
Total Solids
Alkalinity
Color
Hardness
Nitrogen
Sodium Chloride
Temperature
Toxicity

M. MEAT PRODUCTS INDUSTRY

BOD_5
pH
Suspended Solids
Setteable Solids
Oil and Grease
Total Coliforms
Toxic Matrials
Ammonia
Turbidity
Total Dissolved Solids
Phosphate
Color

N. METAL FINISHING INDUSTRY

COD
Oil and Grease
Heavy Metals
Suspended Solids
Cyanide

CCR 000037524

O. ORGANIC CHEMICALS INDUSTRY*

BOD_5
COD
pH
Total Suspended Solids
Total Dissolved Solids
Free-Floating Oil
TOC
Organic Chloride
Total Phosphorus
Heavy Metals
Phenol
Cyanides
Total Nitrogen
Other Pollutants

P. PETROLEUM REFINING INDUSTRY*

Ammonia
BOD_5
Chromium
COD
Oil, Total
pH
Phenol
Sulfide
Suspended Solids
Temperature
Total Dissolved Solids
Chloride
Color
Copper
Cyanide
Iron
Lead
Mercaptans
Nitrogen
Odor
Total Phosphorus
Sulfate
TOC
Toxicity
Turbidity
Volatile Suspended Solids
Zinc

Q. PLASTIC MATERIALS AND SYNTHETICS INDUSTRY

BOD
COD
pH
Total Suspended Solids
Oil and Grease
Phenols
Total Dissolved Solids
Sulfates
Phosphorus
Nitrate
Organic Nitrogen
Ammonia
Cyanides
Toxic additives and materials
Chlorinated benzenoids and polynuclear aromatics
Zinc
Mercaptans

CCR 000037525

R. PULP AND PAPER INDUSTRY

BOD_5
COD^5
TOC
pH
Total Suspended Solids
Coliforms, total and fecal
Color
Heavy metals
Toxic materials
Turbidity
Ammonia
Oil and Grease
Phenols
Sulfite
Nutrients (nitrogen and phosphorus)
Total Dissolved Solids

S. STEAM GENERATION AND STEAM ELECTRIC POWER GENERATION*

BOD_5
Chlorine
Chromate
Oil
pH
Phosphate
Suspended Solids
Temperature
Boron
Copper
Iron
Non-Degradable Organics
Total Dissolved Solids
Zinc

T. STEEL INDUSTRY

Oil and Grease
pH
Chloride
Sulfate
Ammonia
Cyanide
Phenol
Suspended Solids
Iron
Tin
Temperature
Chromium
Zinc

U. TEXTILE MILL PRODUCTS INDUSTRY

BOD_5
COD^5
pH
Suspended Solids
Chromium
Phenolics
Sulfide
Alkalinity
Heavy Metals
Color
Oil and Grease
Total Dissolved Solids
Sulfides
Temperature
Toxic Materials

*Guidelines for these industries not currently available at time of publication.

CCR 000037526

APPENDIX B-1

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CCR 000037528

Amendments To AOPM

ANALYTICAL OPERATING PROCEDURES MANUAL

PART C

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF ENVIRONMENTAL AFFAIRS

HAZARDOUS WASTE MANAGEMENT DIVISION

October 19, 1980

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LOUISIANA DEPARTMENT OF NATURAL RESOURCES
Office of Environmental Affairs
Hazardous Waste Management Division

Amendments:
Analytical Operating Procedures Manual

October 17, 1980

Part C: INTERIM STATUS STANDARDS GUIDELINES

INTRODUCTION

These amendments to the Analytical Operating Procedures Manual (AOPM) clarify and set forth in the form of guidelines certain expectations of the Louisiana Hazardous Waste Management Plan (HWMP) concerning the mandatory interim status standards for Hazardous Waste Treatment, Storage and Disposal Facilities under 5.2.2 A of the HWMP, as amended September 5, 1980.

Publication of these guidelines serves three purposes: (1) they will be utilized by the staff of the Hazardous Waste Management Division as statements of minimimum technical requirements for satisfaction of the interim status conditions set forth under section 5.2.2 A of the HWMP; (2) where compliance orders or schedules are issued to existing facilities, adherence to procedures set forth under this section of the AOPM will be made a condition thereof; (3) they are intended to serve as technical assistance and guidance to the regulated community as statements of minimum technical requirements applicable to Treatment, Storage and Disposal Facilities under interim status.

In addition to the utilization of these guidelines for statements of minimum conditions for satisfaction of interim status requirements of section 5.2.2 A, these guidelines will also be utilized by staff of the Hazardous Waste Division for purposes of statements of minimum requirements of Interim or Standard Permits issued in accordance with section 5.2.3 A, except as precluded by such specific and more stringent minimum requirements otherwise set forth by the HWMP.

Where compliance orders, compliance schedules or interim or standard permits are established or issued, adherence to procedures set forth under this section of the AOPM will be made a condition thereof.

Publication or utilization of these guidelines does not limit or restrict the Secretary, the Assistant Secretary, or the Environmental Control Commission from using more stringent requirements as may be established through issuance of permit conditions, compliance orders or other lawful means as may be necessary to prevent violations of the HWMP, to establish compliance with the requirements and standards of the HWMP, and to prevent endangerment of the public health or the environment.

Full compliance with the Manifest System as set forth in the HWMP is a mandatory requirement for all generators, transporters, and owners and operators of hazardous waste treatment, storage, and disposal facilities.

GENERAL

C.1. Special Reporting: The owner or operator of a facility that has arranged

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to receive hazardous waste from a foreign source must notify the Hazardous Waste Program Administrator in writing at least four weeks in advance of the date the waste is expected to arrive at the facility.

C.2. General Waste Analysis: Before an owner or operator treats, stores, or disposes of any hazardous waste, a detailed chemical and physical analysis of a representative sample of the waste must be obtained. To support the requirements of the HWMP as set forth in sections 8.4.2A1), 8.4.2A2), 8.4.2B, 8.4.9A3), 8.4.9A9), and 8.5.1, each owner or operator shall develop and implement a waste analysis plan. Such plan shall be up-dated as required (e.g., to incorporate modifications and additions made necessary by changes of waste streams or operating procedures), and shall be available at the site for inspection. The waste analysis plan must address the following areas of concern:

1. The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters. As applicable, the rationale for the selection of parameters must address the requirements of:
   a. Receipt and acceptance of hazardous waste and verification of manifest data;
   b. Technical support to decisions on management of the wastes, including any movement or routing of the wastes, and safe and effective storage, treatment and disposal.
2. The test method or methods which will be used to test for each of these parameters.
3. The sampling method or methods which will be used to obtain representative samples of the hazardous waste. Approvable sampling methods may include:
   a. Sampling protocols identified in the Federal Register, Vol. 45, No. 98, p. 33127, as follows:
      Extremely viscous liquid - ASTM Standard D140-70.
      Crushed or powdered material - ASTM Standard D346-75.
      Soil or rock-like material - ASTM Standard D420-69.
      Soil-like material - ASTM Standard D1452-65.
      Fly ash-like material - ASTM Standard D2234-76.
      Containerized liquid wastes - "COLIWASA" described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," U.S. EPA, Office of Solid Waste, also described in "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA 600/2-80-018, January, 1980.
      Liquid waste in pits, ponds, lagoons and similar reservoirs - "Pond Sampler" described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," U.S. EPA Office of Solid Waste, also described in "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA 600/2-80-018, January, 1980.
   b. An equivalent sampling method. Note: documentation supporting the choice of the equivalent sampling method must be provided.
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 who ship wastes to the site have agreed to supply.

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C.3. General inspection requirements: Section 5.5.2A of the HWMP as amended requires the owner or operator of any treatment, storage or disposal facility to develop a schedule of routine facility inspections and to keep a log or record of all inspections carried out thereunder. The required schedule of inspections must include:

1. Inspection of the facility for malfunctions and deterioration, operator errors, and discharges which may be causing, or may lead to:
   a. Release of hazardous waste constituents to the environment, or;
   b. A threat to human health.

   The owner or operator must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment.
2. The owner or operator must develop and follow a written schedule for inspecting and monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (e.g., dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.
3. The owner or operator must keep this schedule at the site, and available for inspection by authorized representatives of th Hazardous Waste Division.
4. The schedule must identify the types of problems (e.g., malfunctions or deterioration) which are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, eroding dike, etc.), and the frequency of inspection for each.
5. The frequency of inspection may vary for the items on the schedule. However, it should be based on the rate of possible or projected deterioration or malfunction of the equipment and the probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.
6. The owner or operator must remedy any deterioration or malfunction of equipment or structures which the inspection reveals on a schedule which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, remedial action must be taken immediately.
7. The owner or operator must record inspections in an inspection log. Such inspection log must be kept for a period of at least three years, and must be available for inspection by the authorized representatives of the Hazardous Waste Division. At a minimum, such inspection log must include:
   a. The date and time of the inspection;
   b. The name of the inspector;
   c. A notation of the observations made; and
   d. The date and nature of any repairs or other remedial actions.

C.4. Personnel training:

1. Personnel at hazardous waste treatment, storage and disposal facilities must successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with all applicable requirements of the HWMP so as to assure protection of the public health and the environment. The owner or operator must ensure

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that this program includes all the elements described in the remainder of this section.

2. This program must be directed by a person trained in hazardous waste management procedures, and must include instruction which teaches facility personnel hazardous waste management procedures (including contingency plan implementation) relevant to the positions in which they are employed.
3. At a minimum, the training program must be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including, where applicable:
   a. Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment;
   b. Key parameters for automatic waste feed cut-off systems;
   c. Communications or alarm systems;
   d. Response to fires or explosions;
   e. Response to ground-water contamination incidents; and
   f. Shutdown of operations.
4. Facility personnel must sucessfully complete the program required in section C.4.1. above within six months after the effective date of the interim status requirements of Section 5.2.2A of the HWMP, or six months after the date of their employment or assignment to a facility, or to a new position at a facility, whichever is later. Employees hired after the effective date of the interim status requirements of Section 5.2.2A of the HWMP must not work in unsupervised positions until they have completed the training requirements of C.4.1.
5. Facility personnel must take part in an annual review of the initial training required in C.4.1.
6. The owner or operator must maintain the following documents and records at the hazardous waste site:
   a. The job title for each position at the hazardous waste site related to hazardous waste management, and the name of the employee filling each job;
   b. A written job description for each person listed in paragraph C.4.6.a. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company location or bargaining unit, but must include the requisite skill, education, or other qualifications, and duties of employees assigned to each position; and
   c. A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed under C.4.6.a.; and
   d. Records that document that the training or job experience required under C.4.1., C.4.2., and C.4.3. above has been given to, and completed by, hazardous waste site personnel.
7. Training records on current personnel must be kept until closure of the hazardous waste site; training records on former employees must be kept for at least three years from the date the employee last worked at the hazardous waste site. Personnel training records may accompany personnel transferred within the same company.

C.5. Preparedness and prevention:

1. Design and operation of the facility: Facilities must be designed ,

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constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned or sudd n or non-sudden rel ase of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

2. Required equipment: All facilities must be equiped with communications and fire control equipment or facilities as required under section 8.4.1D of the HWMP, unless it can be demonstrated to the Secretary pursuant to section 8.4.1G of the HWMP that none of the hazards posed by wastes handled at the facility could require th specified communications and fire control equipment or facilities.
3. Testing and maintenance of equipment: All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be tested and maintained as necessary to assure its proper operation in time of emergency.
4. Access to communications or alarm system:
   a. Whenever hazardous waste is being poured, mixed, spread, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communications device, either directly or through visual or voice contact with another employee, unless the Secretary has ruled that such a device is not required under section 8.4.1D of the HWMP.
   b. If there is ever just one employee on the premises while th facility is operating, he must have immediate access to a device, such as a telephone (immediately available at the point of operation) or a two-way radio, capable of summoning external emergency assistance, unless the Secretary has ruled that such a device is not required under section 8.4.1D of the HWMP.
5. Required aisle space: The owner or operator must maintain aisle space to allow the unobstructed movement of personnel, fire protection, fire protection equipment, and decontamination equipment to any area of facility operation in an emergency, as required for access to services (HWMP 8.3.2D); such access shall be a component of emergency procedure and contingency plans (HWMP 8.5.3), unless th Secretary has ruled such access is not required, pursuant to th procedures of HWMP 8.5.3E.
6. Special handling for ignitable or reactive waste: The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition and reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No Smoking" signs must be conspicuously placed wherever there is a hazard from ignitable or reactive waste.
7. Arrangements with local authorities: As required by HWMP 8.5.3A,B,C, the owner or operator shall:
   a. Conduct training sessions to be held at regular intervals to inform the plant contingency team, representatives of local fire and police departments, and emergency response teams of plant

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layout, location of possible hazards, emergency equipment location and operation, the evacuation plan and route, power and stream cut-offs, communications equipment and phone numbers of all required contacts, and other critical information and procedures.

b. The contingency plan required by HWMP 8.5.3A should include arrangements to familiarize, as appropriate for the type of waste handled at the hazardous waste site and the potential need for health emergency and hospital services, hospitals with the properties of hazardous wastes handled at the hazardous waste site and the types of injuries or illnesses which could result from fires, explosions, or releases at the hazardous waste site.

c. Where State or local authorities decline to enter into such arrangements, the owner or operator must document the refusal in the operating record.

C.6. **Contingency plan and emergency procedures:** As required by HWMP 8.5.3, each owner or operator must have a contingency plan for his hazardous waste site. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. The provisions of the plan must be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment.

1. Filing of the contingency plan:
   a. As required by HWMP 8.5.3A, the plan shall first be filed with the Secretary.
   b. Following approval by the Secretary, the plan shall be filed with: the local fire and police departments (if any operate in the area), hospitals, and emergency response teams operating in the area or subject to call by the operator or the Department.
2. Content of contingency plan:
   a. The contingency plan must describe the actions facility personnel must take to comply with the requirements of HWMP 8.5.3 in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous wastes or hazardous waste constituents to air, soil, or surface water at the hazardous waste site.
   b. If the owner or operator has already prepared a Spill Prevention, Control, and Countermeasures (SPCC) in accordance with 40CFR Part 112 or Part 151, he need only amend that plan to incorporate hazardous waste management provisions that are sufficient to comply with the requirements of HWMP 8.5.3, and are approvable by the Secretary.
   c. The plan must describe arrangements agreed to by local police departments, fire departments, hospitals, contractors, and State and local emergency response teams to coordinate emergency services, pursuant to HWMP 8.5.3.
   d. The plan must list names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator and this list must be kept up to date. Where more than one person is listed, one must be named as primary emergency coordinator and others must be listed in the order in which they

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will assume responsibility as alternates. For new facilities, this information must be supplied to the Secretary at the time of certification, rather than at the time of permit applicatio..

e. The plan must include a list of all emergency equipment at the facility (such as fire extinguishing systems, spill contol equipment, communications and alarm systems (internal and external), and decontamination equipment), where this equipment is required. This list must be kept up to date. In addition, the plan must include the location and a physical description of each item on the list, and a brief outline of its capabilities.

3. Copies of contingency plan: A copy of the plan shall be filed with the Secretary and, after his approval, must be:
   a. Maintained at the hazardous waste site; and
   b. Submitted to all local police departments, fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services.

4. Amendment of contingency plan: The plan must be reviewed, and immediately amended, if necessary, whenever:
   a. The permit is revised;
   b. The facility operations are changed due to expansion, change in type or quantity of waste handled, or other changes which affect the degree or type of possible emergency situation;
   c. The plan fails in an emergency;
   d. The list of emergency coordinators changes; or
   e. The list of emergency equipment changes.

5. Emergency coordinator: As required by HWMP 8.5.3D, at all times there must be at least one employee on the hazardous waste site premises during operation who shall be trained in emergency procedures and in charge of all emergency response measures. An emergency coordinator shall be on call also, when the hazardous waste site is not in operation. The emergency coordinator must be thoroughly familiar with all aspects of the hazardous waste site's contingency plan, all operations and activities at the hazardous waste site, the location and characteristics of waste handled, the location of all records within the hazardous waste site, and the hazardous waste site layout. In additon, this person must have the authority to carry out the contingency plan. Applicable responsibilities for the emergency coordinator vary, depending on factors such as type and variety of waste(s) handled by the hazardous waste site, and type and complexity of the hazardous waste site.

6. Emergency procedures:
   a. Whenever there is an imminent or actual emergency situation, the emergency coordinator must immediately:
      Activate internal hazardous waste site alarms or communications systems, where applicable, to notify all hazardous waste site personnel; and
      Notify appropriate State or local agencies with designated response roles if their help is needed.
   b. Whenever there is a release, fire, or explosion, the emergency coordinator must immediately identify the character, exact source, amount, and areal extent of any released materials. He may do this by observation or review of hazardous waste site records or manifests and, if necessary, by chemical analysis.

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c. Concurrently, the emergency coordinator must assess possible haz rds to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions).

d. If the emergency coordinator determines that the hazardous waste site has had a release, fire, or explosion which could threaten human health, or the environment, outside the hazardous waste site, he must report his findings as follows:

(1) If his assessment indicates that evacuation of local areas may be advisable, he must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated; and

(2)He must immediately notify the Secretary, using the telephone contact designated in the contingency plan, and the National Response Center (using their 24-hour toll free number 800/424-8802). The report must include:

Name and telephone number of reporter;

Name and address of hazardous waste site;

Time and type of incident (e.g., release, fire);

Name and quantity of material(s) involved, to the extent known;

The extent of injuries, if any; and

The possible hazards to human health, or the environment, outside the hazardous waste site.

e. During an emergency, the emergency coordinator must take all reasonable measures necessary to ensure that fire, explosions, and releases do not occur, recur, or spread to other hazardous wastes at the hazardous waste site. These measures must include, where applicable, stopping processes and operations, collecting and containing released wastes, and removing or isolating containers.

f. If the hazardous waste site stops operations in response to a fire, explosion, or release, the emergency coordinator must monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

g. Immediately after an emergency, the emergency coordinator must provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the hazardous waste site. Unless the owner or operator can demonstrate in accordance with the HWMP that the recovered material is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable provisions of the HWMP.

h. The emergency coordinator must ensure that, in the affected area(s) of the hazardous waste site:

(1) No waste that may be incompatible with the released material is treated, stor d, or disposed of until cleanup procedures are completed; and

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(2) All emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed.

i. The owner or operator must notify the Secretary, and appropriate State and local authorities, that the hazardous waste site is in compliance with C.6.8., above, before operations are resumed in the affected area(s) of the hazardous waste site.

j. The owner or operator must note in the operating record the time, date, and details of any incident that requires implementing the contingency plan. Any spill or release that could possibly endanger health or adversely affect the environment off-site shall be reported to the Department within 24 hours, as required by HWMP 6.4A. In addition to such notice to the department, a written report to the Department based on the operating record must be sent within 15 days of the incident; such report must include:

(1) Name, address, and telephone number of the owner or operator;
(2)Name, address, and telephone number of the hazardous waste site;
(3) Date, time, and type of incident (e.g., fire or explosion);
(4) Name and quantity of material(s) involved;
(5) The extent of injuries, if any;
(6) An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
(7) Estimated quantity and disposition of recovered material that resulted from the incident.

C.7. **Operating record:** As required by HWMP 8.5.1, the owner or operator shall keep a written operating record of his hazardous waste site. The following information must be recorded, as it becomes available, and maintained in the operating record until closure of the hazardous waste site:

1. A description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the hazardous waste site. See C.11.: Recordkeeping instructions.
2. The location of each hazardous waste within the hazardous waste site and the quantity at each location. For disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area. For all facilities, this information must include cross-references to specific manifest document numbers, if the waste was accompanied by a manifest;
3. Records and results of waste analyses performed as specified in HWMP 5.5.2, 8.4.2A,B,C, and 8.4.9A.3);
4. Summary reports and details of all incidents that require implementing the contingency plan as specified in HWMP 8.5.3 and in C.6, above;
5. Records and results of inspections as required by HWMP 5.5.2A. and C.3, above (except these data need be kept only three years).
6. Monitoring, testing, or analytical data where required by HWMP 8.4.10, 8.4.6B.7), 8.6.5B, and 8.4.8B.4) (note: as required for evaluation pursuant to HWMP 8.6.6C, monitoring data for land disposal sites is required to be maintained throughout the period of post-closure care); and
7. All closure cost estimates under HWMP 8.6.2 and 8.6.3 and, for land disposal facilities, all post-closure cost estimates under HWMP 8.6.2

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and 8.6.3.

C.8. Availability, retention, and disposition of records:

1. All records, including plans, required under the HWMP must be furnished upon request, and made available at all reasonable times for inspection, by the Secretary or his authorized representative.
2. The retention period for all records required under the HWMP is extended automatically during the course of any enforcement action regarding the hazardous waste site or as requested by the Secretary or the Assistant Secretary.
3. A copy of records of waste disposal locations and quantities, as required by HWMP 8.6.5B, must be submitted to the Secretary and filed with the land records of the Parish in which the hazardous waste site is located, upon closure of the hazardous waste site.

C.9. Quarterly report:

1. As required by HWMP 5.4.3, a quarterly report must be filed with the Department, due no later than 15 days after the end of each quarter: April 15, July 15, October 15 and January 15; quarterly reports shall include:
   a. The EPA identification number (and also State identification number, pending change of State numbers to EPA numbers), name, and address of the hazardous waste site;
   b. The quarter covered by the report;
   c. For off-site facilities, the EPA identification number (and the State identification number, while applicable) of each hazardous waste generator from which the hazardous waste site received a hazardous waste during the year; for imported shipments, the report must give the name and address of the foreign generator;
   d. A description and the quantity of each hazardous waste the hazardous waste site received during the quarter. For off-site facilities, this information must be listed by EPA identification number (and State identification number, while applicable) of each generator:
      The method of treatment, storage, or disposal for each hazardous waste;
      Monitoring data where applicable, e.g., development of background groundwater quality data.

C.10. Annual report:

1. An annual report of the closure fund prepared by a certified public accountant shall be submitted to the Secretary.
2. An update of the cost estimate for closure and post-closure shall be submitted with the annual report, together with certification by the owner or operator of any resulting change in the closure and post-closure plan(s) and the Closure Fund.

C.11. Recordkeeping instructions: For purposes of recordkeeping and reporting as required by the HWMP, the descriptions of wastes and of handling codes are to be provided as follows:

1. Records of each hazardous waste received, treated, stored, or disposed of at the facility must be maintained in the operating record until closure of the facility, in the following manner:
   a. A description by its common name and the EPA Hazardous Waste

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Number(s) from Appendix A of the HWMP or 40 CFR Part 261 which apply to the waste. The waste description must also includ the waste's physical form, i.e., liquid, sludge, solid, or contained gas. If the waste is not listed in HWMP Appendix A or 40 CFR Part 261, Subpart D, the description must also include the process that produced it (for example, solid filter cake from production of ____, EPA Hazardous Waste Number W051).

Each hazardous waste listed in HWMP Appendix A, Category I or 40 CFR Part 261 Subpart D has a four-digit EPA Hazardous Waste Number assigned to it. This number must also be used for recordkeeping and reporting purposes. Where a hazardous waste contains more than one listed hazardous waste, or where more than one hazardous waste characteristic applies to the waste, the waste description must include all applicable EPA Hazardous Waste Numbers.

Where the waste is identified as hazardous under HWMP Appendix A Category III, but is not a hazardous waste under 40 CFR Part 251, the appropriate description according to the HWMP must be provided.

b. The estimated or manifest-reported weight, as required by the HWMP, for each reported waste. The symbol "T" is to be used for short tons, 2000 pounds.

2. The method(s) (by handling code(s) as specified in Table 1, below) and date(s) of treatment, storage or disposal.

Table 1: Handling Codes for the treatment, storage and disposal methods

Enter the handling code(s) listed below that most closely represents the technique(s) used at the facility to treat, store, or dispose of each quantity of hazardous waste received.

1. Storage
   - S01 Container (barrel, drum, etc.)
   - S02 Tank
   - S03 Waste pile
   - S04 Surface impoundment
   - S05 Other (specify)

2. Treatment

   (a) Thermal Treatment
   - T06 Liquid injection incinerator
   - T07 Rotary kiln incinerator
   - T08 Fluidized bed incinerator
   - T09 Multiple hearth incinerator
   - T10 Infrared furnace incinerator
   - T11 Molten salt destructor
   - T12 Pyrolysis
   - T13 Wet Air oxidation
   - T14 Calcination
   - T15 Microwave discharge
   - T16 Cement kiln
   - T17 Lime kiln
   - T18 Other (specify)

   (b) Chemical Treatment
   - T19 Absorption mound
   - T20 Absorption field

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T21 Chemical fixation
T22 Chemical oxidation
T23 Chemical precipitation
T24 Chemical reduction
T25 Chlorination
T26 Chlorinolysis
T27 Cyanide destruction
T28 Degradation
T29 Detoxification
T30 Ion exchange
T31 Neutralization
T32 Ozonation
T33 Photolysis
T34 Other (specify)

(c) Physical Treatment

....(1) Separation of components

T35 Centrifugation
T36 Clarification
T37 Coagulation
T38 Decanting
T39 Encapsulation
T40 Filtration
T41 Flocculation
T42 Flotation
T43 Foaming
T44 Sedimentation
T45 Thickening
T46 Ultrafiltration
T47 Other (specify)

....(2) Removal of Specific Components

T48 Absorption-molecular sieve
T49 Activated carbon
T50 Blending
T51 Catalysis
T52 Crystallization
T53 Dialysis
T54 Distillation
T55 Electrodialysis
T56 Electrolysis
T57 Evaporation
T58 High gradient magnetic separation
T59 Leaching
T60 Liquid ion exchange
T61 Liquid-liquid extraction
T62 Reverse osmosis
T63 Solvent recovery
T64 Stripping
T65 Sand filter
T66 Other (specify)

(d) Biological Treatment

T67 Activated sludge
T68 Aerobic lagoon
T69 Aerobic tank
T70 Anaerobic lagoon

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T71 Composting
T72 Septic tank
T73 Spray irrigation
T74 Thickening filter
T75 Trickling filter
T76 Waste stabilization pond
T77 Other (specify)
T78-79 (Reserved)

3. Disposal
D80 Underground injection
D81 Landfill
D82 Land treatment
D83 Ocean disposal
D84 Surface impoundment (to be closed as a landfill)
D85 Other (specify)

GROUND WATER MONITORING

C.12. Applicability:

1. Within one year from the effective date of the mandatory interim status standards set forth in HWMP 5.2.2A, or upon the issuance of a compliance order or under the terms of an interim or standard permit issued in accordance with HWMP5.2.3A--whichever is the earlier date--the owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste must implement a ground-water monitoring program capable of determining the facility's impact on the quality of ground water in the uppermost aquifer underlying the facility, except as may be more stringently required under HWMP 8.4.10 for any facility.
2. The owner or operator must install, operate, and maintain a ground-water monitoring system which meets the requirements of HWMP 8.4.10, and must carry out the ground-water monitoring program during the active life of the facility, and for land disposal facilities, during the period of post-closure care as specified under HWMP 8.6.6C.
3. For land disposal (burial) facilities, a leachate monitoring system as required under HWMP 8.4.10B.1) shall be installed and operated and maintained, except as an equivalent system may be approved by the Secretary in accordance with HWMP 8.4.10B3).
4. Unlike 40 CFR Part 265.90(c), the HWMP does not provide for waiving in part or in whole of the ground-water monitoring requirements of HWMP 8.4.10A.

C.13. Ground-water monitoring system:

1. Technical requirements of ground-water monitoring are set forth in section A.2. "MONITORING EXPECTATIONS" of the AOPM, through section 2.2.2.
2. The definition of "facilities" in the HWMP requires more stringent interpretation of monitoring system needs than does 40 CFR Part 265.91(b).

C.14. Sampling and analysis:

1. The owner or operator must obtain and analyze samples from the

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installed ground-water monitoring system and, wh re applicable, from the leachate monitoring system. The owner or operator must develop and follow a ground water sampling and analysis plan. H must keep this plan at the facility. The plan must include procedures and techniques for:

a. Sample collection;
b. Sample preservation and shipment;
c. Analytical procedures; and
d. Chain of custody control.

Technical expectations for the development and implementation of such plan are provided in the AOPM, sections A.2 and B. Other satisfactory technical sources providing discussions and technical bases for the plan are: (1) "Procedures Manual For Ground-Water Monitoring At Solid Waste Disposal Facilities," EPA-530/SW-611, August 1977; and "Methods for Chemical Analysis of Water and Waste," EPA-600/4-79-020, March 1979.

2. Within the first quarter following implementation of the monitoring plan, all monitoring wells must be sampled and analyzed thereafter with the following frequencies:
   a. Samples collected to establish ground water quality must be obtained and analyzed for the parameters specified in AOMP A.2.1.2, except as the scope of parameters may be defined by the Secretary after baseline establishment so as to eliminate any compounds consistently not found in the waste handled at the facility, at least annually.
   b. Samples collected to indicate ground-water contamination must be obtained and analyzed for the following parameters quarterly:
      specific conductivity, mho/cm at 25 degrees C
      temperature, C (field and laboratory)
      total dissolved solids (TDS), mg/liter
      chloride, mg/liter
      pH
      dissolved organic carbon, mg/liter
      total organic carbon (TOC)
      two principal metals or other designated parameters (ones found in the largest quantities or which best serve as indicators), as designated by the Department, in mg/liter; where halogenated organics are present in waste components, total organic halogen will be specified.
   c. Elevation of the ground-water surface at each monitoring well must be determined each time a sample is obtained.

C.15. Preparation, evaluation, and response:

1. Within one year after the effective date of the mandatory interim status standards set forth in HWMP 5.2.2A, or as required by compliance order or interim or standard permit condition--whichever is earlier--the owner or operator must be in compliance with the requirements of HWMP 8.4.10A.2), for development of and adherence to a ground-water sampling and analysis plan for the purpose of monitoring ground-water so as to determine any significant change in ground-water quality. Such plan and adherence thereto shall meet the technical requirements of AOPM A.2.
2. When monitoring shows that the concentration of a chemical species has increased above baseline levels by a statistically significant amount, i.e., as indicated by the Student's single-tailed test at the

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95% confidence level (s e AOPM Appendix B), the owner or operator must take the following actions:

a. Notify the Department within 48 hours by telephone, and in writing within 7 days;
b. Undertake confirmatory analyses;
c. Determine the cause of the increase, e.g., the result of a spill, a design failure, an improper operating procedure, etc., and initiate corrective action; and
d. Determine the extent of the ground-water contamination and the actual or potential threat to public health or the environment, where applicable.
e. Provide to the Secretary a written assessment of the ground-water quality, within 15 days of determination of a significant increase of contamination.

3. If the owner or operator determines, based on the results of th ground-water quality assessment in section C.14.3.e. that no hazardous waste or hazardous waste constituents from the facility have entered the ground water, then he may reinstate the monitoring procedures set forth in AOPM A.2 for determination of background ground water quality, and appropriate routine sampline and analyses on indicator parameters. Such action must be noticed to the Department in the written assessment prepared in accordance with C.14.2.e., above.
4. If the owner or operator determines, based on the evaluation and assessment, that hazardous waste or hazardous waste constituents from the facility have entered the ground water, he shall implement a continuing sampling and analysis program for all parameters relevant to continued assessment of ground water quality on a quarterly basis until closure of the facility (if the ground water quality assessment plan was implemented prior to closure of the facility).

C.16. Recordkeeping and reporting: The owner or operator shall report the following ground water monitoring information to the Secretary:

1. During the first year when initial background concentrations are being established for the facility, the following information:
   a. Concentrations or values of all the parameters required to be sampled and analyzed, within 15 days after completing each quarterly analysis;
   b. Separate identification for each monitoring well any parameters whose concentration or value has been found to exceed the maximum contaminant levels identified by EPA interim primary drinking water standards.
2. Concentrations or values of the required parameters for each ground-water monitoring well, along with required evaluations for these levels.
   a. Separate identification must be provided for any significant differences from initial background found in the upgradient wells. During the active life of the facility, this information must be reported as part of the quarterly report required under HWMP.
3. The owner or operator must keep records of the analyses and evaluations specified in the ground-water monitoring plan throughout the active life of the facility and, for land disposal facilities, throughout the post-closure care period as well.
4 The owner or operator must, annually, submit to the Secretary a

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report containing the results of his ground-water quality assessment program which includes, but is not limited to, the calculated (or measured) rate of migration of hazardous waste or hazardous waste constituents in the ground water during the reporting period.

CLOSURE AND POST-CLOSURE

C.17. **Applicability:**

1. Pursuant to HWMP 8.6.1, closure and post-closure requirements in existence as of the effective date of the HWMP, or any new facilities permitted thereafter, except that any facility totally closed before the effective date of HWMP 5.2.2A is excluded from these requirements unless such facility is required to meet closure conditions under previous compliance order or a previous permit condition.
2. Requirements for post-closure care apply to all land disposal facilities not previously totally closed.

C.18. **Closure performance standard:**

1. Pursuant to HWMP 8.6.2, the owner or operator must close his facility in a manner that:
   a. Minimizes the need for further maintenance; and
   b. Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground water, or surface waters, or to the atmosphere.

C.19. **Closure plan; amendment of plan:**

1. On the effective date of HWMP 5.2.2A mandatory interim status standards, or on the effective date of an interim or standard permit, or of a compliance order requiring such plan--whichever is sooner--the owner or operator must have a written closure plan. He must keep this plan at the facility. This plan must identify the steps necessary to completely close the facility at any point during its intended life and at the end of its intended life. The closure plan must include, at least:
   a. A description of how and when the facility will be partially closed, if applicable, and ultimately closed. The description must identify the maximum extent of the operation which will be unclosed during the life of the facility, and how the requirements of HWMP 8.6.2 will be met;
   b. An estimate of the maximum inventory of wastes in storage or in treatment at any given time during the life of the facility;
   c. A description of the steps needed to decontaminate facility equipment during closure; and
   d. A schedule for final closure which must include, as a minimum, the anticipated date when wastes will no longer be received, the date when completion of final closure is anticipated, and intervening milestone dates which will allow tracking of the progress of closure. (For example, the expected date for completing treatment or disposal of waste inventory must be included, as must the planned date for removing any residual wastes from storage facilities and treatment processes.)
2. Pursuant to HWMP 5.3.4A.8), closure and post-closure plans are a required consideration element for permit application by the owner or

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operator.

3. The owner or operator may amend his closure plan at any time during the active life of the facility. (The active life is that period during which wastes are periodically received.) The owner or operator must amend his plan any time changes in operating plans or facility design affect the closure plan, and must submit such amended plan to the Secretary for approval and filing as a condition of the facility permit. At any time the Secretary evaluates the facility permit, including any modifications thereof, amendment to the closure plan may be required.
4. The owner or operator must notify the Secretary at least 90 days before the date he expects to begin closure, as required by HWMP 8.6.3; with the notification, the following information must be submitted;
   a. Date of planned closure;
   b. Changes, if any, requested in the closure plan submitted with the permit application to take advantage of new technology, unforeseen situation, and other requests which improve the safety of the closed facility;
   c. Closure schedule and estimated costs of each phase of the closure plan; and
   d. Request for release of closure funds in amounts and times as required by the closure schedules.
   e. Pursuant to HWMP 8.6.4B, if the owner or operator applies to the Secretary for approval of change of the closure plan previously approved as a condition of the facility permit, the procedures established for the permit process (HWMP 5.3) will be followed in evaluating the requested changes and making a determination, including provison of notice and potential for public comment.

C.20. Time allowed for closure:

1. Timely adherence to the closure schedules approved by the Secretary will be required. Each phase of closure must be evaluated by the Secretary and will be accepted or rejected. Closure funds for each phase of closure will not be released until after acceptance of such phase by the Secretary, as provided by HWMP 8.6.4A.1). Failure to comply with timely schedules may result in issuance of a compliance order, or other enforcement action as provided under HWMP 10.0. Failure of the owner or operator to obtain approval of closure renders him subject to declaration that the facility is an abandoned site. In such case, the State has the authority to take necessary action to properly close the site, retain control of the closure fund, and to seek recovery of any costs from the owner or operator (see Attorney General's statement on new 1980 State authority in such circumstances).
2. Expected schedules for timely closure are as follows:
   a. Within 90 days after receiving the final volume of hazardous wastes, the owner or operator must treat all hazardous wastes in storage or in treatment, or remove them from the site, or dispose of them on-site, in accordance with the approved closure plan; and
   b. The owner or operator must complete closure activities in accordance with the approved closure plan and within six months after receiving the final volume of hazardous wastes. The Secretary may approve a longer closure period under HWMP 8.6.4B,

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if the owner or operator has demonstrated that: (1) the required or planned closure activities will, of necessity, take him longer than six months to complete, and (2) that he has taken all steps to eliminate any significant threat to human health and the environment from the unclosed but inactive facility.

C.21. Disposal or decontamination of equipment:

1. Pursuant to HWMP 8.6.5A, all movable equipment, containers, and facilities shall be decontaminated, and inspected and approved by the Department prior to removal from the site or disposal on the site following approved procedures. Proper decontamination shall include removal of all hazardous waste and residues from such equipment, containers, and facilities, or appropriate disposal of them as hazardous wastes.

C.22. Certification of closure:

1. Pursuant to HWMP 8.6.5D, the operator and a Registered Professional Engineer who supervised the closure shall submit to the Secretary certification that the closure has been accomplished in accordance with the approved plan; such certification shall be in addition to inspection and acceptance of each phase of closure by the Secretary.

23. Post-closure care and use of property; period of care:

1. Pursuant to HWMP 5.3.4A8.b)iv) as a requirement for interim or standard permit, and 8.6.2A (mandatory closure plan), and as a requirement for land disposal facilities, post-closure care must consist of at least:
   a. Ground-water monitoring and reporting (see C.14 and C.15); and
   b. Maintenance of monitoring and waste containment systems as specified under HWMP facility standards by type of facility, and related sections of AOPM, where applicable.
2. The Secretary may require any or all of the security requirements of HWMP 8.4.1 (also see statements on security requirements in section C of the AOPM) during the post-closure period, when:
   a. wastes may remain exposed after completion of closure; or
   b. Short-term, incidental access by the public or domestic livestock may pose a hazard to human health.
3. Post-closure use of property on or in which hazardous waste remains after closure must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of any containment system, or the function of the facility's monitoring systems, unless the owner or operator can demonstrate to the Secretary, either in the post-closure plan, or by petition to the Secretary pursuant to HWMP 8.6.6B and/or C, that the disturbance:
   a. Is necessary to the proposed use of the property, and will not increase the potential hazard to human health or the environment; or
   b. Is necessary to reduce a threat to human health or the environment.
4. Pursuant to HWMP 8.6.6C, the Secretary will conduct an annual evaluation of the site for a period to be <u>not less than</u> twenty years from date of closure. [redacted] whether twenty years [redacted]

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[redacted] Procedures established in the Permit Process (HWMP 3.3) will be followed in evaluating and rendering decisions on such petitions.

5. Pursuant to HWMP 8.6.6, any proposed transfer of ownership of the property after closure shall be reported to the Secretary at least 60 days prior to execution of such sale. The Secretary must approve any new owner. Criteria for approval include (HWMP 8.6.6B):
   a. Agreement to land use restrictions necessary to protect public health; and
   b. Financial responsibility covering liability due to change in land use.
6. The owner or operator must provide post-closure care in accordance with the pproved post-closure plan for at least 20 years after the date of completing closure. The Secretary will conduct an annual evaluation of the site during this time period, and may modify the conditions of maintenance and monitoring as appropriate to the maintenance and monitoring records. The Secretary may extend the time of maintenance and monitoring, or other care, if he finds there has been noncompliance with any applicable standards or requirements, or that such continuation is necessary to protect human health or the environment.

C.24. **Post-closure plan; amendment of plan:**

1. On the effective date of HWMP 5.2.2A interim status standards, or as may have been required on a prior date by compliance order or permit condition, the owner or operator of a land disposal facility must have a written post-closure plan. He must keep this plan at the facility. This plan must identify the activities which will be carried on after final closure and the frequency of those activities. The post-closure plan must include at least:
   a. Ground-water monitoring activities and frequencies as specified in HWMP facility standards (see AOPM C.14 and C.15, and sections on facility standards) for the post-closure period; and
   b. Maintenance activities and frequencies to ensure: (1) the integrity of the cap and final cover or other containment structures as required under applicable facility standards, and (2) the function of the facility's monitoring equipment as required under HWMP 8.6.5C and 5.3.4A.8)b).
2. The owner or operator may amend his post-closure plan at any time during the active life of the disposal facility or during the post-closure care period (with the approval of the Secretary). The owner or operator must amend his plan any time changes in operating plans or facilities design affect his post-closure plan, or evaluaton or modification of his permit makes such modification necessary.
3. The owner or operator of a disposal facility must submit his post-closure plan to the Secretary as a condition of an interim or standard permit and also concurrently with the closure plan submission at least 90 days before he plans to begin closure. The procedures for acceptance or modification are similar to those for closure plan (see AOPM C.18.). The plan may be modified to include

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security equipment maintenance (see AOPM C.18.). If an unpermitted existing facility plans to begin closure within 90 days of the effective date of HWMP 5.2.2A mandatory interim status standards, the owner or operator must submit the necessary plans on the effective date of the mandatory interim status standards.

C.25. Notice to local land authority:

1. At the time closure is accepted, the owner or operator must prepare and submit to the Secretary and the Parish land authority in th Parish in which the facility is located, a certified plat indicating the locations of all burial sites and facilities, and the contents (by hazardous waste type or identification and the quantities of wastes as documented by the operating record) of those sites (such a certified plat must be prepared by a professional land surveyor, utilizing surveyed bench marks of record), as required by HWMP 8.6.5B. For wastes disposed of before the effective date of th HWMP, the owner or operator must identify the type, location, and quantity of the wastes to the best of his knowledge and in accordance with any records he has kept.

C.26. Notice in deed to property:

1. The owner or operator, at the time of acceptance of closure, must file the certified plat discussed in C.24 with the land records of the Parish in which the facility is located, pursuant to HWMP 8.6.5B.
2. State law provides, pursuant to HWMP 8.6.6A, that the owner or operator must report to the Secretary for his approval any proposed transfer of ownership of the property. Criteria for approval by the Secretary, as set forth in HWMP 8.6.6B, includ agreement by the proposed new owner to land use restrictions necessary to protect public health, and acceptance by the proposed new owner of financial responsibility covering liability due to any change in land use.
3. HWMP 8.6.6C. also requires the Secretary to conduct an annual evaluation of the site for a period to be not less than twenty years from date of closure, to afford additonal supervision and control of subsequent maintenance and use.

CLOSURE AND POST-CLOSURE FINANCIAL REQUIREMENTS

C.27. Applicability

1. HWMP 8.6.2 requires all owners and operators of hazardous waste treatment, storage and disposal facilities to estimate the cost of closure, and long-term monitoring and other long-term maintenance after closure of such facility, and to create a "Closure Fund" to provide assets at time of closure and for post-closure care.

28. Cost estimate for facility closure:

1. On the effective date of the mandatory interim status standards set forth in HWMP 5.2.2A (or for prior periods as required by complianc schedules or interim or standard permit conditions under HWMP 5.3.4 and 8.6.2) each facility owner or operator must have a written estimate of the cost of closing the facility in aaccordance with applicable facility standards under the HWMP. He must keep this estimate, and all subsequent estimates required under the HWMP, at

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the facility, and must file the estimate with the Secretary as a conditon of permit application. For estimate of costs, the estimate must equal the cost of closure at the point in the facility's operating life when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan.

2. The owner or operator must prepare a new closure cost estimate whenever a change in the closure plan affects the cost of closure, or as may be required by the Secretary in periodic evaluation of the facility permit, or any modification of the permit such as to affect closure cost.
3. An annual report of the closure fund prepared by a certified public accountant shall be submitted to the Secretary.
4. Annual reevaluation of factors affecting changes in closure cost should be done by the owner or operator, including effects of inflation. The adjustment by an inflation factor derived from the annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its Survey of Current Business is a recommended method (per discussion by EPA, 40 CFR 265.142(c)).

C.29. **Cost estimate for post-closure monitoring and maintenance:**

1 A cost estimate for post-closure monitoring and maintenance is required under the same schedule(s), and under the same responsibilities on the owner and operator, as is required for closure costs (this is a component of closure cost requirements of the HWMP).

USE AND MANAGEMENT OF CONTAINERS

C.30. **Applicability:**

1. These requirements apply to all owners or operators of facilities required to be permitted under the HWMP.

C.31. **Condition of Containers:**

1. HWMP 8.4.5A requires that containers be handled and stored to minimize damage and potential leakage.
2. If a container holding hazardous waste is not in good condition, or if it begins to leak, the owner or operator must transfer the hazardous waste from this container to a container that is in good condition, or manage the waste in some other way that complies with the requirements of HWMP 8.4.5A.

C.32. **Compatibility of waste with container:**

1. HWMP 8.4.11C requires that container materials shall be compatible with the wastes contained therein.
2. The owner or operator must use a container made of or lined with materials which will not react with, and are otherwise compatible with, the hazaardous waste to be stored, so that the ability of the container to contain the waste is not impaired.

C.33. **Management of containers:**

1. HWMP 8.4.5A requires that containers shall be handled and stored to minimize damage and potential leakage.
2. A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste.

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3. A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C.34. **Inspections:**

1. HWMP 8.4.5 requires that containers shall be handled and stored to minimize damage and potential leakage.
2. The owner or operator must inspect areas where containers are stored, at least weekly, looking for leaks and for deterioration caused by corrosion or other factors.

C.35. **Special requirements for ignitable or reactive waste:**

1. Containers holding ignitable or rective waste must be located at least 50 feet from the facility's property line.

TANKS

C.36. **Applicability:**

1. HWMP 8.4.4 applies to all treatment, storage and disposal facilities that use tanks to treat or store hazardous waste.

C.37. **General operating requirements:**

1. HWMP 8.4.11 requires that treatment and storage facilities containing ignitable, reactive or incompatible wastes shall be sufficiently separated or protected to prevent mixing, ignition or reaction as a result of a spill, tank failure or other cause. Protection shall include use of container materials compatible with the wastes contained therein.
2. HWMP 8.4.4B.1) requires that a spill containment area capable of containing the waste in case of a spill shall surround the tank. Capacity of the containment area must equal the capacity of the tank plus precipitation resulting from a 24-hour, 25-year storm.
3. Where hazardous waste is continuously fed into a tank, the tank must be equipped with a means to stop this inflow (e.g., a waste feed cutoff system or by-pass system to a stand-by tank).

C.38. **Waste analysis and trial tests:**

1. In addition to the waste analyses required by HWMP 8.4.2, whenever a tank is to be used to:
   a. Chemically treat or store a hazardous waste which is substantially different from waste previously treated or stored in that tank; or
   b. Chemically treat hazardous waste with a substantially different process than any previously used in that tank;

   the owner or operator must, before treating or storing the different waste or using the different process: (1) Conduct waste analyses and trial treatment or storage tests; or (2) Obtain written, documented information or similar storage or treatment of similar waste under similar operating conditions, to show that this proposed treatment or storage will meet all applicable requirements of HWMP 8.4.4 and 8.4.9.

C.39. **Inspections:**

1. The owner or operator must inspect, where present:
   a. Discharge control equipment at least once each operating day, to

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ensure that it is in good working order;

b. Data gathered from monitoring equipment (e.g., pressure and temperature gauges), at least once each operating day, to ensure that the tank is being operated according to its design;

c. The level of waste in the tank, at least once each operating day, to ensure compliance with HWMP 8.4.4B.

d. The construction materials of the tank, at least once weekly, to detect corrosion or leaking of the fixtures or seams; and

e. The construction materials of, and the area immediately surrounding, discharge confinement areas (e.g., dikes) at least once weekly, to detect erosion or obvious signs of leakage.

C.40. Closure

1. At closure, all hazardous waste and hazardous waste residues must be removed from tanks, discharge control equipment, and discharge confinement equipment.

C.41. Special requirements for ignitable or reactive waste:

1. Ignitable or reactive waste must not be placed in a tank, unless:
   a. The waste is treated, rendered, or mixed before or immediately after placement in the tank so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under HWMP Appendix A, Category III, and HWMP 8.4.11C is complied with; or
   b. The waste is treated or stored in such a way that it is protected from any material or conditions which may cause the waste to ignite or react; or
   c. The tank is used solely for emergencies.
2. The owner or operator of a facility which treats or stores ignitable or reactive waste in covered tanks must conply with the National Fire Protection Association's (NFPA's) buffer zone requirements for tanks, contained in Tables 2-1 through 2-6 of the "Flammable and Combustible Code--1977".

C.42 Special requirements for incompatible wastes:

1. Pursuant to HWMP 8.4.11A, incompatible wastes, or incompatible wastes and materials, shall not be placed in the same tank.
2. Hazardous waste must not be placed in an unwashed tank which previously held an incompatible waste or material.

SURFACE IMPOUNDMENTS

C.43. Applicability:

1 Application is to all owners or operators of hazardous waste facilities that use surface impoundments to treat, store, or dispose of hazardous wastes, pursuant to HWMP 8.0 and 8.4.3

C.44. General operating requirements:

1. As required by HWMP 8.3.4, the site as a whole, as well as the facility (e.g., a surface impoundment) shall be isolated from outside surface water and shall contain any potential discharges, including runoff. A surface impoundment must maintain enough freeboard to prevent any overtopping by overfilling, wave action, or a storm. There shall be at least 2 feet of freeboard; such freeboard will in many cases be insufficient to meet the requirements of HWMP 8.3.4,

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8.4.3B, and 8.4.7 B.1) and 2); if so, the higher appropriate freeboard must be used and maintained.

C. 45. **Containment system:**

1. Earthen dikes shall be properly engineered to minimize wind and water erosion and to preserve their structural integrity, by use of protective cover including grass or other acceptable method.

C. 46. **Waste analysis and trial tests:**

1. In addition to the waste analyses required by HWMP 8.4.2, analyses required by HWMP 8.4.9A shall be performed whenever a surface impoundment is to be used to treat a waste substantially difference from waste previously treated at that facility, or whenever a previously unused treatment method is to be employed.

C.47. **Inspections:**

1. The owner or operator must inspect:
   a. The freeboard level at least once each operating day to ensure compliance with HWMP 8.3.4A and 8.4.3 (see C.45., above).
   b. The surface impoundment, including dikes and vegetation surrounding the dike, at least once a week to detect any leaks, deterioration, or failures in the impoundment (the condition of surrounding vegetation should be observed as a possible indicator of any release or leakage from the impoundment).

C.48. **Closure and post-closure:**

1. At closure, the owner or operator may elect to remove from the impoundment:
   a. Standing liquids;
   b. Waste and waste residues;
   c. The liner, if any; and
   d. Underlying and surrounding contaminated soil.
2. [redacted]
3. If the owner or operator does not remove all the impoundment materials listed in paragraph 1. of this section, or does not make the demonstraton in paragraph 2. of this section, he must close th impoundment and provide post-closure care as for a landfill under HWMP 8.6. If necessary to support the final cover specified in the approved closure plan, the owner or operator must treat remaining liquids, residues, and solids by removal of liquids, drying, or other means.

C.49. **Special requirements for ignitable or reactive waste:**

1. Ignitable or reactive waste must not be placed in a surface impoundment, unless:
   a. The waste is treated, rendered, or mixed before or immediately after placement in the impoundment so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under HWMP Appendix A,

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Category III A or C, and (2) HWMP 8.4.11 is complied with; or
b. The surface impoundm nt is used solely for emergencies.

C.50. Special requirements for incompatible wastes:
1. Incompatible wastes, or incompatible wastes and materials, must not be placed in the same surface impoundment, unless the requirements of HWMP 8.4.11 and 8.4.9A.2),3),4),5),6),7),8), and 9) are complied with.

WASTE PILES

C.51. Applicability:
1. These requirements apply to owners or operators of facilities that treat or store hazardous waste in piles. Alternatively, a pile of hazardous waste may be managed as a landfill under HWMP 8.4.7.

C.52. Protection from wind:
1. The owner or operator of a pile containing hazardous waste which could be subject to dispersal by wind must cover or otherwise manage the pile so that wind dispersal is controlled.

C.53. Waste analysis:
1. In addition to the waste analysis plan and waste analyses required by HWMP 5.5.2A., 8.4.2A.,B., and C., the owner or operator must analyze a representative sample from each incoming movement before adding th 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 or incompatible wastes does not inadvertently occur. The analysis must include a visual comparison of color and texture.

C.54. Containment:
1. If leachate or run-off from a pile is a hazardous waste, then either:
   a. The pile must be placed on an impermeable base that is compatible with the waste under the conditions of treatment or storage, run-on must be diverted away from the pile, and any leachate and run-off from the pile must be collected and managed as a hazardous waste; or
   b. (1) The pile must be protected from precipitation and run-on by some other means; and (2) no liquids or wastes containing free liquids may be placed in the pile.

C.55. Special requirements for ignitable or reactive waste:
1. Ignitable or reactive wastes must not be placed in a pile, unless:
   a. Addition of the waste to an existing pile results in the waste or mixture no longer meeting the definition of ignitable or reactive waste under HWMP Appendix A, Category III A or C; or
   b. The waste is managed in such a way that is is protected from any material or conditions which may cause it to ignite or react.

C.56. Special requirements for incompatible waste:

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1. Incompatible wast s, or incompatible wastes and materials, may not be placed in the same pile, pursuant to HWMP 8.4.11, unless such placing is carried out safely and by design as a treatment procedure, and all requirements of HWMP 8.4.9A. have been met, including prior tests or documentation and other requirements for safety and performance.
2. 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 shall be separated from the other materials or protected from them as required by HWMP 8.4.11C., e.g., by means of a dike, berm, wall, or other device.
3. Hazardous waste must not be piled on the same area where incompatible wastes or materials were previously piled or placed, unless that area has been decontaminated sufficiently to ensure compliance with HWMP 8.4.11.

LAND TREATMENT

C.57. **Applicability:**

1. These requirements apply to owners and operators of hazardous waste landfarming (land treatment) facilities.

C.58. **General operating requirements:**

1. Pursuant to HWMP 8.4.7 and (under permitted operation) 5.3.4A.7), no hazardous waste shall be placed in or on a land treatment facility unless the waste can be made less hazardous or non-hazardous by biological degradation or chemical reactions occurring in or on the soil.
2. Run-on must be diverted away from the active portions of a landfarming facility, pursuant to HWMP 8.3.4A.
3. Run-off from active portions of a facility must be collected and properly disposed of, pursuant to HWMP 8.4.6B.6).

C.59. **Waste analysis:**

1. In addition to the waste analyses required by HWMP 8.4.2, before placing a hazardous waste on or in a landfarm, the owner or operator must:
   a. Determine the concentrations in the waste of any substances which exceed the maximum concentrations contained in the Table, "Maximum Concentration of Contaminants for Characteristic of EP Toxicity", HWMP Appendix A, Category III D;
   b. For any waste listed in HWMP Appendix A, determine the concentration of any substances which caused the waste to be listed or identified as a hazardous waste; and
   c. Ensure by operations and monitoring that concentrations of hazardous waste or components of hazardous waste or dissolution of hazardous waste do not accumulate in the soil to a degree posing a threat to human health or the environment.

C.60. **Food chain crops:**

1. No food chain crops may be grown on an active landfarm for the treatment of hazardous wastes.

C.61. **Unsaturated zone (zone of aeration) monitoring:**

1. As required by HWMP 5.5.2 and 8.4.6b.7), the owner or operator must have in writing, and must implement, an unsaturated zone monitoring

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plan which is designed to:

a. Detect the vertical migration of hazardous waste and hazardous waste constituents under the active portion of the landfarm; and

b. Provide information on the background concentrations of the hazardous waste and hazardous waste constituents in similar but untreated soils nearby; this background monitoring must be conducted before or in conjunction with the monitoring required under paragraph 1.a. of this section.

2. The unsaturated zone monitoring must include, at a minimum:

a. Soil monitoring using soil cores, and

b. Soil-pore water monitoring using devices such as lysimeters.

3. To comply with paragraph 1.a. of this section, the owner or operator must demonstrate in his unsaturated zone monitoring that:

a. The depth at which soil and soil-pore water samples are to be taken is below the depth to which the waste is incorporated into the soil;

b. The number of soil and soil-pore water samples to be taken is based on the variability of:

The hazardous waste constituents in the waste and in the soil; and

The soil type(s); and

c. The frequency and timing of soil and soil-pore water sampling is based on the frequency, time, and rate of waste application, proximity to ground water, and soil permeability.

4. The owner or operator must keep at the facility his unsaturated zone monitoring plan and the rationale used in developing this plan.

5. The owner or operator must analyze the soil and soil-pore water samples for the hazardous waste constituents that were found in the waste during the waste analysis under C.59.1. and 2.

C.62. **Recordkeeping:**

1. The owner or operator of a landfarm must keep records of the application dates, application rates, quantities, and location of each hazardous waste placed in the facility, in the operating plan of the facility.

C.63. **Closure and post-closure:**

1. In the closure plan and post-closure plan required under HWMP 5.3.4A.8) and 8.6.3, the owner or operator must address the following objectives and indicate how they will be achieved:

a. Control of the migration of hazardous waste and hazardous waste constituents from the treated area into the ground water;

b. Control of the release of contaminated run-off from the facility into surface water;

c. Control of the release of airborne particulate contaminants caused by wind erosion; and

d. If food chain crops are intended to be grown on the land after closure, satisfaction of the requirements of 40 CFR 265.276, and demonstration to the Secretary, and acceptance by him, of the satisfaction of such requirements, prior to such land use.

2. The owner or operator must consider at least the following factors in addressing the closure and post-closure requirements of paragraph 1. of this section:

a. Type and amount of hazardous waste and hazardous waste constituents applied to the landfarm;

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b. The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;
c. Site location, topography, and surrounding land us , with respect to the potential effects of pollutant migration (e.g., proximity to ground water, surface water and drinking water sources).
d. Climate, including amount, frequency, and pH of precipitation;
e. Geological and soil profiles and surface and subsurface hydrology of the site, and soil characteristics, including cation exchange capacity, total organic carbon, and pH;
f. Unsaturated zone monitoring information obtained in accordance with C.61.; and
g. Type, concentration, and depth of migration of hazardous waste constituents in the soil as compared to their background concentrations.

3. The owner or operator must consider at least the following methods in addressing the closure and post-closure care objectives of paragraph 1. of this section:
a. Removal of contaminated soils;
b. Placement of a final cover, considering: (1) Functions of the cover (e.g., infiltration control, erosion and run-off control, and wind erosion control), and (2) Characteristics of the cover, including material, final surface contours, thickness, porosity and permeability, slope, length of run of slope, and type of vegetation on the cover;
c. Collection and treatment of run-off;
d. Diversion structures to prevent surface water run-on from entering the treated area; and
e. Monitoring of soil, soil-pore water, and ground water.

4. In addition to the requirements of HWMP 8.6.5 and 8.6.6 (see C.22.), during the post-closure care period, the owner or operator must:
a. Maintain any unsaturated zone monitoring system, and collect and analyze samples from this system in a manner and frequency specified in the post-closure plan;
b. Restrict access to the facility as appropriate for its post-closure use; and
c. Assure that growth of food chain crops (if any) meets requirements as noted in C.60.

C.64. Special requirements for ignitable or reactive waste:

1. Ignitable or reactive wastes must not be landfarmed, unless the waste is immediately incorporated into the soil so that:
a. The resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under HWMP Appendix A Category III A or C; and
b. No threat to human health or the environment resulting from extreme heat, fire or explosion or violent reaction; nor from uncontrollable toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health; nor from production of uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion; nor from damage to the structural integrity of the device or facility containing the wastes occurs.

C.65. Special requirements for incompatible wastes:

1. Incompatibl wastes, or incompatible wastes and materials, must not

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be placed in the same landfarm area.

LANDFILLS

C.66. **Applicability:**

1. These requirements apply to owners and operators of facilities that dispose of hazardous waste in landfills; a waste pile used as a disposal facility is subject to these requirements.

C.67. **General operating requirements:**

1. Pursuant to HWMP 8.3.4A and 8.4.7B.1) and 2), run-on must be diverted away from the active portions of a landfill.
2. Run-off from active portions of a landfill must be collected.
3. The owner or operator of a landfill containing hazardous waste which is subject to dispersal by wind must cover or owherwise manage the landfill so that wind dispersal of the hazardous waste is controlled.

C.68. **Surveying and recordkeeping:**

1. The owner or operator of a landfill must maintain the following items in the operating record of the facility, which must be kept up to date at least until closure of the facility, and is required by HWMP 8.6.5B.:
   a. On a map or plat of the site, the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks; and
   b. The contents of each cell and the approximate location of each hazardous waste type within each cell.

C.69. **Closure and post-closure:**

1. The owner or operator must place a final cover over the landfill, and the closure plan required under HWMP 5.3.4A and 8.6.3 must specify the function and design of the cover. In the post-closure plan, the owner or operator must include the post-closure care requirements stated in paragraph 4. of this section.
2. In the closure and post-closure plans, the owner or operator must address the following objectives and indicate how they will be achieved:
   a. Control of pollutant migration from the facility via ground water, surface water, and air;
   b. Control of surface water infiltration, including prevention of pooling; and
   c. Prevention of erosion.
3. The owner or operator must consider at least the following factors in addressing the closure and post-closure objectives of paragraph 2. of this section:
   a. Type and amount of hazardous waste and hazardous waste constituents in the landfill;
   b. The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;
   c. Site location, topography, and surrounding land use, with respect to the potential effects of pollutant migration (e.g., proximity to ground water, surface water, and drinking water sources);
   d. Climate, including amount, frequency, and pH of precipitation;
   e. Characteristics of the cover including material, final surface contours, thickness, porosity and permeability, slope, length of

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run of slope, and type of vegetation on the cover; and

f. Geological and soil profiles and surface and subsurface hydrology of the site.

4. In addition to the requirements discussed under C.22., during the post-closure care period, the owner or operator of a hazardous waste landfill must:

a. Maintain the function and integrity of the final cover as specified in the approved closure plan;

b. Maintain and monitor the leachate collection, removal, and treatment system (if there is one present in the landfill) to prevent excess accumulation of leachate in the system;

c. Maintain and monitor the gas collection and control system (if there is one present in the landfill) to control the vertical and horizontal escape of gases;

d. Protect and maintain surveyed benchmarks; and

e. Restrict access to the landfill as appropriate for its post-closure use.

C.70. **Special requirements for ignitable or reactive waste:**

1. [redacted]

a. The resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under HWMP Appendix A Category III A or C; and

b. No threat to human health or the environment resulting from extreme heat, fire or explosion or violent reaction; nor from uncontrollable toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health; nor from production of uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion; nor from damage to the structural integrity of the device or facility containing the wastes occurs.

C.71. **Special requirements for incompatible wastes:**

1. Incompatible wastes, as required by HWMP 8.4.11B., must not be placed in the same landfill cell.

C.72. **Special requirements for liquid wastes:**

1. Bulk or non-containerized liquid waste or waste containing free liquids must not be placed into a landfill, unless:

a. The landfill has a liner which is chemically and physically resistent to the added liquid, and a functioning leachate collection and removing system with a capacity to remove all leachate produced; or

b. 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 tht free liquids are no longer present.

2. A container holding liquid waste or waste containing free liquids must mot be placed in a landfill, unless:

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

b. The container is very small, such as an ampule.

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C.73. Special requirements for containers:

1. An empty container must be crushed flat, shredded, or similarly reduced in volume before it is buried beneath the surface of a landfill.

INCINERATORS

C.74. Applicability:

1. These requirements apply to owners and operators of facilities that treat hazardous waste in incinerators.

C.75. General operating requirements:

1. Before adding hazardous waste, the owner or operator must bring his incinerator to steady state (normal) conditions of operation -- including steady state operating temperature and air flow -- using auxiliary fuel or other means.

C.76. Waste analysis:

1. In addition to the waste analyses required by the HWMP as discussed in C.2., 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.

C.77. Monitoring and inspections:

1. The owner or operator must conduct, as a minimum, the following monitoring and inspections when incinerating hazardous wastes:
   a. Existing instuments which relate to combustion and emission control must be monitored at least every 15 minutes. Appropriate corrections to maintain steady state combustion conditions must be made immediately either automatically or by the operator. Instruments which relate to combustion and emission control would normally include those measuring fuel feed, air flow, incinerator temperature, scrubber flow, scrubber pH, and relevant level controls.
   b. The stack plume (emissions) must be observed visually at least hourly for normal appearance (color and opacity). The operator must immediately make any indicated corrections necessary to return visible emissions to their normal appearance.
   c. The complete incinerator and associated equipment (pumps, valves, conveyors, pipes, etc.) must be inspected at least daily for leaks, spills, and fugitive emissions, and all emergency shutdown controls and system alarms must be checked to assure proper operations.

C.78. Closure:

1. At closure, the owner or operator must remove all hazardous waste and

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hazardous waste residues (including but not limited to ash, scrubber waters, and scrubber sludges) from the incinerator.

THERMAL TREATMENT

C.79. **Applicability:**

1. These requirements apply to owners and operators of facilities that thermally treat hazardous waste in devices other than incinerators.

C.80. **General operating requirements:**

1. 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.

C.81. **Waste analysis:**

1. In addition to the waste analysis required by the HWMP as discuss d in C.2., 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.

C.82. **Monitoring and inspections:**

1. The owner or operator must conduct, as a minimum, the following monitoring and inspections when thermally treating hazardous waste:
   a. 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.
   b. 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.
   c. The complete thermal treatment process and associated equipment (pumps, valves, conveyors, pipes, etc.) must be inspected at least daily for leaks, spills, and fugitive emissions, and all emergency shutdown controls and system alarms must be checked to assure proper operation.

C.83. **Closure:**

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1. At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash) from the thermal treatment process or equipment.

C.84. Open burning; waste explosives:

1. 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 militaryt 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 a table of minimum distances from the property of others, as presented in 40 CFR Part 265.382.

CHEMICAL, PHYSICAL, AND BIOLOGICAL TREATMENT:

C.85. Applicability:

1. These requirements apply to owners and operators of facilities which treat hazardous wastes by chemical, physical, or biological methods in other than tanks, surface impoundments, and land treatment facilities.

C.86. General operating requirements:

1. Chemical, physical, or biological treatment of hazardous waste must not allow the occurrence of any events harmful to human health or the environment, including extreme heat, fire, explosion, release of toxic gases or other injurious substances, or damage to containment equipment or facilities.
2. Hazardous wastes or treatment reagents must not be placed in the treatment process or equipment if they could cause the treatment process or equipment to rupture, leak, corrode, or otherwise fail before the end of its intended life.
3. Where hazarous waste is continuously fed into a treatment process or equipment, the process or equipment must be equipped with a means to stop this inflow (e.g., a waste feed cut-off system or by-pass system to a standby containment device).

C.87. Waste analysis and trial tests:

1. In addition to the waste analysis plan and analyses required under the HWMP and discussed under C.2., the requirements of HWMP 8.4.9A must be met whenever a new and substantially different waste is to be treated at a facility, or a new treatment process is to be employed.

C.88. Inspections:

1. The owner or operator of a treatment facility must inspect, where present:
   a. Discharge control and safety equipment (e.g., waste feed cut-off systems, by-pass systems, drainage systems, and pressure relief systems) at least once each operating day, to ensure that it is in good working order;
   b. Data gathered from monitoring equipment (e.g., pressure and temperature gauges), at least once each operating day, to ensure that the treatment process or equipment is being operated

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according to its design;

c. The construction materials of the treatment process or equipmen , at least weekly, to detect corrosion or leaking of fixtures or seams; and

d. The construction materials of, and the area immediately surrounding, discharge confinement structures (e.g., dikes), at least weekly, to detect erosion or obvious signs of leakage (e.g., wet spots or dead vegetation).

C.89. Closure:

1. At closure, all hazardous waste and hazardous waste residues must be removed from treatment processes or equipment, discharge control equipment, and discharge confinement structures.

C.90. Special requirements for ignitable or reactive waste:

1. Ignitable or reactive waste must not be placed in a treatment process or equipment unless:

a. The waste is treated, rendered, or mixed before or immediately after placement in the treatment process or equipment so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under the HWMP Appendix A, Category III A and C., and (2) no physical or chemical effects (e.g., explosion or release of toxic gases) are allowed which could be harmful to human health, the environment, or the integrity of the containment systems and equipment.

C.91. Special requirements for incompatible wastes:

1. Incompatible wastes and materials may not be placed in the same treatment process or equipment, unless that process or equipment is designed and is capable of safe handling of the mixture.
2. Hazardous waste must not be placed in unwashed treatment equipment which previously held an incompatible waste or material.

SECURITY

C.92. General Requirements for Facilities:

1. Pursuant to HWMP 8.4.1, each treatment, storage and disposal site must provide security and control of access as follows, unless exemption from these requirements in whole or in part can be demonstrated in accordance with HWMP 8.4.1G on the basis that lesser requirements will provide adequate safety and protection:

a. Perimeter barrier, which shall enclose the entire hazardous waste site and shall have the capability to deny unauthorized ingress or egress, except by willful entry, and prevent entry by domestic livestock;

b. Entry facilities, including:

(1) Gate at each entry point equiped with secure locking device;

(2) Gate house for guard, or electromechanical equipment permitting controlled access; and

(3) Floodlighting -- each entry shall be well lighted to insure safety and security at night; and

(4) Safety control devices as may be required under HWMP 8.4.1E.

2. Other security measures and procedures as may be required under HWMP

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8.5.2, including a sign reading "WARNING - Hazardous Waste Area - Unauthorized . Personel Keep Out", posted at each entry and at 200' intervals around the perimeter of the hazardous waste area.

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