GUIDANCE MANUAL FOR THE CLASSIFICATION OF SOLID WASTE DISPOSAL FACILITIES

DRAFT

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INTRODUCTION

The purpose of this document is to assist States in evaluating existing solid waste disposal facilities to identify the facilities which do not comply with the "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (the Criteria). The Criteria were promulgated on September 10, 1979, (44 FR 53438) under the authority of Sections 4004 and 1008 of the Resource Conservation and Recovery Act (RCRA) of 1976 and Section 405(d) of the Clean Water Act. The Criteria were published in the Federal Register on September 13, 1979 (Vol. 44, No. 179, p. 53438). Those facilities that are evaluated by the States and found not to comply with the Criteria will be reported to the Environmental Protection Agency and published in the Open Dump Inventory as required by Section 4005 of RCRA. This Guidance Manual for the Classification of Solid Waste Disposal Facilities is designed as a decision-maker's guide for those responsible for allocating resources and for managing facility evaluations for the Open Dump Inventory. It contains suggested procedures representing EPA's synthesis of the state-of-the-art for evaluating existing facilities against the Criteria. This manual may also be used by disposal facility managers in examining their facilities.

This manual provides technical guidance on setting priorities for the Inventory and on determining whether a particular facility violates the Criteria. Because no Federal enforcement actions result from such a determination, the manual does not address legal or enforcement issues (e.g., chain of custody, site access, inspection procedures, due process). However, to the extent that the State may use the results of these evaluations in any subsequent State enforcement actions, the evaluation procedures employed should take into account State legal requirements.

The Criteria provide minimum national standards for the protection of health and the environment from adverse effects resulting from solid waste disposal. The use of this manual's procedures to evaluate existing disposal facilities should go far in providing for uniform and consistent judgments in the application of the Criteria. Every effort has been

extended to make this document understandable, practical, complete, and technically accurate and to provide that results obtained are replicable. It must be emphasized, however, that the Criteria, not the Guidance Manual, are the determining factors for the classification of facilities. While the States are not bound to use the procedures found in this document to evaluate facilities, EPA expects the States to either use the Guidance Manual or equivalent procedures (i.e., ones which achieve the same results), as approved by the appropriate EPA Regional Office, for development of the Inventory.

EPA expects that field use of the manual will produce new data, expand the state-of-the-art of evaluations, and lead to changes in some of the procedures contained herein. In addition, EPA intends to continue field tests and data collection and to reflect procedural advancements in future revisions of the Guidance Manual.

The Subtitle D Program

The Subtitle D Program of RCRA seeks to improve solid waste management in the United States through funding of grants to States to support the development and implementation of State solid waste management plans. These plans are being developed in accordance with guidelines promulgated under Section 4002(b) of RCRA on July 31, 1979 (44 FR 45066). In accepting a Subtitle D grant, the State agrees to develop a State plan which lays out a scheme for closing or upgrading existing open dumps (i.e., those facilities found to be in violation of the Criteria) and to prohibit new open dumps. The State also agrees to work toward development of regulatory powers to implement the plan; i.e., to enforce the prohibition of new open dumps and the closure or upgrading of existing open dumps.

The annual State grant application (the "work program") will be developed with public participation and include a list of those facilities which the State intends to evaluate against the Criteria during the year. The list will indicate facilities for which the State has substantial data. The Guidance Manual will aid in making determinations for those Criteria elements for which the State must gather further information or do further analysis of existing information in order to determine whether the facilities

should be listed in the Inventory. Clearly, the States will not be able to evaluate all disposal facilities in one year. The State plan, which is also subject to public participation and public hearing, will lay out a scheme for time-phasing the facility evaluations. This scheme must be based on:

(1) potential health and environmental impacts of facilities;
(2) availability of State regulatory and enforcement powers; and
(3) availability of resources.

The States' general priorities have been set for FY 80, and the procedures in the Guidance Manual will help the States determine which of the priority facilities are most likely to cause potential health and environmental impacts (i.e., violate the Criteria) and require greater scrutiny. The manual will also aid in establishing priorities in subsequent years' work programs.

The Open Dump Inventory

Under Section 4005(b) of RCRA, EPA is required to "publish an inventory of all disposal facilities or sites in the United States which are open dumps within the meaning of this Act." An open dump is a disposal facility which does not comply with the Criteria.

Using this manual or equivalent procedures, the States will use Subtitle D grant funds to identify those facilities which violate the Criteria. EPA encourages the States to evaluate each facility for all of the Criteria elements, particularly where the facility is expected to be upgraded. However, EPA will publish as the "Open Dump Inventory" a list of all facilities which the States have found to fail any one or more of the Criteria.

It should be noted that a facility may only be listed in the Open Dump Inventory for violation of the Criteria, and not for violation of more stringent State or local standards. EPA recommends that the States inform all concerned parties (e.g., facility managers and users) of the classification of a facility as an open dump prior to EPA's publication of that facility in the Open Dump Inventory.

EPA will supply open dump inventory reporting forms to the States (see Appendix A). While the States may delegate facility evaluation work to sub-State agencies or private firms, or use field information gathered by a State, local or Federal agency (e.g., the NPDES permitting agency), the forms must be signed and submitted to EPA by a responsible State official. By October 1 of each year, the States are to submit a form to the EPA Regional Office for each disposal facility found to violate the Criteria during that fiscal year (October 1-September 30). Annually, EPA will publish in the Federal Register the list (Inventory) of those facilities identified by the States as violating the Criteria. The Federal Register notice will explain that EPA is reporting on part of the State planning process and that the Inventory is a planning tool intended to provide information to the public and to help the States set priorities for their solid waste management programs. The listing of a particular facility does not constitute a legal determination subjecting any party to Federal sanctions under RCRA.

Coverage of the Manual

The procedures detailed in this manual are specifically targeted at the evaluation of existing solid waste disposal facilities. While the Criteria, as explained in the September 13, 1979 Federal Register, apply to a broad range of disposal activities, the following assumptions and conditions regarding the use of the manual must be reviewed carefully prior to commencing evaluations:

(1) The manual is designed for the evaluation of currently operating solid waste disposal facilities. (For purposes of the Criteria, the term "disposal facility" is used to mean those facilities involved in the placement of solid waste on the land and not such facilities as transfer stations, incinerators, resource recovery plants, etc.). Thus, the manual is not intended for use in evaluating permit applications for new facilities or for the design of such new facilities.

(2) With the exceptions listed in (3) below, the manual is designed to be used for evaluations of the following solid waste disposal facilities:

(a) municipal waste landfills;

(b) industrial waste landfills, both off site and on site;

(c) sludge and other waste landspreading facilities, including those accepting sludges or wastes from:

- sewage treatment plants,
- water supply treatment plants,
- air pollution control facilities,
- industrial or commercial facilities,
- mining and agricultural operations.

(d) surface impoundments of solid, liquid, or semisolid wastes;

(e) facilities for the disposal of septic tank pumpings.

(3) For purposes of the Inventory, the manual is <u>not</u> intended for use in the following cases:

(a) facilities where agricultural wastes (e.g., manure and crop residues) are returned to the soil as fertilizers or soil conditioners;

(b) facilities where overburden resulting from mining operations is deposited when the overburden is intended for return to the mine site;

(c) land application of:

- domestic sewage and
- treated wastewater from publicly-owned treatment works.

(d) point sources of irrigation return flows or industrial discharges which are subject to permits under Section 402 of the Federal Water Pollution Control Act;

(e) source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954;

(f) location and operation of septic tanks;

(g) hazardous waste disposal facilities subject to regulation under Subtitle C of RCRA;

(h) underground well injection facilities subject to regulations for State Underground Injection Control Programs (proposed as 40 CFR Part 146); and

(i) backyard burning and waste composting.

(4) The State may evaluate an inactive facility and submit the results to EPA if the State believes the inactive facility may be causing adverse health or environmental effects and if the State feels that it is important to upgrade such a facility. However, the State should be cautioned when using the manual for evaluating inactive facilities; the manual was designed specifically for operating facilities and the procedures may not be applicable to inactive facilities.

(5) Regulations to be promulgated under Subtitle C of RCRA will define hazardous wastes and set forth the procedures for operators of hazardous waste disposal facilities to notify EPA and apply for permits. Prior to promulgation of these regulations, States may evaluate any disposal facility according to the Criteria, at the State's discretion. After promulgation of the Subtitle C regulations, however, hazardous waste facilities will be subject to the Subtitle C regulatory scheme.

(6) Facilities on Federally-owned or leased land are subject to evaluation against the Criteria. States are encouraged to work with agencies responsible for Federal lands on plans for and conduct of the facility evaluations. Facilities on Federal lands are subject to Federal, State and sub-State requirements for solid waste management (RCRA, Section 6001).

(7) Facilities on Indian lands may be classified if the State secures the approval of the tribe which has jurisdiction. EPA will provide further guidance to the States on this issue.

Guidance Manual Format

The manual addresses each Criteria element in a separate chapter. The chapters follow the organization and format listed below.

1. Criterion and Definitions

The wording of each criterion is reproduced as presented in the Federal Register (44 FR 53438-53468, September 13, 1979).

2. Inventory Procedure

This section contains a brief discussion of each Criterion's significance, including possible adverse health and environmental

effects of violation of the Criterion. Also presented is a summary of the suggested approach for evaluations for purposes of the Open Dump Inventory.

Given the limited resources to develop the Open Dump Inventory, the evaluation approach presented in this manual consists of suggested schemes to eliminate facilities from further consideration, priority ranking schemes, and then procedures to determine non-compliance.

For each Criterion, there are a number of questions to be answered in order to efficiently develop the Inventory, focus on priority facilities or groups of facilities, and to identify violations of the Criterion. These questions are organized into a logical sequence which is depicted in a decision flow chart for each Criterion. The meaning of the flow chart terms is as follows:

(a) "Does not comply" means that the facility is an open dump for that reason.

(b) "Complies" means complies with that Criterion, or portion thereof.

In either case (a) or (b) above, the evaluator should go on to the next box indicated in the flow chart or to the next Criterion if there is no further box indicated. This procedure should be followed for all criteria. If the flow charts and procedures contained in this manual have been followed from beginning to end, a facility will have been evaluated against the full Criteria and all reasons (if any) for the facility to be classified as an open dump will have been identified.

3. Resolution of Decision Flow Chart Questions

Each question posed in the flow chart is restated in the text and step-by-step procedures, methods, and techniques for answering each question are presented.

As indicated previously, the procedures for evaluation of facilities involve:

(a) Elimination schemes

The first step in most evaluation procedures in this manual involves elimination of some facilities from further consideration. This elimination step is designed to rule out or quickly rate facilities to which the Criterion does not apply or where non-compliance or the likelihood of non-compliance is easily determined.

(b) Ranking schemes

In order to optimize the use of limited resources for evaluating facilities and to focus attention on these facilities most likely to violate the Criteria (i.e., have a high probability of causing adverse effects), ranking schemes are presented. The emphasis on ranking schemes is greatest for those situations where the determinations are time consuming or expensive to make, and where the adverse effect involves public health or safety.

(c) Determination schemes

Specific technical procedures are provided for identifying non-complying facilities. These procedures are for performance evaluations (i.e., measuring or predicting adverse effects) and/or substitute operational evaluations (i.e., evaluating the adequacy of techniques employed to control adverse effects). For purposes of the Inventory and State planning activities, substitute operational evaluations are acceptable in lieu of performance evaluations where the state-of-the-art establishes a direct cause and effect relationship between adverse effect and operational technology (e.g., cover soil effectively controls rats).

4. Checklist

At the end of each chapter is a suggested decision checklist to be used for each disposal facility. The checklist summarizes the flow chart questions and provides a place indicating the determination for each specific facility.

Additional Issues

(1) EPA believes that the current state-of-the-art precludes definitive determination of non-compliance with the Ground Water and Gas Criteria without monitoring.

(2) EPA recommends that no disposal facility be classified as an open dump without an on-site field evaluation which reflects the current operational and physical conditions of the facility.

(3) Field inspections should take into account how seasonal variations will affect data results. For example, rainy seasons impact surface leachate seeps; saturated or frozen surfaces increase methane migration and concentrations; vectors appear seasonally; birds migrate; etc.

(4) States must use their judgment in determining whether a violation observed on a single site visit constitutes non-compliance, taking into account the seriousness of the violation and any previous history of violations.

(5) The manual is designed to be used by State managers, inspectors, and evaluators who have been sufficiently trained to apply the procedures. College degrees are not required, but a science background and/or solid waste management experience is preferred.

CHAPTER 1

AIR

1.0 Criterion and Definitions

§ 257.3-7 Air.

(a) The facility or practice shall not engage in open burning of residential, commercial, institutional or industrial solid waste. This requirement does not apply to infrequent burning of agricultural wastes in the field, silvicultural wastes for forest management purposes, land-clearing debris, diseased trees, debris from emergency clean-up operations, and ordnance.

(b) The facility or practice shall not violate applicable requirements developed under a State implementation plan approved or promulgated by the Administrator pursuant to Section 110 of the Clean Air Act.

(c) As used in this section "open burning" means the combustion of solid waste without (1) control of combustion air to maintain adequate temperature for efficient combustion, (2) containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and (3) control of the emission of the combustion products.

2.0 Inventory Procedure

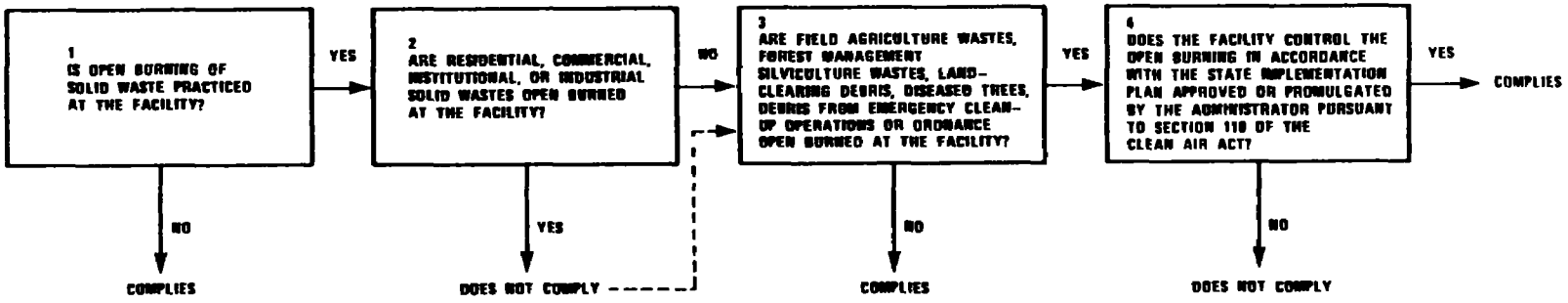
For the purpose of the Inventory the approach is to initially identify disposal facilities which do not practice open burning of wastes. Facilities which practice open burning must then be evaluated for the type of waste burned and compliance with the State Implementation Plan developed pursuant to the Clean Air Act.

The compliance decision flow chart is presented in Figure 1-1.

3.0 Resolution of Decision Flow Chart Questions

3.1 Is open burning of solid waste practiced at the facility?

The first step in evaluating a facility for the air criterion is to determine whether open burning is practiced (flow chart question 1). A facility that uses trench or pit incinerators practices open burning because such incinerators do not control emissions (see discussion of air criterion in preamble to 40 CFR Part 257).



NOTE DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOWCHART QUESTION

FIGURE 1 1 FLOW CHART-AIR

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In general, this criterion does not apply to surface impoundments and landspreading facilities since their operation does not involve open burning. There might, however, be special cases of combustible waste disposal and open burning at these types of facilities. These cases should be evaluated as outlined below.

The procedure for determining whether open burning is being practiced is to:

(a) study the previous history of the facility through:
- past inspections
- design plan and permit conditions (does facility have a variance which allows open burning?)
- complaints of open burning
- interview with local air quality agency

(b) conduct a field inspection
- visual observation of active open burning (including evidence of underground fires)
- evidence of previous burning, such as
  - burning pits
  - ash piles
  - smoldering

Where open burning is not practiced, *the facility complies with the Air Criterion*. If open burning is practiced, the next step is to determine the type(s) of waste being burned (flow chart questions 2 and 3).

3.2 Are residential, commercial, institutional, or industrial solid wastes open burned at the facility?

Where open burning is practiced, from past history or field inspection, determine if the wastes burned are residential, commercial, institutional, or industrial. If any of these wastes are open burned, then *the facility does not comply with the Air Criterion*.

3.3 Are field agriculture wastes, forest management silvicultural wastes, land-clearing debris, diseased trees, debris from emergency cleanup operations, or ordnance open burned at the facility?

If none of these wastes are open burned, *then the facility complies with the Criterion*. If the wastes are open burned, the evaluation must continue to determine if they are open burned in accordance with the State Implementation Plan.

3.4 Does the facility control the open burning of these wastes in accordance with the State Implementation Plan (SIP), approved or promulgated by the Administrator pursuant to Section 110 of the Clean Air Act?

The State or local agency responsible for air pollution control should be consulted to determine whether the burning of the wastes is in compliance with the SIP (flow chart question 4). If the agency is unable to make this determination, obtain from the agency the general and facility specific requirements of the SIP and regulations or guidelines developed thereunder for the open burning of field agricultural wastes, forest management silvicultural wastes, land-clearing debris, diseased trees, debris from emergency cleanup operations, or ordnance. Examine variances, permits, or exemptions for burning and the conditions thereof. For example, open burning may be limited to certain

- hours of the day
- seasons of the year
- atmospheric conditions
- designated burn areas
- number of times per year
- distances from the working face, public roads, highways, residences, etc.
- notification requirements to the air agency, solid waste office, or fire department stating when open burning occurs
- times when adequate fire protection is available
- exemptions for certain areas of the State

Determine if the facility operates in accordance with the SIP and the applicable variances, permits and exemptions by:

- Study of the past history of the facility, including inspection and citizen complaint records
- Field inspection(s) for visual observations of active or previous burning

If there are violations of the conditions of the SIP, *the facility does not comply with the Air Criterion.*

Chapter 7

AIR

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is open burning of solid wastes practiced at the facility?

☐ YES (Continue to 2)

- ☐ Records of previous open burning
- ☐ Visual observation of open burning
- ☐ Physical evidence of previous open burning

☐ NO (COMPLIES)

- ☐ Facility is a surface impoundment and does not open burn wastes
- ☐ Facility is a landspreading operation and does not open burn wastes
- ☐ Landfill which does not open burn

2. Are residential, commercial, institutional, or industrial solid wastes open burned at the facility?

☐ YES (Does not comply)

- ☐ Records of previous open burning
- ☐ Visual observation of open burning
- ☐ Physical evidence of previous open burning

☐ NO (Continue to 3)

3. Are landclearing debris, diseased trees, debris from emergency clean-up operations, silvicultural and agricultural wastes, or ordnance open burned at the facility?

☐ YES (Continue to 4)

- ☐ Records of previous burning
- ☐ Visual observation of open burning
- ☐ Physical evidence of previous open burning

☐ NO (COMPLIES)

4. Does the facility control air emissions in accordance with the State Implementation Plan (SIL) approved or promulgated by the administrator pursuant to Section 110 of the Clean Air Act?

☐ YES (COMPLIES)

- ☐ Opinion given by State agency managing the SIP
- ☐ Variances or permits under SIP examined
- ☐ Visual observations of open burning comply with SIP

☐ NO (Does not comply)

SAFETY

CHAPTER 2(a)

SAFETY - EXPLOSIVE GASES

1.0 Criterion and Definitions

§ 257.3-8 Safety.

(a) *Explosive gases.* The concentration of explosive gases generated by the facility or practice shall not exceed:

(1) Twenty-five percent (25%) of the lower explosive limit for the gases in facility structures (excluding gas control or recovery system components); and

(2) The lower explosive limit for the gases at the property boundary.

(e) As used in this section:

(3) "Explosive gas" means methane (CH_4).

(4) "Facility structures" means any buildings and sheds or utility or drainage lines on the facility.

(5) "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases which will propagate a flame in air at 25°C and atmospheric pressure

2.0 Inventory Procedure

Due to the large number of solid waste disposal facilities at which methane is likely to be generated, and the time involved to monitor a facility for determination of compliance, the Inventory procedure includes the ranking of facilities according to their potential for possible migration problems at the time of the Inventory. The entire classification process consists of:

(1) The elimination from further consideration (compliance) of certain facilities at which methane is not generated and at which methane is prevented from migrating beyond the property boundary and accumulating in facility structures;

(2) Ranking of the remaining facilities based on the potential for any methane hazard at the time of the Inventory;

(3) Determination of compliance by monitoring.

Figure 2(a)-1 presents the compliance decision flow chart.

2.1 Other Definitions

As used in this chapter for the purpose of the Inventory:

(1) "Property boundary" means the perimeter of the property on which a facility is sited; or the perimeter of the property, including buffer zones, which is designated as a facility by appropriate local and State regulations or permits; whichever is lesser.

3.0 Resolution of Decision Flow Chart Questions

3.1 Is methane generated?

Certain disposal facilities will either not generate any methane, or such minor amounts, that they may be assumed to comply with the Explosive Gases Criterion without any monitoring. The data needed to make this determination includes:

(a) The type of waste, organic or inorganic, disposed of at the facility;

(b) The method of disposal, i.e., landfilling, surface impoundment, or landspreading;

(c) The age of the facility;

(d) Operating conditions at surface impoundments.

This information can be collected from permit and inspection records, field observations, and interviews with the facility owners or operators.

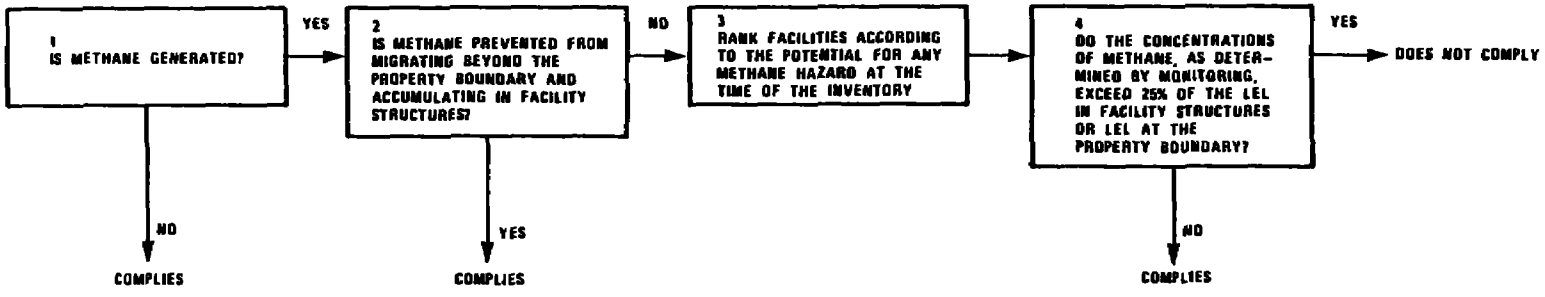


FIGURE 2(a) 1 FLOW CHART-SAFETY-EXPLOSIVE GASES

Those facilities which may be assumed to comply for the purpose of the Inventory are:

(a) Landfills

(1) Any landfills that have not in the past and do not presently accept organic waste, since no methane will be generated. Coal and peat processing waste, incinerator, composting, resource recovery residues and septic tank pumpings should be considered organic wastes.

(2) Any landfills that are less than one year old, even those accepting organic waste, since they are not old enough to be of concern.

(b) Landspreading Facilities - Since methane production is an anaerobic process, all landspreading facilities may be assumed to comply as, in general, the waste is maintained in an aerobic condition.

(c) Surface Impoundments - Since any methane generated is prevented from migrating by the liquid, it may be assumed that all surface impoundments comply with the Criterion for the purpose of the Inventory. Should the State find a surface impoundment where methane is being generated with a facility structure in contact with the liquid, then the Gas Criterion evaluation may need to be conducted for that case.

3.2 Is methane prevented from migrating beyond the property boundary and accumulating in facility structures?

At some disposal facilities, water, saturated soil or impervious rock naturally prevent the migration of any methane generated, or migration is controlled with venting or gas recovery systems and therefore the facility complies with the Criterion.

Data needed to make this determination include:

- The location and types of facility structures;
- Hydrogeologic conditions surrounding the disposal area;
- Property boundaries;

- Information on any venting, migration control, or gas recovery systems;
- Recent monitoring records.

Example landfills are:

- Any landfill which is at all times entirely surrounded (sides and bottom) inside the property boundaries by water or saturated (e.g. surface water interconnected to ground water) or impervious rock and at which there are no facility structures located inside the surrounding barrier or on top of the waste deposit. Examples would be a facility in a marsh or swamp, a facility on an island where the property boundary is at or outside the edge of the water, or a facility where a high ground water table is being lowered inside the property boundary by open drainage tenches.
- Any landfill with recent monitoring records which show that both sections of the criterion are being met in accordance with the requirements of the monitoring section (3.4). Conversely, if recent records show the levels stipulated by the Criterion are being exceeded in facility structures, or at or beyond the property boundary, the facility is not in compliance and the evaluation may proceed to the next criterion.

3.3 Ranking of facilities based on the potential for any methane hazard at the time of the Inventory.

The preceding sections have dealt with the elimination from further consideration of facilities which due to certain conditions comply with both provisions of this Criterion. The only facilities remaining to be evaluated are landfills. Due to the fact that very few landfill facilities are being monitored for gas, and the time involved in monitoring, a ranking technique is presented in this section, so that those facilities with the greatest potential methane hazard at the time of the Inventory can be given top priority for evaluation. The scheme separates facilities into high, medium and low monitoring priorities

based on a history of methane related events, field observation, and methane migration distance prediction charts.

3.3.1 Ranking Based on Methane Related Events

Facilities with the following characteristics should be given highest monitoring priority:

1. A history of methane related fires or explosions in facility or off-site structures, including non-pressurized utility lines;

2. Where existing monitoring data at facility structures and off-site structures indicate that the requirements of the criteria may be being exceeded. This group should also include those facilities where migration control devices have been installed to control a historical problem in on- or off-site structures.

For further evaluation of these highest priority facilities, proceed to the monitoring section (3.4). For the remaining facilities, continue to the second ranking step.

3.3.2 Ranking Based on Preliminary Field Observations

Certain facilities can be assigned monitoring rankings from simple field observations. A scale plot plan of the facility and the surrounding land use within 1/4 mile of the facility, including the location of facility and off-site structures, is needed. The property boundaries and the solid waste limits should be on the map. A recent scale aerial photo might also be used. From this map, photo or plot plan, and an on-site inspection, the following rankings can be assigned:

(a) Low Priority - those facilities at which there are no off-site structures within 1,200 feet of any side of the solid waste limits;

(b) Medium Priority - those facilities where within 1,200 feet of any side of the solid waste limits there are no off-site structures and no facility structures, but at which there is evidence of unhealthy or dead vegetation outside or near any property boundary.

Note: Vegetation destruction is not necessarily related to the explosive gas hazard, but it may be good indicator of methane migration.

(c) Highest Priority - those facilities located in sand or gravel pits and at which there are off-site or facility structures within 300 feet of any side of the solid waste limits.

For further evaluation of the facilities ranked in this section, proceed to the monitoring Section 3.4. For the remaining facilities that have not been eliminated or ranked, proceed to the third ranking step 3.3.3.

3.3.3 Ranking Based on Methane Migration Distance Prediction Charts

It is difficult to rank the remaining landfills by potential hazard without an estimate of the distance the methane may have migrated at the time of the Inventory. Migration distance charts have therefore been developed for Inventory ranking. These estimated distances, when compared to the location of the facility structures, property boundaries, and off-site structures, can then be used to establish a monitoring priority for the remaining landfills.

A basic methane migration distance prediction chart and appropriate corrective factor charts were produced by imposing a set of simplifying assumptions on a general methane migration computer model. These charts should not be used for any purpose other than Inventory ranking because of the number of assumptions that had to be made to produce them. An example of a landfill is shown in Figure 2(a)-2 along with 2 cross-sections. Conditions along each side of the waste deposit are typical conditions that could be encountered. A similar sketch or plan of a facility being evaluated should be prepared. The land use within ¼ mile of the solid waste limits, including off-site and facility structures, should be on the map. The property boundaries and solid waste deposit limits should also be plotted, as has been done in Figure 2(a)-2.

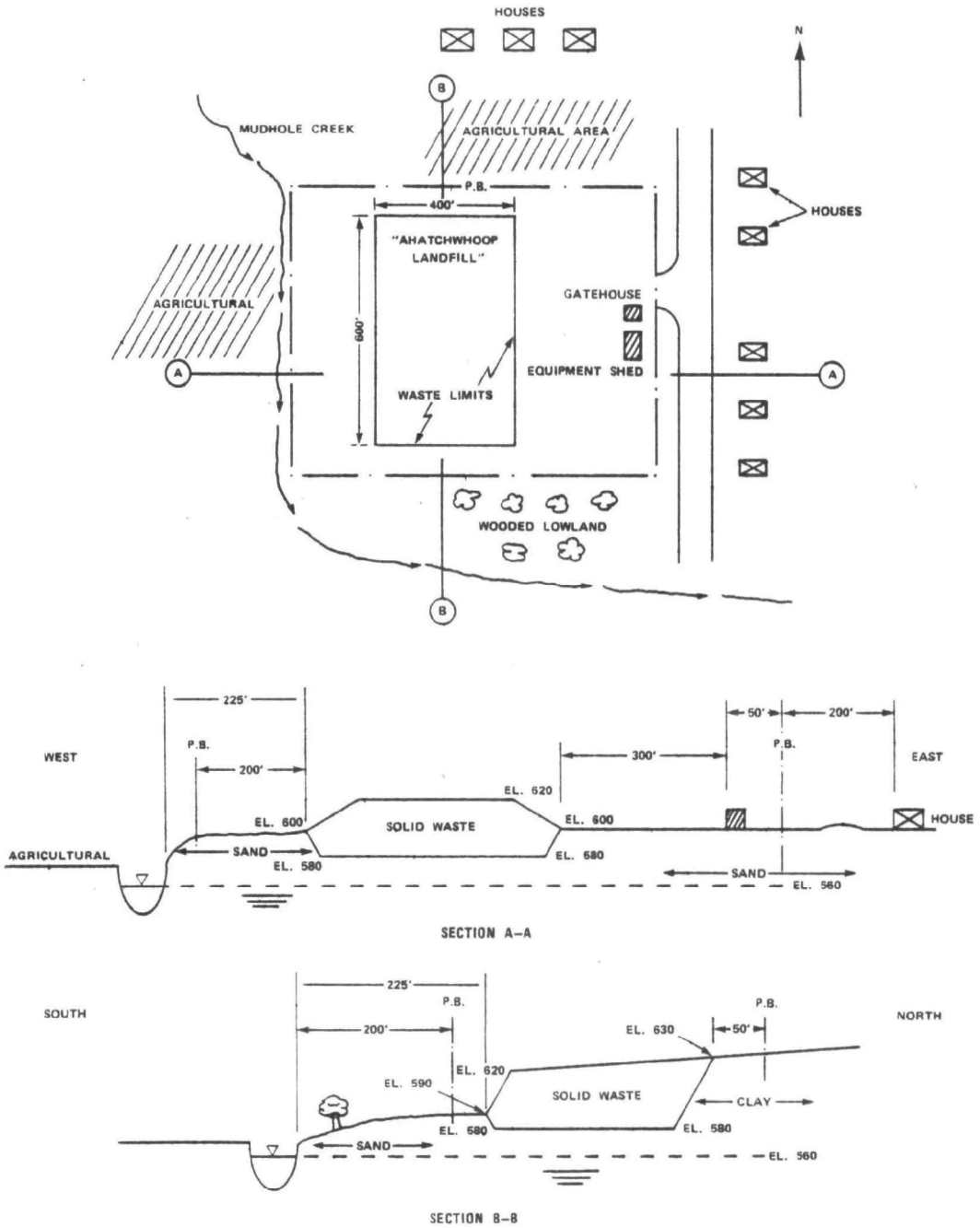


FIGURE 2(a)-2 EXAMPLE LANDFILL (NOT TO SCALE)

Additional data needs are:

1. The age of the site from the initial disposal of organic waste;
2. The average elevation of the bottom of the solid waste;
3. Natural boundaries and topography around the site;
4. The average elevation below the solid waste of a gas impervious boundary, such as the ground water table or a rock formation consisting of granite, marble or shale.

Two calculations of migration distance from the waste boundary are needed for each side of the landfill, to determine if the Criterion is satisfied:

(1) The 5 percent (LEL) distance for property boundaries.

(2) The 1.25 percent (1/4 LEL) distance for facility structures on or off site.

After preparation of the sketch and cross-sections, the determination of the estimated migration distances begins with the use of Figure 2(a)-3 for the 5 percent lower explosive limit (LEL) methane migration distance and for the 1.25 percent (1/4 LEL) distance. These distances are then modified, if necessary, with the corrective factors for depth and surrounding soil surface permeability, Figures 2(a) 4 and 5. The final distances of migration for each side of the landfill can then be plotted on the landfill sketch for comparison to property boundary and structure locations, and the priority determined using Table 2(a)-2.

Uncorrected Migration Distances - The use of Figure 2(a)-3 requires the age of the site and the type of soil extending out from each side of the solid waste deposit. The graph is entered with the site age, moving up to the appropriate soil type and methane concentration (1.25 or 5 percent). Interpolations between the sand and clay lines on the graph can be made for other soils, using the following general guidance:

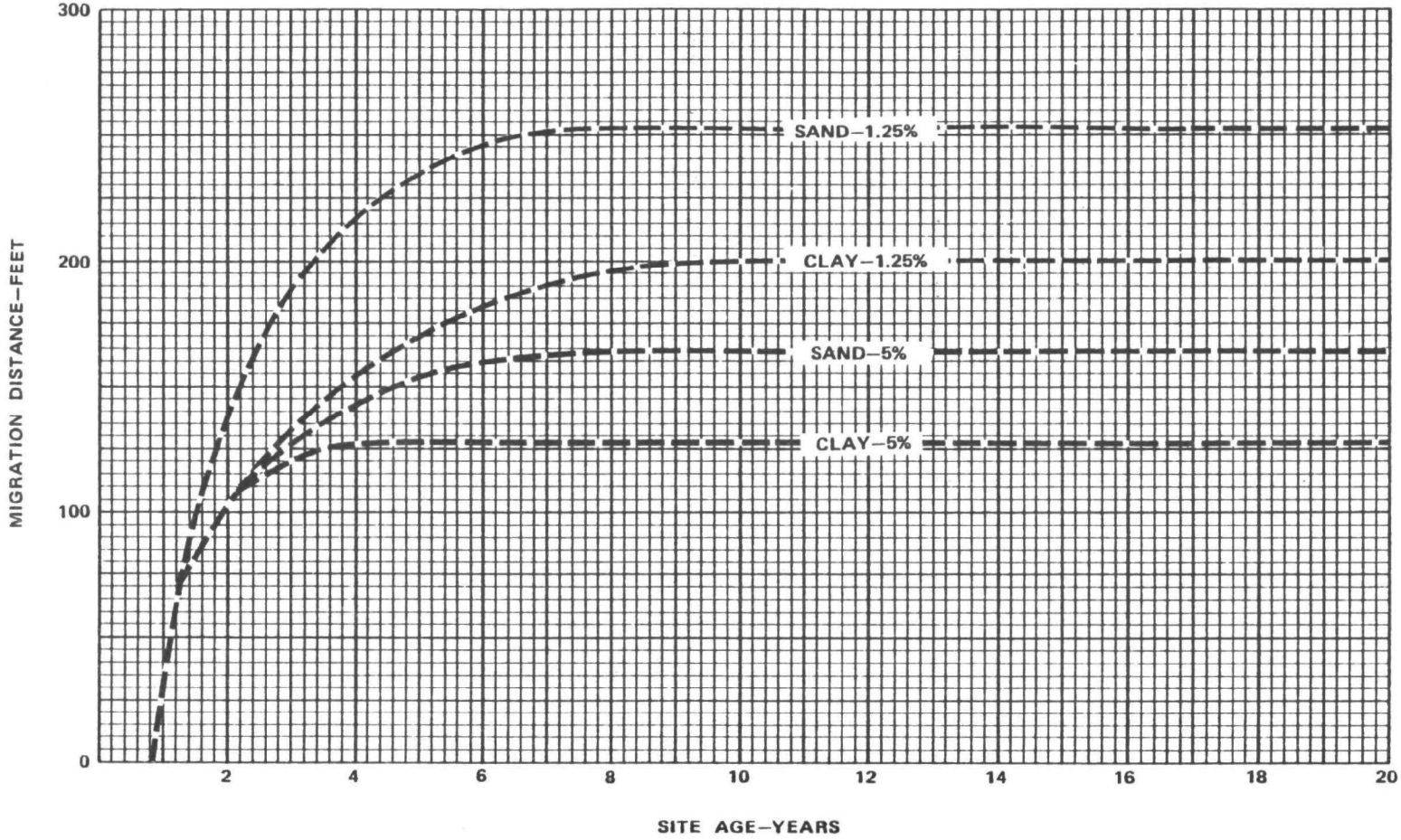


FIGURE 2(a)-3 5% AND 1.25% METHANE MIGRATION DISTANCE

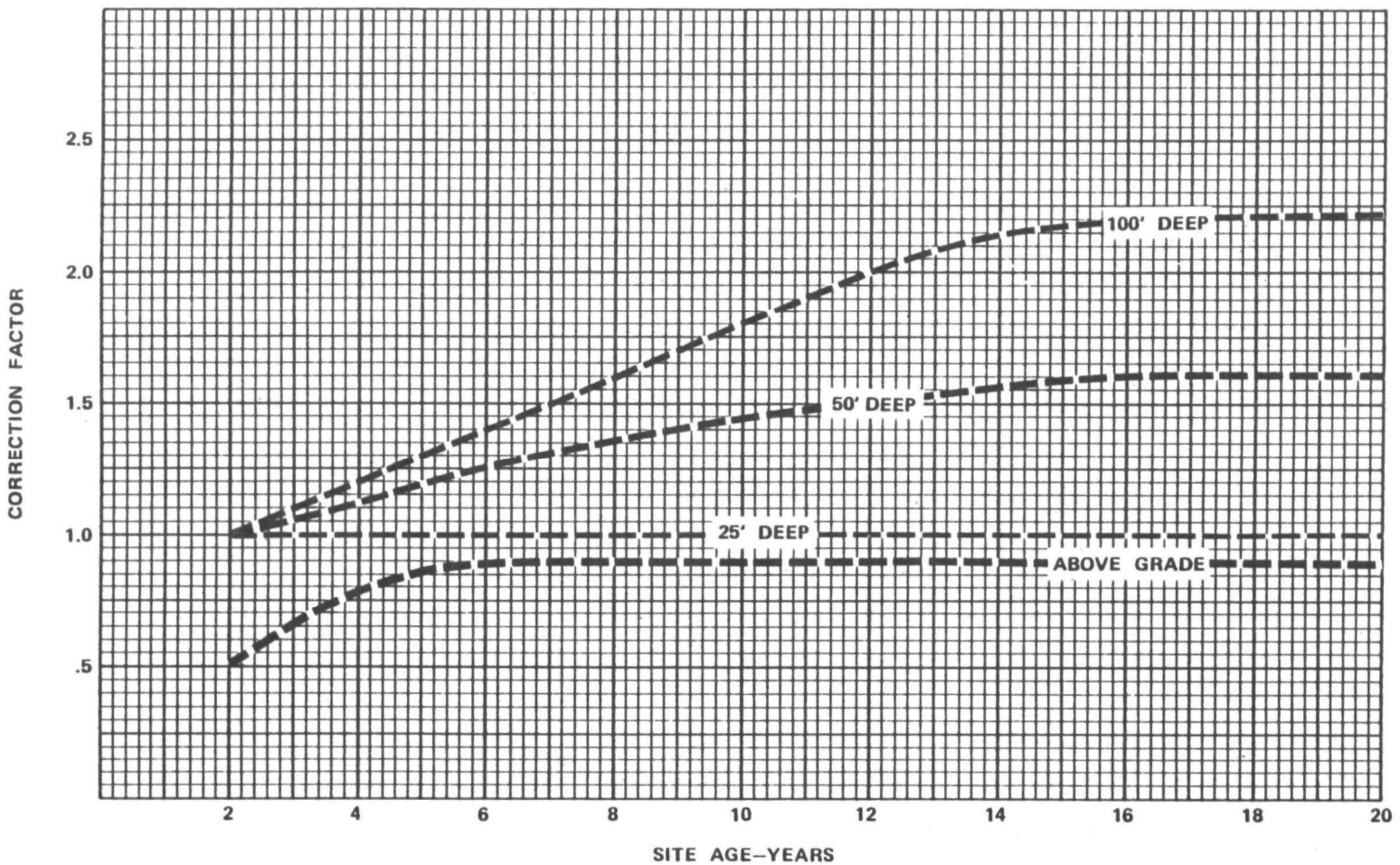


FIGURE 2(a)-4 CORRECTION FACTORS FOR LANDFILL DEPTH BELOW GRADE

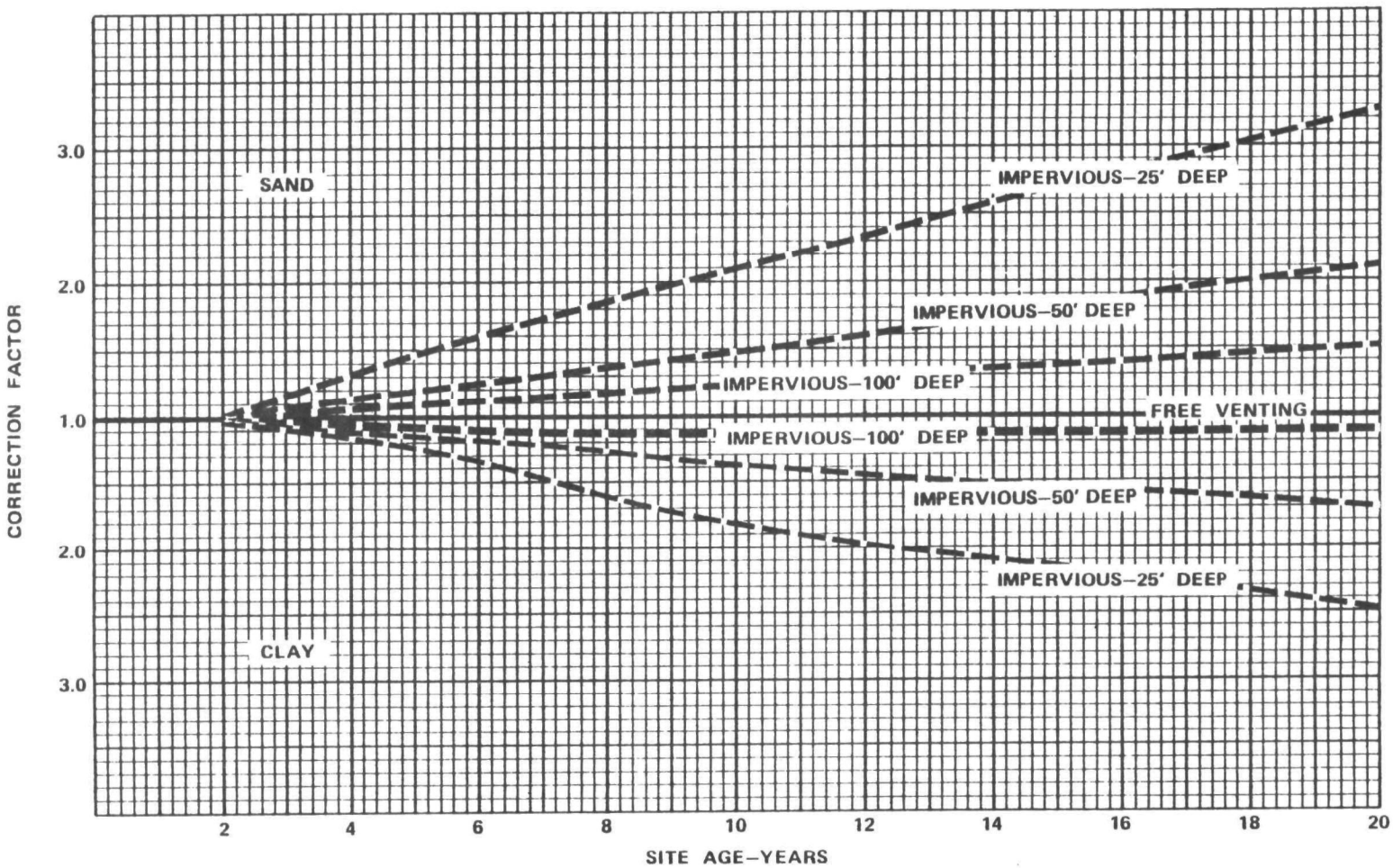


FIGURE 2(a)-5 CORRECTION FACTORS FOR SOIL SURFACE VENTING CONDITION AROUND LANDFILL

Soil Name	USCS Classification	Chart Use
Clean (no fines) gravels and sands	GW, GP, SW, SP	Sand
Silty gravels and sands, silt, silty and sandy loam, organic silts	GM, SM, ML, OL, MH	Interpolate
Clayey gravels and sands, lean, fat and organic clays	GC, SC, CL, CH, OH	Clay

The uncorrected migration distance from the solid waste limit can then be read on the left for the appropriate site age and soil type.

If the soil along a given boundary is stratified and the variability extends from the waste deposit to the property boundary, the most permeable unsaturated thickness should be used in entering the charts. For example, if dry clean sand underlies surficial silty clays, the uncorrected migration distance should be obtained using the sand line of the chart. Where there are questions as to the extent of particular soils along a boundary, helpful information can be obtained from Soil Conservation Service Soil Survey Maps. Field inspection, SCS maps and permit boring information should be sufficient. Additional borings are not necessary as this is only a ranking procedure. Where there is doubt, use the most permeable soil group present.

For the example landfill in Figure 2(a)-2, the uncorrected 5 percent methane migration distances for a 10 year old landfill would be (Figure 2(a)-3).

Section A-A: East side, 10 years, sand = 165'
West side, 10 years, sand = 165'

Section B-B: South side, 10 years, sand = 165'
North side, 10 years, clay = 130'

The corresponding uncorrected distances for the 1.25 percent methane migration would be:

Section A-A: East side, 10 years, sand = 255'
West side, 10 years, sand = 255'

Section B-B: South side, 10 years, sand = 255'
North side, 10 years, sand = 200'

The corrective multipliers for the example site would be:

Section A-A: East side, 10 years, 20' deep = 1.0
West side, 10 years, 20' deep = 1.0

Section B-B: South side, 10 years, 10' deep = 0.95
North side, 10 years, 50' deep = 1.4

Venting Conditions Correction - The corrective factors for the surrounding soil venting conditions are obtained using the chart in Figure 2(a)-5. This chart is based on the assumption that the surrounding surficial soil is impervious 100 percent of the time. Thus the value read from the chart must be adjusted, based on the percentage of time the surrounding surficial soil is saturated or frozen and the percentage of land along the path of gas migration from which gas venting to the atmosphere is blocked all year (asphalt or contrete roads or parking lots, shallow perched ground water, surface water bodies not interconnected to ground water). The totally impervious corrective factor is only used when the landfill is entirely surrounded at all times by these conditions. If both time and area adjustments are necessary, the percentages are additive. Estimates to the nearest 20 percent are sufficient. An adjusted corrective factor is obtained by entering the chart with site age and obtaining the totally impervious corrective factor for the appropriate depth and soil type and then entering this value in the following equation:

Adjusted corrective factor =
[Impervious corrective factor)-1] x [% of impervious time or area] + 1

When free venting conditions are prevalent most of the year, simply use 1.0 (no correction). For depths less than 25' deep, use the 25' value.

For the example site, the adjusted corrective factors for frozen or wet soil conditions 50 percent of the year are:

Section A-A:	East side (ignore narrow road, sand, 20' deep, 10 years old)	= (2.2-1)(.50)+1 = 1.6
	West side (sand, 20' deep, 10 years old)	= (2.2-1)(.50)+1 = 1.6
Section B-B:	South side (sand, 10' deep, 10 years old)	= (2.2-1)(.50)+1 = 1.6
	North side (clay, 50' deep, 10 years old)	= (1.5-1)(.50)+1 = 1.25

Once the surface venting factors have been tabulated in Table 2(a)-1, the corrected distance can be obtained by multiplying across the chart for each side of the landfill. These values can then be plotted on the original scale plan to describe contours of the 5 percent and 1.25 percent methane concentrations or simply compared to the distances from the waste deposit to structures of concern (Figure 2(a)-6). The comparisons are then used with Table 2(a)-2 to arrive at the ranking or priority for facility monitoring.

3.4 Do the concentrations of methane, as determined by monitoring, exceed 25 percent of the LEL in facility structures or LEL at the property boundary?

In order to determine compliance with the criterion it is necessary to monitor facilities for methane gas at facility structures and at the property boundaries. The ranking sequence provides the order of which landfills, and which boundaries or structures, should be monitored first.

The distance of methane movement at a site at a particular time is influenced by a number of factors, including the stratification and moisture content of soils and the venting conditions at the soil surface surrounding the waste deposit. The location of probes and the timing of samples is therefore very important to the accuracy of a compliance determination.

For field measurements it is recommended that a combustible gas indicator be used to determine methane concentrations as a percent of the LEL. The indicator should be of the hot-wire Wheatstone bridge type (catalytic combustion). The thermal conductivity type of meter is not recommended because of carbon dioxide interference. Instructions on the use and calibration of these instruments should be obtained from the manufacturer. These meters normally measure methane concentration as a percentage of the LEL rather than percent methane. Some models are equipped though to measure both. High concentrations of methane (75 percent) sometimes cause erratic performance with the percent LEL meter. Therefore, meters which are capable of reading methane concentrations directly are recommended as a check in the event of erratic percent LEL readings. Alternate instrumentation could include the collection of samples in vacuum bottles, with lab analysis using a gas partitioner or chromatograph.

3.4.1 Monitoring in Facility Structures

Monitoring in a facility structure should normally be done after the building has been closed overnight or for a weekend, and when the soil surface has been wet or frozen for several days. Sampling should be done in confined areas where gas may accumulate, such as basements, crawl spaces, near floor cracks, attics and around subsurface utility connections. Gas recovery and gas control equipment need not be sampled. The results, location, date and time for each sample should

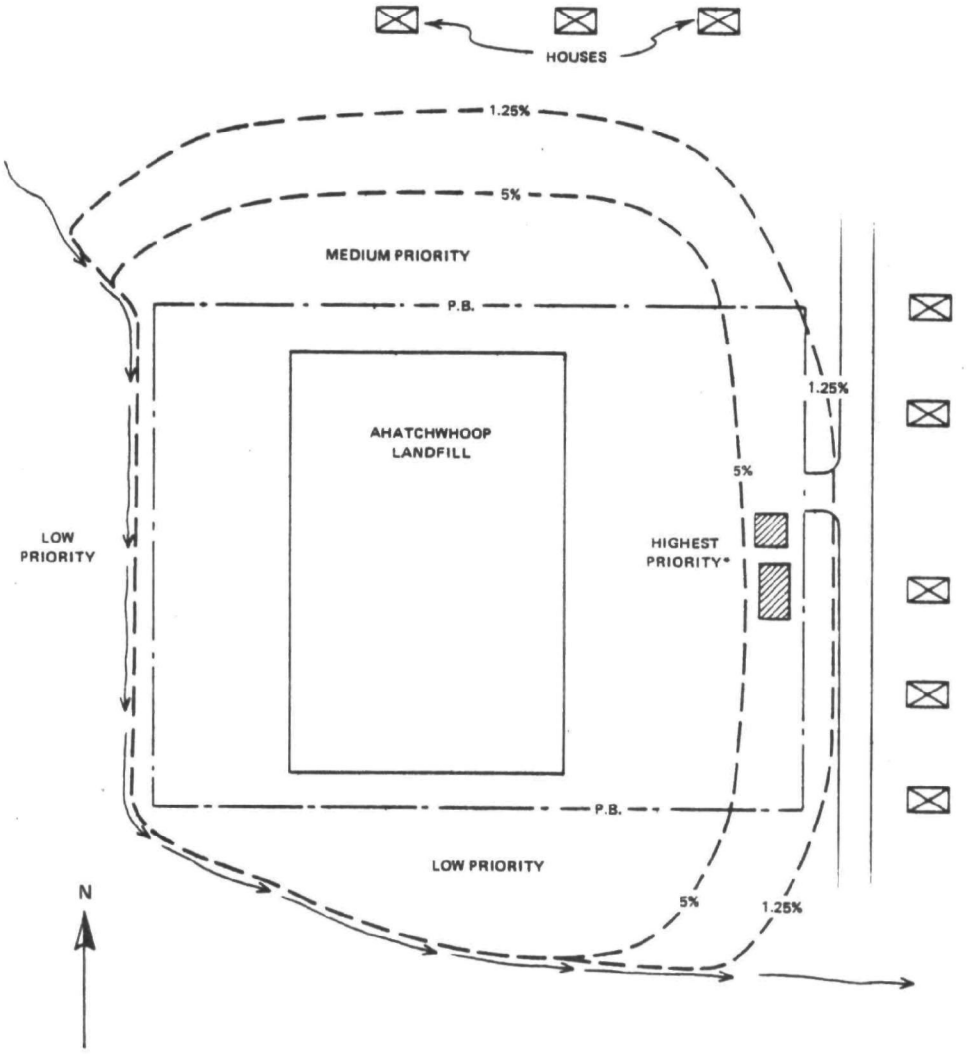
be recorded. If any of the readings are equal to or greater than 1/4 LEL, *then the facility is not in compliance*. If all the readings are less than 1/4 LEL, *the facility is in compliance*. It might be desirable to repeat the tests at a later date or under different climatic conditions to verify the readings.

3.4.2 Monitoring at the Property Boundary

Monitoring points should be located along the top priority property boundaries of the site first. There should be at least 2 monitoring points along a boundary. The exact location of these points should take into account any gas permeable seams; such as dry sand or gravel, alignment with an off-site point of concern, proximity of the waste deposit, areas where there is dead or unhealthy vegetation that might be due to gas migration, and areas where underground construction might have created a natural path for gas flow (utility lines).

In soils that are of uniform depth, probes or sampling points should be at least 3 feet below the ground surface. Where dry sand, gravel or more gas permeable soil strata might interconnect the waste deposit and the property boundary, multiple sampling points should be used, with the uppermost one three feet deep and additional ones in the permeable layers.

For shallow sampling points (3'), a bar punch may be used. A rubber stopper or gas impervious seal must be placed over the top of the hole for at least an hour before sampling. This will allow the gas to displace air that entered the hole while punching it. Information on the use of the bar punch may be obtained from a local gas utility company or a manufacturer. A photo is shown in Figure 2(a)-6. Shallow sampling points may also be excavated with a hand auger and be constructed with the various probes shown in Figures 2(a)-7 through 2(a)-10.

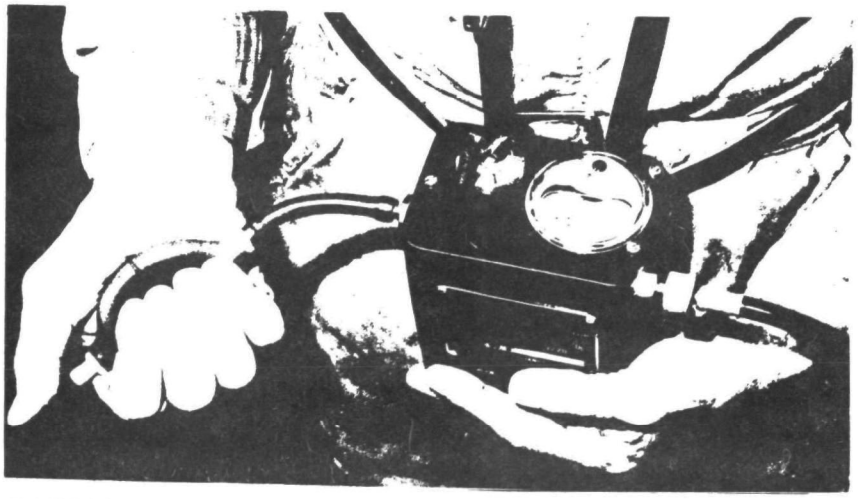


*HIGHEST PRIORITY RESULTS FROM STRUCTURES WITHIN 300'
IN SAND, NOT FROM CONCENTRATION CONTOURS

FIGURE 2(a)-6 EXAMPLE LANDFILL METHANE CONCENTRATION CONTOURS (NOT TO SCALE)

USING 'POGO STICK' (BAR HOLE MAKER) TO MAKE A GROUND GAS SAMPLING HOLE

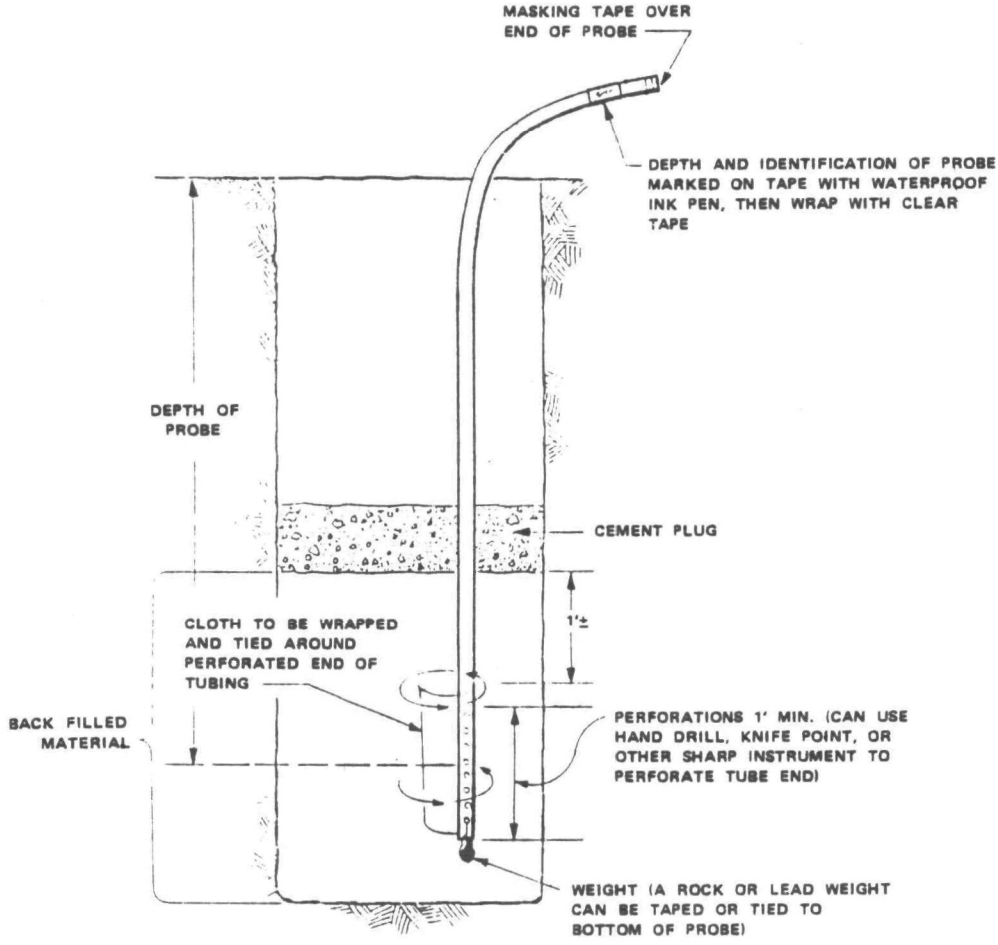
WITHDRAWING A GROUND GAS SAMPLE THROUGH AN EXPLOSIMETER



CLOSE-UP OF EXPLOSIMETER

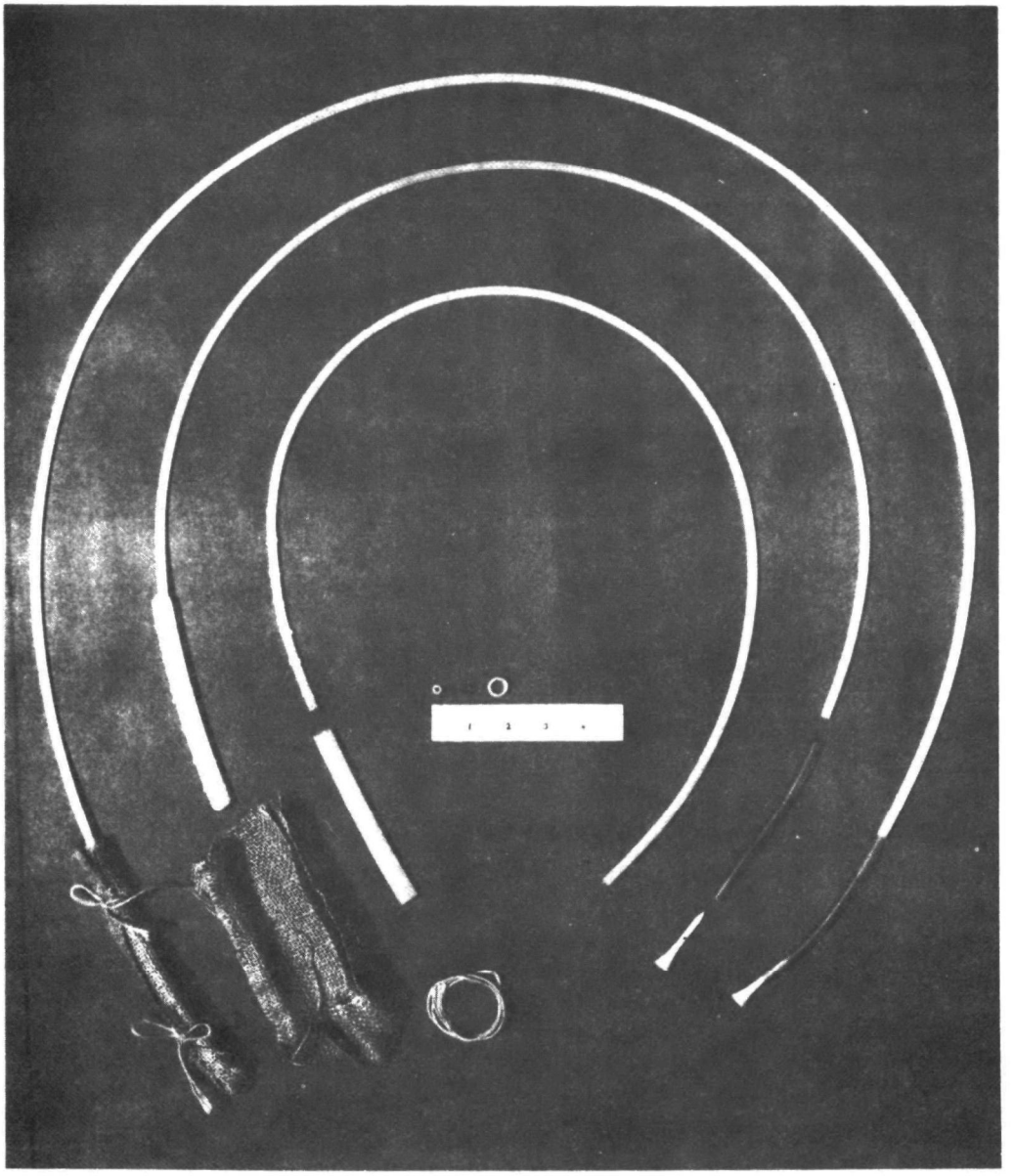
SOURCE: FRANK FLOWERS

FIGURE 2(a)-7 EXAMPLE OF GAS MONITORING APPARATUS



SOURCE: SCS ENGINEERS

FIGURE 2(a)-8 SCHEMATIC OF A TYPICAL GAS PROBE PLACEMENT



SOURCE: LOS ANGELES COUNTY SANITATION DISTRICTS

FIGURE 2(a)-9 TYPICAL DISASSEMBLED GAS PROBE

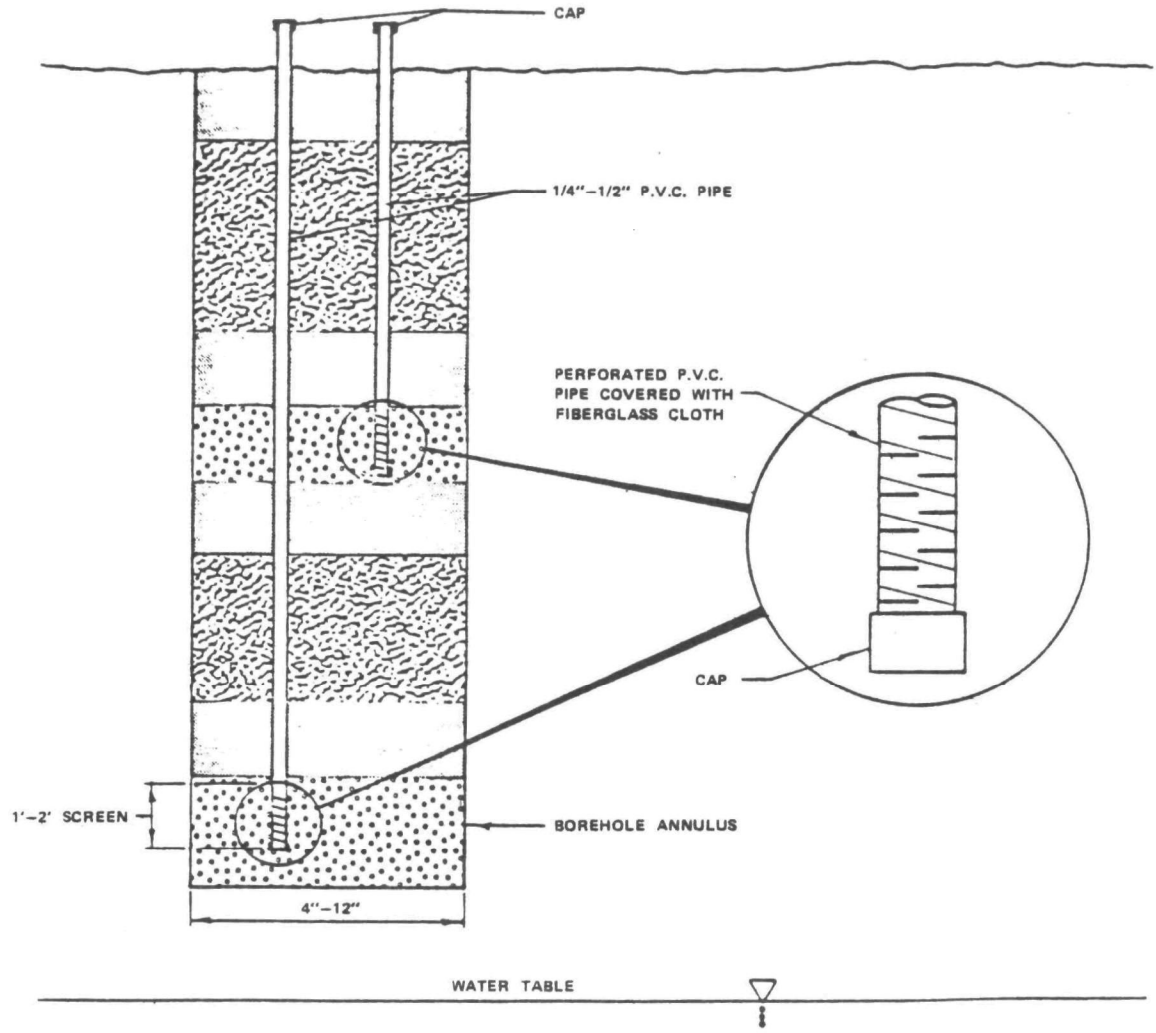
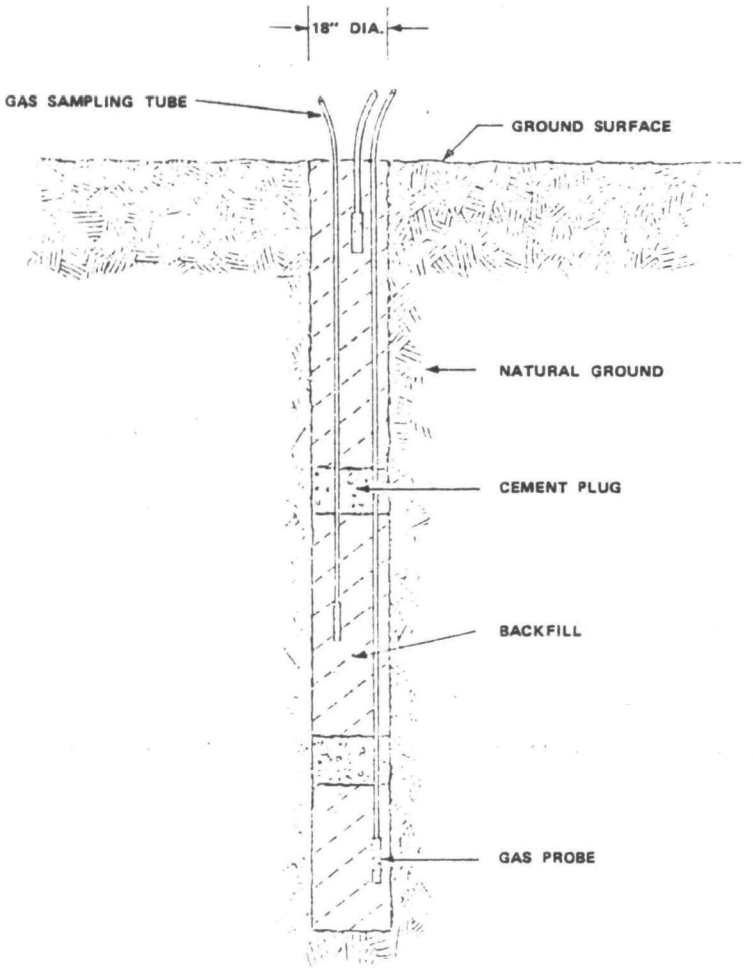


FIGURE 2(a)-10 MULTI-LEVEL PERMANENT GAS PROBE INSTALLATION



SOURCE: SCS ENGINEERS

FIGURE 2(a)-11 TYPICAL MULTI-LEVEL GAS SAMPLING PROBE INSTALLATION

Multiple probe installations may be placed in the same hole, or in separate holes in the same location. Normally a boring rig or portable power auger will bc needed to excavate for the installation of the deeper probes. Deep probes should not be sampled for at least 24 hours after installation. Non-pressurized utility lines leaving the site or alongside it should also be monitored.

When sampling with a combustible gas indicator, samples should be withdrawn with the vacuum pump or hand bulb until a constant reading is obtained. When vacuum bottles are being used, at least the volume of air or gas in the probe and line should be withdrawn before taking a sample. The location or probe number, the time and date and the results should be recorded.

If the site has a gas control or recovery system in operation, the sampling points should be located at the property boundary on the opposite side of any trench or pipes with respect to the disposal area and the property boundary. It may be necessary to locate the sampling points off the facility if the control system is located at the property boundary.

Sampling should preferably be done when the soil surface has been wet or frozen for several days. The results, location, date and time should be recorded. If any of the readings are equal to or greater than the LEL (5 percent), *then the facility is not in compliance.* It might be desirable to repeat the tests at a later date or under different climatic conditions to verify the readings. Where pumping control systems are being used, samples should be taken when all pumps have been shut down for their maximum time during normal operation.

TABLE 2(a)-1

METHANE MIGRATION DISTANCE TABULATING FORM

Landfill Side	Methane Concentration	Uncorrected Distance		Correction for Depth		Correction for Venting		Corrected Distance
E	5%	165'	X	1.0	X	1.6	=	264'
	1.25%	255'	X	1.0	X	1.6	=	408'
W	5%	165'	X	1.0	X	1.6	=	264' * (225' max.)
	1.25%	255'	X	1.0	X	1.6	=	408' * (225' max.)
S	5%	165'	X	0.95	X	1.6	=	250' * (225' max.)
	1.25%	255'	X	0.95	X	1.6	=	388' * (225' max.)
N	5%	130'	X	1.4	X	1.25	=	228'
	1.25%	200'	X	1.4	X	1.25	=	350'

* When these distances are plotted on the landfill sketch, they exceed the distance to the creek, which acts as a barrier to the gas migration. Thus the distance to the creek is the maximum migration distance.

TABLE 2(a)-2

DISPOSAL FACILITY RANKING - METHANE GAS MIGRATION

Location of Structure of Concern	ESTIMATED METHANE CONCENTRATION AT APPROPRIATE DISTANCE				
	≥5% Methane at an Off-Site or Facility Structure	>5% Methane at the Property Boundary But Less than 5% at an Off-Site Structure	<5% Methane at the Property Boundary	<5% but ≥1.25% Methane at the Facility Structure	<1.25% Methane at the Facility Structure
Off-site	Highest	Medium	Low	--	--
On-site	Highest	--	--	High	Low

Chapter 2(a)

SAFETY - EXPLOSIVE GASES

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is methane generated?

☐ YES (Continue to 2)

- ☐ Landfill with organic waste
- ☐ Surface impoundment generating methane with a facility structure in contact with the liquid

☐ NO (COMPLIES)

- ☐ Landfill with no organic waste
- ☐ Landfill less than one year old
- ☐ Surface impoundment with no structures located adjacent to or above the disposal area
- ☐ Landspreading operations

2. Is methane prevented from migrating beyond the property boundary and accumulating in facility structures?

☐ YES (COMPLIES)

- ☐ Facility located on impervious rock
- ☐ Facility located on saturated soil or surrounded by surface water
- ☐ Facility with gas venting or recovery systems
- ☐ Facility with recent monitoring records showing no migration

☐ NO (Does not comply - continue to 3)

3. Ranking of facilities based on potential for methane hazard at the time of the Inventory.

☐ High priority (continue to 4)

- ☐ History of methane-related fires or explosions
- ☐ Monitoring results that indicate a migration problem
- ☐ Location in sand and gravel pits, and facility or off-site structures within 1200 feet
- ☐ Ranking from Table 2(a)-2

☐ Medium priority

- ☐ Vegetative stress within 1200 feet, but no facility or off-site structures
- ☐ Ranking from Table 2(a)-2

☐ Low priority

☐ No off-site structures within 1200 feet
☐ Ranking from Table 2 (a)-2

4. Do the concentrations of methane, as determined by monitoring, exceed 25 percent of the LEL in facility structures or the LEL at the property boundary?

☐ YES (Does not comply)

☐ NO (COMPLIES)

CHAPTER 2(b)

SAFETY - FIRES

1.0 Criterion and Definitions

(b) *Fires.* A facility or practice shall not pose a hazard to the safety of persons or property from fires. This may be accomplished through compliance with § 257.3-7 and through the periodic application of cover material or other techniques as appropriate.

(e) As used in this section:

(8) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede disease vectors' access to the waste.

2.0 Inventory Procedure

The Fires Criterion is satisified when a facility does not pose a hazard to the safety of persons or property from fires. The general procedure is to first eliminate from farther consideration (complies) those facilities handling non-flammable wastes.

The remaining facilities are then evaluated for:

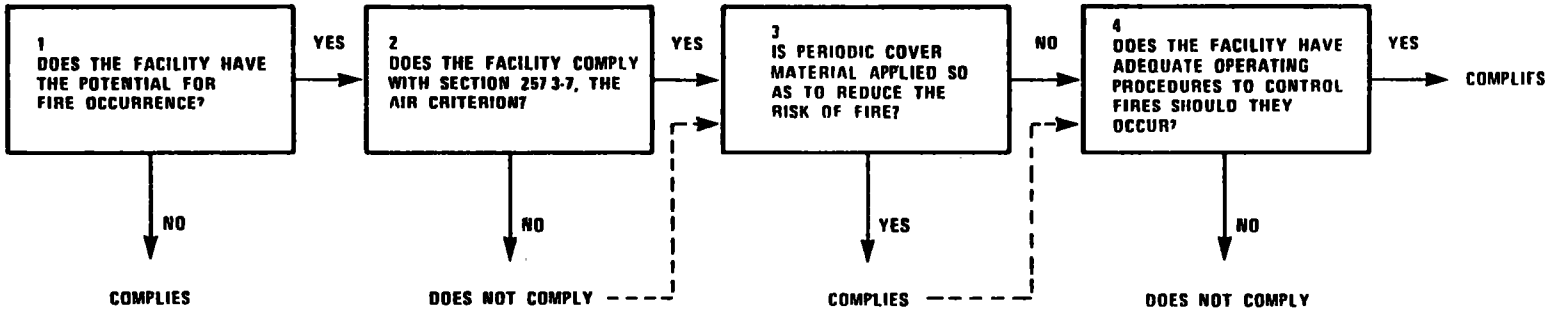
- compliance with the Air Criterion
- periodic cover application
- adequate operating procedures to control fires should they occur

The compliance decision flow chart is shown in Figure 2(b)-1.

3.0 Resolution of Decision Flow Chart Questions

3.1 Does the facility have the potential for fire occurrence?

A facility which receives only non-flammable or non-combustible waste, such as rock and earth, or processing wastes and non-combustible



NOTE· DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOWCHART QUESTION

FIGURE 2(b) 1 FLOW CHART-SAFETY-FIRES

sludges, liquids and aqueous solutions does not have the potential for a fire hazard *and therefore it complies with the Fire Criterion.*

If a facility accepts flammable or combustible waste, the next step is to determine whether it meets the Air Criterion, (Flow chart question 2; see Chapter 1.)

3.2 Does the facility comply with Section 257,3-7, the Air Criterion?

A facility is limited by the Air Criterion to only open buring of agriculture wastes in the field, silvicultural wastes for forest management purposes, land-clearing debris, diseased trees, debris from emergency clean-up operations and ordnance; and, further, must not violate the applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the Administrator pursuant to Section 110 of the Clean Air Act.

The evaluation procedure is merely to determine if the facility has complied with the Air Criterion, Chapter 1.

3.3 Is periodic cover material applied?

For the purpose of the Inventory, the application and compaction of soil or other suitable materials over all combustible solid waste at the end of each operating day is sufficient to reduce the risk of fire and satisfy the requirements of the criterion. *For those landfill facilities operating 24 hours per day, it is sufficient to apply cover once each operating day.* These facilities which do not practice daily covering of all combustible waste or that open burn must next be evaluated for the adequacy of any periodic cover and other fire control techniques.

For landspreading operations handling combustible solid waste, incorporation of all waste into the soil at the end of each operating day in accordance with Chapter 7 is sufficient to meet periodic cover requirements.

3.4 Does the facility have adequate operating procedures to control fires should they occur?

Where a facility does not or cannot completely cover all combustible solid waste at the end of each operating day or where open burning is practiced, (even in compliance with the Air Criterion) it is necessary to employ adequate operating techniques to prevent and/or control fires, including underground fires.

(a) At a landfill where open burning is practiced, common control measures include:

- supervision while burning is practiced
- limitation of access to users while burning occurs
- established arrangements with the local fire department
- earth stockpiles near the burning area
- arrangements for, or on-site availability of heavy equipment to control spread of fire
- water supply under sufficient pressure
- fire extinguishers
- presence of firebreaks or firelanes

Determination of compliance is facility specific with regard to whether one or more of these measures is sufficient to assure that the open burning does not pose a hazard to the safety of persons or property. A review of existing records and/or new inspections will be needed to make this determination.

(b) A landfill where cover material is not applied to all combustible waste at the end of each operating day, must also be evaluated. The following should be considered in deciding whether there is a fire hazard.

- previous inspections and reports
- permit conditions (for a fire protection plan)
- complaint record
- the frequency of spreading and compacting of all combustible waste
- supervision of waste unloading to ensure that hot loads and special wastes that have a high potential for starting fires are unloaded a safe distance from the working face. (Also, supervision of the waste unloading area is required to prevent users from intentionally or accidentally setting waste on fire.)
- the practice of extinguishing hot or burning loads with soil or water before incorporating them into the fill
- presence of earth stockpiles located near the working face
- presence of a water supply under sufficient pressure available at the working face
- presence of fire extinguishers on all solid waste handling equipment
- established arrangements with the local fire fighting department
- arrangements for availability of heavy equipment to extinguish fires
- presence of firebreaks or firelanes

Determination of compliance is facility specific as to whether those methods being employed are sufficient so that fires do not pose a hazard.

(c) For surface impoundments the determination is again facility specific. The evaluation should include whether combustible wastes are properly handled or stored to prevent fire and the techniques that are employed to control fires. The following factors should be considered:

- mixing of wastes to reduce flammability
- presence of suitable fire extinguishing equipment for the type of waste (water under pressure, foam, properly rated extinguishers)
- arrangements with local fire department or trained on-site personnel
- ability to rapidly drain wastes and control inflow
- ability to isolate waste
- accessibility to the impoundment by fire fighting equipment

(d) At landspreading facilities where combustible waste is being handled, site specific determinations should consider the following factors:

- availability of suitable fire extinguishing equipment for the type of waste (water under pressure, foam, or properly rated extinguishers)
- arrangements with local fire department
- accessibility to the facility by fire fighting equipment

Chapter 2(b)

SAFETY - FIRES

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Does the facility have the potential for fire occurrence?

☐ YES (Continue to 2)

☐ NO (COMPLIES)

☐ Facility receives only non-flammable, non-combustible wastes

2. Does the facility comply with Section 257.3-7, of the Air Criterion?

☐ YES (COMPLIES)

☐ The facility controls the occurrence of fires through compliance with Section 237.3-7

☐ NO (Continue to 3)

3. Is periodic cover material applied so as to reduce the risk of fire?

☐ YES (COMPLIES)

☐ The facility applies and compacts cover over combustible solid waste at the end of the operating day

☐ The facility applies and compacts cover at least once every 24 hours

☐ The facility incorporates all waste into the soil at the end of the operating day

☐ NO (Continue to 4)

4. Does the facility have adequate operating procedures to control fires should they occur?

☐ YES (COMPLIES)

☐ Landfill minimizes fire hazards when conducting open burning, such as:

☐ Supervision during burning
☐ Limiting access during burning
☐ Established arrangements with the local fire department
☐ Earth stockpiles near the burning area
☐ On-site availability of heavy equipment to extinguish fires
☐ Water supply under sufficient pressure is available
☐ Fire extinguishers are available
☐ Firebreaks or fire lanes are present

Chapter 2(b)

SAFETY - FIRES

(Continued)

☐ Landfill minimizes fire hazards by proper operating procedures:

- ☐ Previous inspections and reports indicate no problem
- ☐ Permit conditions are being followed (for a fire protection plan)
- ☐ No complaints have been made
- ☐ Records of local fire department indicate no citations have been given
- ☐ High frequency of spreading and compacting all combustible wastes
- ☐ Waste materials with high fire potential are unloaded a safe distance from the working face
- ☐ Unloading of wastes adequately supervised
- ☐ Hot or burning loads are extinguished with water or soil before incorporating into the fill
- ☐ Earth stockpiles are located near the working face
- ☐ Water supply under sufficient pressure is available at the working face
- ☐ Fire extinguishers present on all equipment and buildings
- ☐ Arrangements are established with local fire fighting departments
- ☐ On-site availability of heavy equipment to extinguish fires
- ☐ Firebreaks, fire lanes are present

☐ Surface impoundment minimizes fire hazards by proper handling and storage of liquid wastes:

- ☐ Wastes are mixed to reduce flammability
- ☐ Suitable fire extinguishing equipment is present
- ☐ Established arrangements with local fire department or trained on-site personnel
- ☐ Wastes can be rapidly drained or waste flow can be controlled
- ☐ Waste can be isolated
- ☐ Impoundment is readily accessible by fire-fighting equipment

☐ Landspreading facility minimizes fire hazards by proper operating procedures:

- ☐ Suitable fire-fighting equipment is available
- ☐ Established arrangements with local fire department
- ☐ Facility is readily accessible by fire-fighting equipment

☐ NO (Does not comply)

CHAPTER 2(c)

SAFETY - BIRD HAZARDS TO AIRCRAFT

1.0 Criterion and Definitions

(c) *Bird hazards to aircraft.* A facility or practice disposing of putrescible wastes that may attract birds and which occurs within 10,000 feet (3,048 meters) of any airport runway used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway used by only piston-type aircraft shall not pose a bird hazard to aircraft.

(e) As used in this section:

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

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

(7) "Putrescible wastes" means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds.

2.0 Inventory Procedure

Solid waste disposal facilities have been found by study and observation to be artificial attractants of birds, often providing a feeding, watering and roosting area. In the vicinity of airports, an increase in bird populations may increase the probability of a bird strike to aircraft. Thus, disposal facililities located in the vicinity of airports, with uncontrolled populations of birds, may contribute to a bird hazard to aircraft.

For the purpose of the Inventory, the classification process consists of:

(1) The elimination from further consideration (compliance) of certain facilities based on their location (distance to airports).

(2) The elimination from further consideration (compliance) of certain facilities based on the type of waste received (non-putrescible).

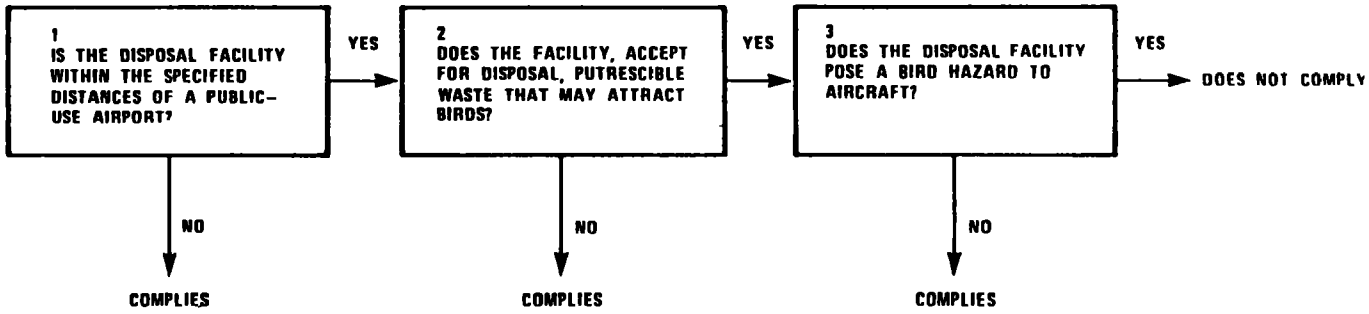


FIGURE 2(c) 1 FLOW CHART –SAFETY–BIRD HAZARDS TO AIRCRAFT

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(3) Ranking of the remaining disposal facilities based on airports with known bird hazards.

(4) The determination of whether a disposal facility poses a bird hazard to aircraft.

The compliance decision flow chart is presented in Figure 2(c)-1.

3.0 Resolution of Decision Flow Chart Questions

3.1 Is the disposal facility within the specified distances of a public-use airport?

Disposal facilities farther than 10,000 feet from any airport runway used by turbojet aircraft or 5,000 feet from any airport runway used only by piston-type aircraft automatically *comply with the criterion*. Most of these determinations will be obvious. Where there are questions about classification of the airport, the type of aircraft using the runway, and the exact distance, the following procedures and definitions may be used.

Public-use airport, as defined in the criteria, means that anyone (the public) may use the airport without prior permission and without restrictions within the physical capacities of available facilities. This would include those airports that have restrictions based on safety or environmental considerations, such as:

- The number of planes per hour
- The hours of operation (noise or safety considerations)
- Types of planes; runways too short for turbojet planes

This does not include airports such as:

- Those restricted to specific individual or company planes
- Agricultural runways
- Private individual's airstrips (not open to the public)

Up-to-date listings of public-use airports are contained in the appropriate regional Airport/Facility Directory published by the U.S. Department of Commerce, NOAA, National Ocean Survey, Rockville, Maryland, 20852. The regions for which the directory is published are shown in Figure 2(c)-2.

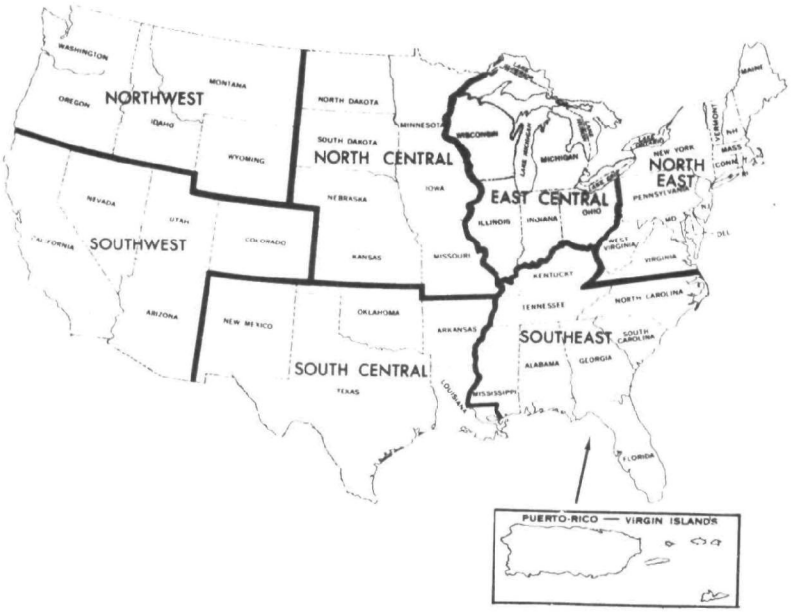


Figure 2(c)-2

Where there are questions about the type of aircraft using the runway, the airport owner or operator should be contacted. If turbojet aircraft regularly use the runway in non-emergency situations, the

10,000 foot distance would apply. These situations would include, but not be limited to:

- Scheduled or non-scheduled commercial passenger or freight service
- Private traffic
- Military aircraft

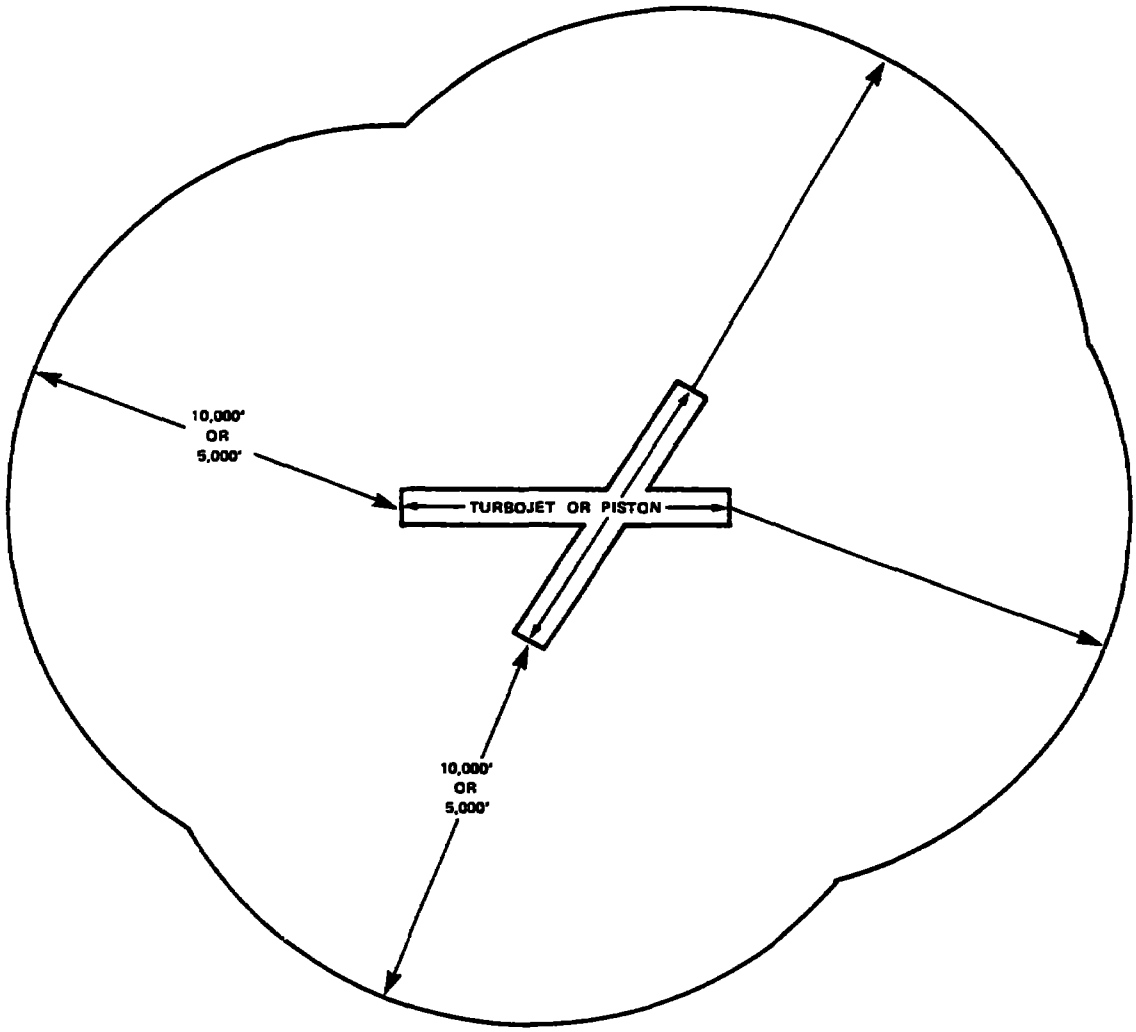
The distance from the runway is measured radially from the end of the runway. The runway is defined as "a defined rectangular area, on a land airport prepared for the landing and takeoff of aircraft along its length." (FAA Glossary). Examples of measuring out from a runway are shown in Figure 2(c)-3.

The determination of distance can be made on recent USGS 7½ min maps, scale aerial photos of the area, or plot plans of the facility and the surrounding area. Measurement to the disposal facility would be to the solid waste boundary, as defined on Page 4-1. If no portion of the facility is within the 10,000 or 5,000 foot radial distance from the end of the runway, *the facility complies with the criterion.* If the facility or portion thereof lies within the specified distance the evaluation should proceed to the next section.

3.2 Does the facility accept for disposal putrescible waste that may attract birds?

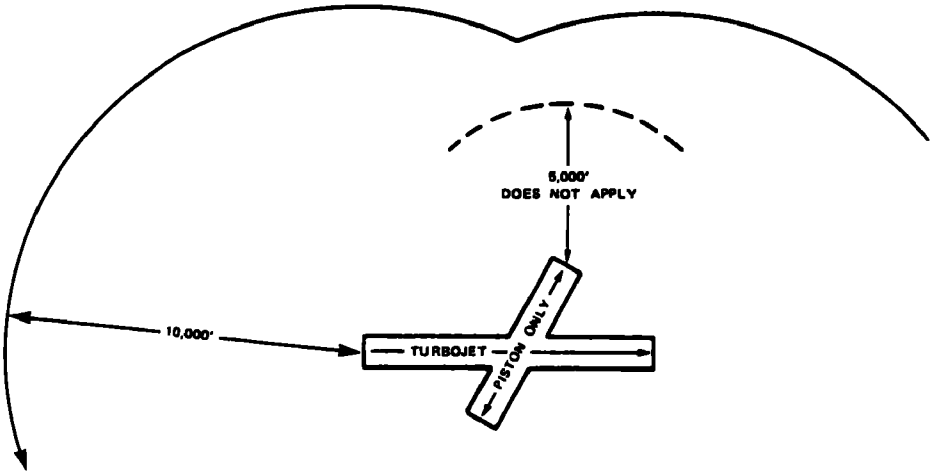
This determination is YES, if the disposal facility accepts any of the following:

- residential wastes
- food wastes, food marketing wastes, food processing wastes such as agricultural wastes, or food canning wastes
- sewage sludge
- septic tank pumpings

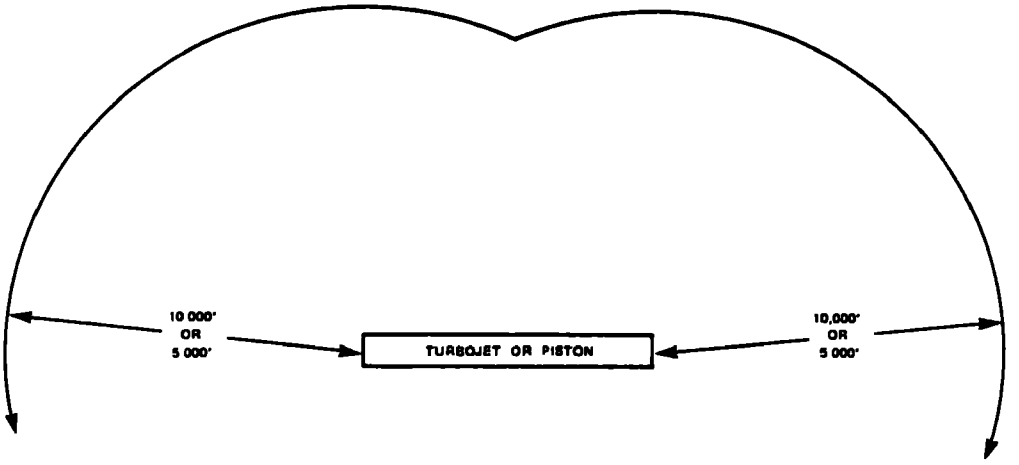


A BOTH RUNWAYS HANDLING SAME TYPE OF AIRCRAFT

FIGURE 2(c) 3 MEASUREMENT OF DISTANCE FROM RUNWAY



B RUNWAYS HANDLING DIFFERENT TYPES OF AIRCRAFT



C SINGLE RUNWAY, EITHER TYPE OF AIRCRAFT

FIGURE 2(c) 3 (CONTINUED) MEASUREMENT OF DISTANCE FROM RUNWAY

- animal manures
- animal carcasses
- similar putrescible wastes

This determination is NO, and *the facility complies with the Criterion,* if the facility receives only:

- fill dirt
- clean construction and demolition wastes
- inorganic wastes such as ash, metals, plastics, glass, ceramic, rubber, mineral, or chemical wastes
- bulky wastes such as large auto parts, tires, stoves, and refrigerators
- similar non-putrescible wastes

State discretion should be used if the facility receives only:

- land clearing debris
- industrial wastes such as leather, cartons, paper, pulp, lumber, sawdust, bark
- processed wastes such as incinerator residue, shredded, or baled wastes

3.3 Does the disposal facility pose a bird hazard to aircraft?

In order to pose a bird hazard to aircraft, the disposal facility must attract birds and increase the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants. The complexity that can be involved in this determination precludes immediate evaluations of all of those facilities not previously eliminated. Therefore, it is recommended that facilities be ranked according to their potential to pose a bird hazard. The suggested order of ranking is:

(a) First Priority - Those facilities which are located within the specified distances of an airport identified by FAA as having a solid waste related bird hazard. These facilities are listed in Appendix 2(c)-1.

(b) Second Priority - Those facilities which are located within the specified distances of an airport identified by FAA as having a bird hazard to aircraft. These airports are listed in Appendix 2(c)-2.

(c) Third Priority - Those facilities which are located within the specified distances of an airport known to the State Solid Waste Office as having a bird hazard to aircraft. A list of such facilities might be obtained from existing office records of:

- previous complaints
- past inspection reports
- previous study or knowledge of a potential problem

and by contacting or referring to:

- Airport owners/operators
- State aviation office
- U.S. Fish and Wildlife Service
- U.S. EPA Regional Offices
- State Wildlife offices
- Bird hazard specialists
- Airman's Information Manual, Part 3A (published by the National Flight Data Center)

(d) Lowest Priority - Those facilities which are located within the specified distances and have not previously been eliminated or ranked.

The evaluations should be made in the order of the priorities, in consultation with the FAA, the State aviation office, the U.S. Fish and Wildlife Service and the owners and operators of the airport and the disposal facility. The compliance decision should be made by the State Solid Waste Office.

The initial step in the evaluation of first, second and third priority facilities is to determine whether the bird populations of the facility are greater than natural populations in the area, for each species. If it is shown that the populations are less or similar, then *the facility is in compliance with this criterion.* It is inadequate that this be determined through one field inspection, since birds may occur at the facility only during certain times of the day, during inclement weather, or certain times of the year. This should be shown through several field inspections and previous study if available. If it is shown that birds are attracted to the disposal facility, further analysis is necessary to determine if these birds pose a hazard to aircraft.

For facilities assigned a low priority, the initial step in the evaluation is to contact the airport to determine if there has been a history of bird strikes. If there has not been, it may be assumed that the *facility complies with the criterion for the purpose of the Inventory.* If there is a history of bird strikes at the airport the evaluation should proceed with the study of populations, as previously discussed. It is now known that:

- the disposal facility is located within the specified distances of a public-use airport;
- the disposal facility receives putrescible waste;

- birds are attracted to the disposal facility (i.e., bird populations on-site are greater than naturally occur in the area);
- a bird hazard exists at the airport.

It remains to be determined whether the disposal facility contributes to the bird hazard at the airport or whether the bird hazard is solely due to other attractants, such as the airport itself or other off-site features.

The most reliable method to determine if the facility does or does not contribute to the bird hazard at the airport is to establish the flight patterns of the species of concern. Methods to establish bird flight patterns include visual observation; radar tracings of birds actively flying from the disposal facility to the airport area; marking birds at the disposal facility and recapturing or seeing them at the airport area; or examination of stomach contents of dead birds in the airport area to evidence previous feeding at the disposal facility. If birds attracted by the disposal facility do indeed fly across the landing or departure pattern for aircraft within the specified distances of the airport, *the facility is not in compliance with this Criterion*.

If the flight patterns of the birds cannot be clearly established, a comparison should be made of the birds at the airport which are posing the hazard, with the birds at the disposal facility and with the birds at other surrounding areas in the vicinity of the airport. The characteristics and occurrence of the bird population at the airport may be similar enough to birds in surrounding areas to indicate that the birds are entering the airport from these surrounding areas.

To make such a comparison, all areas in the vicinity of the airport, as well as any airport features capable of attracting birds, should be identified. Such areas are:

- crop land
- water - especially standing bodies of water and wetlands
- vegetation, especially forests
- open areas - fields (especially recently disturbed), grasses, golf courses
- animal feeding operations
- solid waste handling at the airport

The bird population in these areas should be identified and characterized. The characteristics of the bird population at the airport, the disposal facility, and these other surrounding areas should be compared. Characteristics of bird population to be compared are:

- species of birds - What species poses the hazard at the airport? Does the disposal facility, or other surrounding areas support this species?
- number of birds - What is the approximate number of birds at the airport? Is it a flock, or single birds? Does the disposal facility or surrounding areas support this number of birds?
- daily occurrence - What part of the day do the birds usually occur at the airport? Morning, evening, or all day? Does this bear any relationship to the daily occurrence of birds at the disposal facility or other surrounding areas?
- seasonal occurrence - What are the seasonal patterns of birds at the airport? Are birds most numerous during spring and autumn migration or during winter due to heat and food availability at the disposal facility or other surrounding areas?

- weather conditions - Are birds seeking shelter from inclement weather at the airport? Disposal facility? Surrounding areas?

After a comparison of the birds at the airport, the disposal facility and other surrounding areas, evidence should be weighed to determine the attractant of the birds posing the hazard.

If the bird population at the airport appears to be more clearly related to the bird population of the other surrounding areas than to the bird population of the disposal facility, then the other surrounding areas pose the bird hazard and the *disposal facility is in compliance with this criterion*.

If the bird population at the airport appears to be more closely related to the bird population at the disposal facility than to the bird population of the other surrounding areas, the disposal facility poses the bird hazard and the *disposal facility is not in compliance with this criterion*.

Appendix 2(c)-1

AIRPORTS HAVING SOLID WASTE RELATED BIRD HAZARD

AIRPORTS WITH BIRD HAZARDS

ALASKAN REGION

ASSOCIATED CITY	AIRPORT NAME
Kodiak, Alaska	Kodiak State
Homer, Alaska	Homer
Anchorage, Alaska	Merrill Field

NORTHWEST REGION

Renton, Washington	Renton Municipal
Hoquiam, Washington	Bowerman
Bremerton, Washington	Kitsap County

PACIFIC REGION

None

WESTERN REGION

San Francisco, California	San Francisco International
Oakland, California	Metropolitan Oakland
Stockton, California	Stockton Metropolitan
Santa Barbara, California	Santa Barbara Municipal
Concord, California	Buchanan Field

SOUTHWEST REGION

None

GREAT LAKES REGION

Benton Harbor, Michigan	Ross Field
Escanaba, Michigan	Delta County
Lansing, Michigan	Capital City
Duluth, Minnesota	Duluth International
International Falls, Minnesota	Falls International

AIRPORTS WITH BIRD HAZARDS (continued)

SOUTHERN REGION

ASSOCIATED CITY	AIRPORT NAME
Atlanta, Georgia	Hartsfield Atlanta International
Augusta, Georgia	Bush Field

CENTRAL REGION

Omaha, Nebraska	Eppley Airfield

ROCKY MOUNTAIN REGION

Salt Lake City, Utah	Salt Lake City International
Ogden, Utah	Ogden Municipal

NEW ENGLAND REGION

None

EASTERN REGION

Newark, New Jersey	Newark International
Trenton, New Jersey	Mercer County
Atlantic City, New Jersey	Atlantic City Municipal
Atlantic City, New Jersey	NAFEC/Atlantic City
New York, New York	John F. Kennedy International
New York, New York	La Guardia

- Disposal facilities may not necessarily be within the specified distances of these airports
- Listing subject to updating by FAA

Appendix 2(c)-2

AIRPORTS HAVING A
KNOWN BIRD HAZARD

AIRPORTS WITH BIRD HAZARDS

ALASKAN REGION

ASSOCIATED CITY	AIRPORT NAME
None	

NORTHWEST REGION

Seattle, Washington	Boeing Field/King County
Moses Lake, Washington	Grant County
Lewiston, Idaho	Lewiston-Nez Perce County
Pocatello, Idaho	Pocatello Municipal
Salem, Oregon	McNary Field
Medford, Oregon	Medford-Jackson County
Astoria, Oregon	Clatsop County
Idaho Falls, Idaho	Fanning Field

PACIFIC REGION

Pago Pago, Samoa	Pago Pago International
Honolulu, Hawaii	Honolulu International
Kahului, Hawaii	Kahului, International
Lihue, Hawaii	Lihue International
Lanai City, Hawaii	Lanai

WESTERN REGION

Los Angeles, California	Los Angeles International
Sacramento, California	Sacramento Metropolitan
Sacramento, California	Sacramento Executive
Santa Ana, California	John Wayne/Orange County
Napa, California	Napa County
San Diego, California	San Diego International
Fresno, California	Fresno Air Terminal
Burbank, California	Hollywood Burbank
Santa Monica, California	Santa Monica Municipal
Livermore, California	Livermore
Palo Alto,California	Palo Alto

AIRPORTS WITH BIRD HAZARDS (continued)

ASSOCIATED CITY	AIRPORT NAME
WESTERN REGION (continued)	
Long Beach, California	Long Beach/Daugherty Field
Santa Maria, California	Santa Maria Public
Torrance, California	Torrance Municipal
Compton, California	Compton Airport
Phoenix, Arizona	Phoenix-Sky Harbor
Reno, Nevada	Reno International
SOUTHWEST REGION	
Tulsa, Oklahoma	Tulsa International
Lawton, Oklahoma	Lawton Municipal
New Orleans, Louisiana	Lakefront International
New Orleans, Louisiana	New Orleans International
Monroe, Louisiana	Monroe Regional
GREAT LAKES REGION	
South Bend, Indiana	Michiana Regional
Detroit, Michigan	Detroit City
Detroit, Michigan	Detroit Metropolitan
Detroit, Michigan	Willow Run
Grand Rapids, Michigan	Kent County International
Kalamazoo, Michigan	Kalamazoo Municipal
Muskegon, Michigan	Muskegon County
Chicago, Illinois	Merrill C. Meigs
Chicago, Illinois	Chicago Midway
Moline, Illinois	Quad City
Alexandria, Minnesota	Chandler Field
St. Paul, Minnesota	Holman Field
Appleton, Wisconsin	Outagamie County
Green Bay, Wisconsin	Austin-Straubel Field
La Crosse, Wisconsin	La Crosse Municipal
Manitowoc, Wisconsin	Manitowoc County
Milwaukee, Wisconsin	General Mitchell Field
Oshkosh, Wisconsin	Wittman Field

AIRPORTS WITH BIRD HAZARDS (continued)

ASSOCIATED CITY	AIRPORT NAME
SOUTHERN REGION	
Tampa, Florida	Tampa International
Sarasota/Bradenton, Florida	Sarasota-Bradenton
Ft. Myers, Florida	Page Field
Miami, Florida	Miami International
Orlando, Florida	Orlando International
St. Petersburg/Clearwater, Florida	St. Petersburg/Clearwater Int'l
Melbourne, Florida	Melbourne Regional
Marathon, Florida	Marathon Flight Strip
Jacksonville, Florida	Jacksonville International
Key West, Florida	Key West International
Lake Okeechobee	Lake Okeechobee Municipal
Brunswick, Georgia	Glynco Jetport
Birmingham, Alabama	Birmingham Municipal
Muscle Shoals, Alabama	Muscle Shoals
Anniston, Alabama	Anniston - Calhoun County
Louisville, Kentucky	Standford Field
Lexington, Kentucky	Blue Grass
Wilmington, North Carolina	New Hanover County
Memphis, Tennessee	Memphis International
Nashville, Tennessee	Nashville Metropolitan
Christiansted, Virgin Islands	Alexander Hamilton
San Juan, Puerto Rico	Puerto Rico International
CENTRAL REGION	
Wichita, Kansas	Wichita Mid-Continent
Sioux City, Iowa	Mason City Municipal
Columbia, Missouri	Columbia Regional
St. Louis, Missouri	Lambert-St. Louis International
Kaiser, Missouri	Lee C. Fine Memorial
Cape Girardeau, Missouri	Cape Girardeau Municipal

AIRPORTS WITH BIRD HAZARDS (continued)

ASSOCIATED CITY	AIRPORT NAME
ROCKY MOUNTAIN REGION	
Bismarck, North Dakota	Bismarck Municipal
Watertown, South Dakota	Watertown Municipal
Helena, Montana	Helena
Cody, Wyoming	Cody Municipal
NEW ENGLAND REGION	
Willimantic, Connecticut	Willimantic - Windom
New Haven, Connecticut	Tweed - New Haven
Boston, Massachusetts	General Edward Lawrence Logan
Hyannis, Massachusetts	Barnstable Municipal
EASTERN REGION	
Buffalo, New York	Greater Buffalo International
Ithaca, New York	Tompkins County
Islip, New York	Islip McArthur
Teterboro, New Jersey	Teterboro
Farmingdale, New York	Republic Airport
Poughkeepsie, New York	Dutchess County
Harrisburg, Pennsylvania	Capital City

- Disposal facilities may not necessarily be within the specified distances of these airports
- Listing subject to updating by FAA

Chapter 2(c)

SAFETY -
BIRD HAZARDS TO AIRCRAFT

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is the disposal facility within the specified distances of a public-use airport?

☐ YES (Continue to 2)

☐ 10,000 feet from any airport runway used by turbojet aircraft
☐ 5,000 feet from any airport runway used by piston-type aircraft

☐ NO (COMPLIES)

2. Does the facility receive putrescible waste?

☐ YES (Continue to 3)

☐ Food waste
☐ Sewage sludge, septic tank pumpings
☐ Animal manures
☐ Animal carcasses
☐ Others

☐ NO (COMPLIES)

3. Does the facility pose a bird hazard to aircraft?

☐ YES (Does not comply)

☐ Bird populations of the facility are greater than natural populations in the area
☐ Facility attracts birds
☐ There is a bird hazard at the airport from areas outside the airport
☐ Flight patterns of the birds show that birds do fly from the disposal facility to the airport area

☐ NO (COMPLIES)

☐ Bird populations of the facility are less than or equal to the natural populations in the area
☐ Facility does not attract birds
☐ Bird attraction is due to the airport facility
☐ Flight patterns of birds show that they do not fly from the disposal facility to the airport

CHAPTER 2(d)

SAFETY - ACCESS

1.0 Criterion and Definitions

> **(d) *Access.* A facility or practice shall not allow uncontrolled public access so as to expose the public to potential health and safety hazards at the disposal site.**

2.0 Inventory Procedure

Injury to persons may result from the materials and activities associated with solid waste disposal facilities. The sources of hazards include:

(a) operation of heavy equipment and haul vehicles,

(b) exposure to waste including sharp objects, pathogens, and toxic, explosive, or flammable materials,

(c) accidental or intentional fires, and

(d) excavations and earth-moving activities.

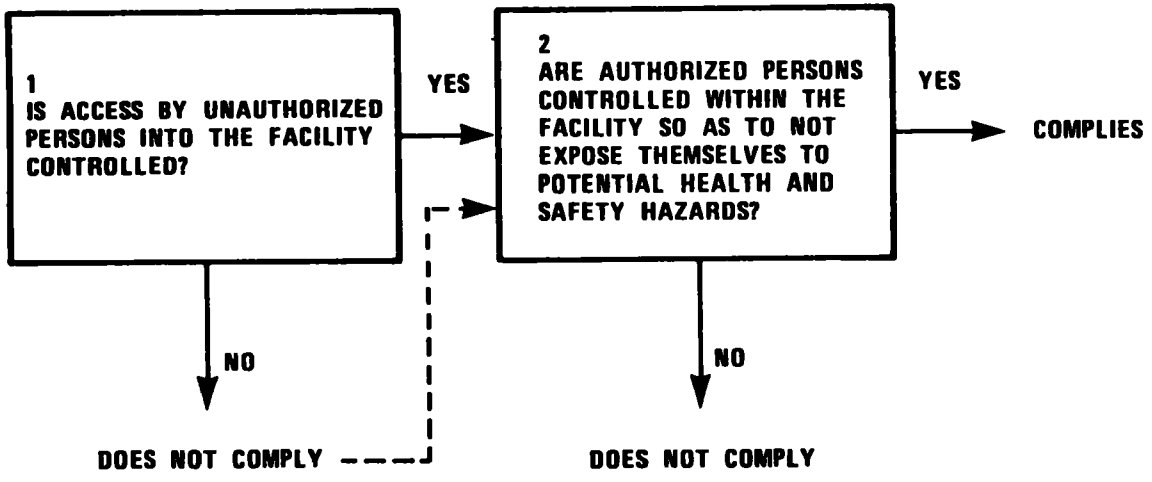
For purposes of the Inventory the public is defined as "authorized persons" and "unauthorized persons." Authorized persons are those with permission to be on or within the facility.

To be in compliance with this Criterion, a facility must provide adequate measures for controlling entry of the public to the facility and, where appropriate, control authorized persons within the facility so as to protect them from potential health and safety hazards. The compliance decision flow chart is shown in Figure 2(d)-1.

3.0 Resolution of Decision Flow Chart Questions

3.1 Is access of unauthorized persons into the facility controlled?

Facility access must be controlled to prevent unauthorized persons from entering the facility. This is accomplished through:



NOTE: DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOWCHART QUESTION

FIGURE 2(d)-1 FLOW CHART–SAFETY–ACCESS

(1) artificial (man-made) control, and/or

(2) natural controls.

Compliance with this Criterion is based on a facility-specific determination of the facility's physical constraints to access by unauthorized persons.

The sources of information needed to make the determinations are:

(1) review of the past history of the facility through:

(a) previous inspections, records and permit conditions indicating controlled access into the facility

(b) records of accidents at the facility due to a lack of controlled access

(2) field inspection.

The assessment should be based on the following:

(1) Artificial controls

(a) Gates - Access at all facilities should be limited to entrances that have gates which can be locked when the site is unsupervised. Depending on the natural controls present at the facility, entrance gates may be all that are needed to control unauthorized entry.

(b) Fences - Fencing requirements are dependent on the natural controls and remoteness of the facility. At some facilities it is necessary to construct fences at selected points along the boundary or in some cases along the circumference of the facility to keep out unauthorized persons. This is especially true if the facility is located in an urban area associated with high usage and close proximity to populated areas. The type of fencing needed (chain link, farm type, etc.) is also facility specific according to the needs of the facility.

(2) Natural Controls - The topography and vegetation on or near the facility may be adequate to control access. Examples of natural controls existing or developed at a facility are trees, hedges, berms, ditches, cliffs, ravines or embankments associated with railroads and roadways. At some remote facilities access control

(other than locked gates) may be satisfied by the distance of the facility from a major roadway or by its location within a larger land area where the public is restricted.

3.2 Are authorized persons controlled within the facility so as to not expose them to potential health and safety hazards?

Methods of control of authorized persons within the facility include the following:

- unloading area supervision
- lighting
- information and directional signs
- prohibition of scavenging
- control of salvaging
- trafficable roadways
- alternate discharge point
- internal fencing or barriers (berms, ditches, etc.)

The sources of information needed to make this determination are:

(1) Review of the past history of the facility through:
   (a) Previous inspections, records and permit conditions indicating control methods within the facility
   (b) Records of accidents at the facility due to inadequate control
(2) Field inspection.

The assessment should be based on the following:

(1) Supervision of the unloading area(s) should occur in a manner which clearly directs users as to where and where not to discharge wastes. This supervision must take place whenever the landfill gates are unlocked.
(2) For those facilities operating after dark, lighting must be provided at the unloading area.
(3) Information and directional signs may be necessary. A facility may need to have such information as hours of operation, authorized users, waste types accepted or excluded, where specific waste types or vehicle types are to be unloaded, appropriate warning signs,

owner or operator emergency telephone numbers, and facility rules posted at the entrance and within the facility. Directional signs may be necessary within the facility to direct drivers to the appropriate unloading area, assist in traffic control and to regulate speed within the facility.

(4) Scavenging (the uncontrolled removal of materials at a disposal facility) should not be allowed.

(5) Salvaging is the controlled removal and handling of waste material for utilization. Examples of salvagable material are metals, glass, paper, bricks and bulky items. Compliance in this case must focus on the salvaging procedures. Generally, the material to be salvaged should not be unloaded at the working face but should be unloaded at a separate salvage area. Materials should be removed from the facility daily or properly stored so they do not create a hazard.

(6) Trafficable Roadways - Internal access roads should be maintained so that traffic will flow smoothly and will not be interrupted by ordinary inclement weather.

(7) Provisions for Alternate Discharge Point - Bulk containers or roll-off units may be provided at an unloading area at a separate location within the facility for small vehicles to dispose of waste. This area should be located away from the working face to reduce the potential for accidents.

(8) Internal fencing or barriers (berms, ditches, etc.) may be used to control the movement of vehicles or persons within the facility.

Chapter 2(d)

SAFETY - ACCESS

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is access of unauthorized persons into the facility controlled?

☐ YES (COMPLIES)

Natural controls:

☐ Trees and hedges
☐ Berms and ditches
☐ Cliffs and ravines
☐ Remoteness

Artificial controls:

☐ Gates
☐ Fences

☐ NO (Continue to 2)

2. Are authorized persons controlled within the facility so as to not expose them to potential health and safety hazards?

☐ YES (COMPLIES)

☐ Supervision of the unloading area
☐ Adequate lighting
☐ Posting information and direction signs
☐ Prohibition of scavenging
☐ Control of salvaging
☐ Trafficable roadways
☐ Alternate discharge point

☐ NO (Does not comply)

CHAPTER 3

SURFACE WATER

1.0 Criterion and Definitions

§ 257.3-3 Surface Water.

(a) A facility or practice shall not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES) under Section 402 of the Clean Water Act, as amended.

(b) A facility or practice shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under Section 404 of the Clean Water Act, as amended.

(c) A facility or practice shall not cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been approved by the Administrator under Section 208 of the Clean Water Act, as amended.

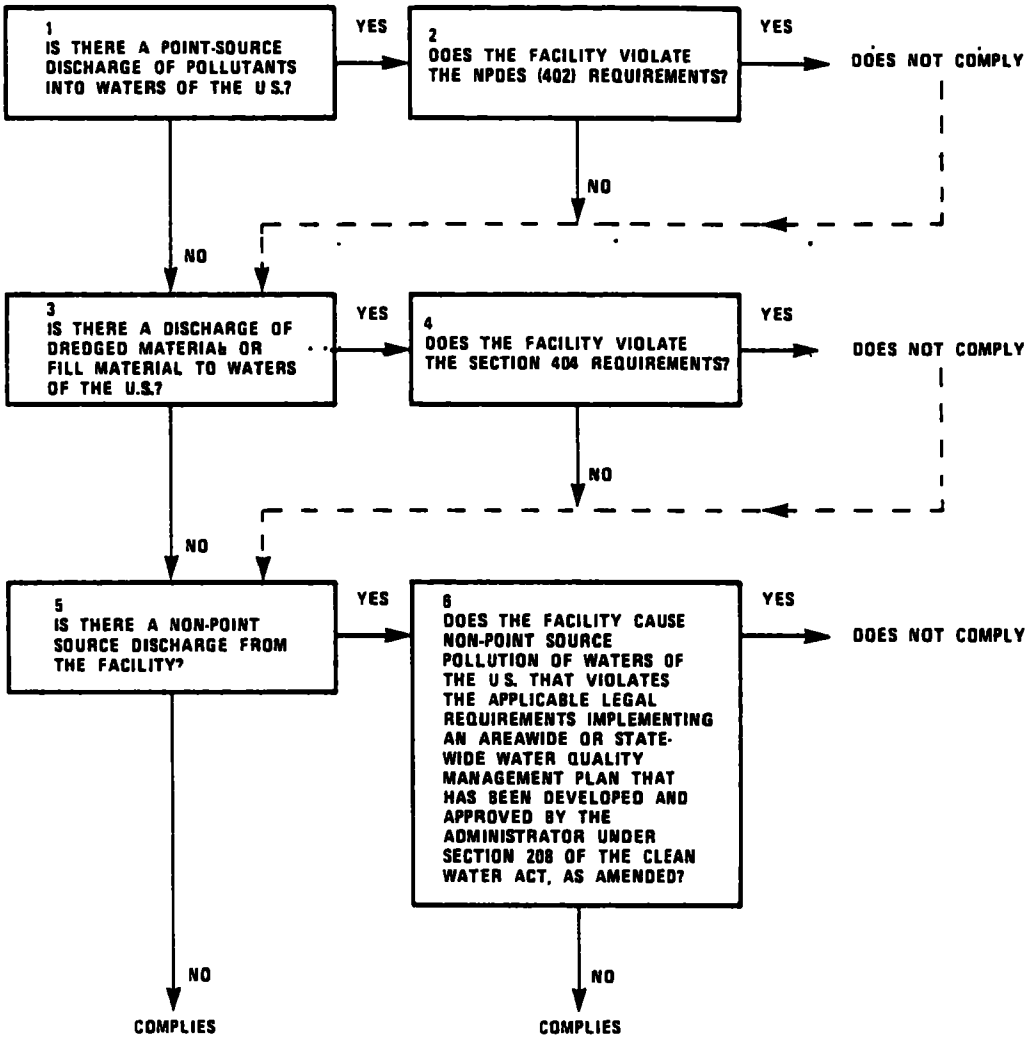
(d) Definitions of the terms "Discharge of dredged material", "Point source", "Pollutant", "Waters of the United States", and "Wetlands" can be found in the Clean Water Act, as amended, 33 U.S.C. 1251 et seq., and implementing regulations, specifically 33 CFR Part 323 (42 FR 37122, July 19, 1977).

2.0 Inventory Procedure

The Inventory classification procedure involves determining if a facility complies with the requirements of 3 Sections of the Clean Water Act; Section 402, Section 404, and any applicable legal requirements developed under Section 208. The procedure is to determine whether any of these requirements are applicable to the facility, and if so, whether the facility complies. The decision procedure flow chart is shown in Figure 3-1.

A disposal facility operating within waters of the United States, discharging pollutants into waters of the United States, or placing fill material with the primary purpose of waste disposal into waters of the United States will require a Section 402 (NPDES) permit.

A disposal facility discharging dredged or fill material into waters of the United States will require a Section 404 permit. Applicable discharges include, but are not limited to, the disposal of dredged material and the placement of dikes or levees (e.g. fill material) to restrain waste from entering surrounding waters. Facilities



NOTE DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOW CHART QUESTION

FIGURE 3-1 FLOWCHART–SURFACE WATER

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may require both a 402 and a 404 permit.

State and area wide 208 water quality management plans address non-point source pollution of surface waters. A facility located in an area covered by a 208 plan which is implemented by legal requirements for contol of non-point source pollution from solid waste disposal facilities must comply with such requirements.

2.1 Definitions

The following definitions are from the regulations for the 402 (NPDES) permit program (40 CFR 122).

> (a) "Discharge of Pollutant(s)" includes (in reference to waters of the United States): any addition of any pollutant or combination of pollutants to navigable waters from any point source, or. . . surface runoff which is collected or channelled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality or other party which do not lead to treatment systems; and discharges through pipes, sewers, or other conveyances, leading into treatment systems owned in whole or in part by a third party other than a State or a municipality.
>
> (b) "Point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.
>
> (c) "Pollutant" means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.
>
> (d) "Waters of the United States." This term includes:
>
> (1) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign

commerce, including all waters which are subject to the ebb and flow of the tide;

(2) Interstate waters, including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats and wetlands, the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

- which are or could be used by interstate or foreign travelers for recreational or other purposes;
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce;
- which are used or could be used for industrial purposes by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as navigable waters under this paragraph;

(5) Tributaries of waters identified in paragraphs (1)-(4) of this section, including adjacent wetlands; and

(6) Wetlands adjacent to waters identified in paragraphs (1)-(5) of this section ("Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include playa lakes, swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds); provided that waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States.

The following definitions are from the regulations for the 404 (dredge and fill) permit program (33 CFR 323).

(e) "Discharge of dredged material" means any addition of dredged material into the waters of the United States. The term includes,

without limitation, the addition of dredged material to a specified disposal site located in waters of the United States and the runoff or overflow from a contained land or water disposal area. Discharges of pollutants into waters of the United States resulting from the onshore subsequent processing of dredged material that is extracted for any commercial use (other than fill) are not included within this term and are subject to Section 402 of the Federal Water Pollution Control Act even though the extraction and deposit of such material may require a permit from the Corps of Engineers. The term does not include plowing, cultivating, seeding and harvesting for the production of food, fiber, and forest products.

(f) "Discharge of fill material" means the addition of fill material into waters of the United States. The term generally includes, without limitation, the following activities: placement of fill that is necessary to the construction of any structure in a water of the United States, the building of any structure or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; beach nourishment; levees; fill for structures such as sewage treatment facilities, intake and outfall pipes associated with power plants and subaqueous utility lines; and artificial reefs. The term does not include plowing, cultivating, seeding and harvesting for the production of food, fiber, and forest products.

(g) "Dredged material" means material that is excavated or dredged from waters of the United States.

(h) "Fill material" means any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody. The term does not include any pollutant discharged into the water primarily to dispose of waste, as that activity is regulated under Section 402 of the Federal Water Pollution Control Act (Clean Water Act) Amendments of 1972.

3.0 Resolution of Decision Flow Chart Questions

This manual does not recommend ranking facilities for the evaluation of the Surface Water Criterion. The pollution potential is significant, but little effort has been concentrated thus far on using the mechanisms of the Clean Water Act to address the problem. Although a large number of facilities are located in or adjacent to waters of the United States, only a small percentage currently have 402 (NPDES) permits. Also, many 208 plans either do not address non-point source pollution from solid waste disposal facilities or, where such provisions are found, are not implemented by legal requirements.

3.1 Is there a point source discharge of pollutants to the waters of the United States?

A facility which causes a point source discharge of pollutants to waters of the United States violates this Criterion unless it has applied for or is operating in compliance with a 402 (NPDES) permit. To determine whether there is a point source discharge of pollutants, check the facility location, design and operational history, conduct a field inspection, or check with the appropriate 402 (NPDES) permit program to see whether the facility requires a permit (e.g. has a point source discharge). The following types of discharges are considered as point sources and will require evaluation as to whether they violate 402 (NPDES) requirements (Question 3.2).

(a) Landfills - point source discharge of pollutants include:

- A discharge from a leachate collection system into waters of the United States, including leachate from discrete channels or fissures.
- A discharge from an on-site leachate treatment system directly into waters of the United States. Leachate that is conveyed to off-site treatment facilities (e.g. sewage treatment plants) is not considered as a point source discharge from the facility.

- A direct discharge of solid waste into waters of the United States where the primary purpose is for disposal rather than filling.
- A discharge of surface runoff which is collected or channelled by man.

In general, where there is a discharge of solid waste into the waters of the United States (diked or not), the primary purpose may be assumed to be disposal rather than filling unless clear evidence to the contrary is available. This evidence might include zoning changes or the purchase of waste for fill. When the discharge is fill material, the primary purpose may be assumed to be filling, rather than disposal, and there is not a point source discharge requirement.

(b) Surface Impoundments - point source discharge of pollutants includes:

- location in waters of the United States.
- clearly delineated outflows to waters of the United States such as discharges from pipes, outfalls, spillway structures and channels.

(c) Landspreading Operations - point source discharge of pollutants includes:

- discharge to waters of the United States from any outfall, pipe, or clearly delineated channel that drains a land-spreading area where the waste is not incorporated into the soil as defined in Chapter 7.
- landspreading operations located in waters of the United States where the waste is not applied for the purpose of enhancement of vegetative growth.

If there is a point source discharge, a facility must be evaluated against the 402 (NPDES) requirements. If there is no point source discharge, *the facility complies with this part of the Criterion.*

3.2 Does the facility violate the 402 (NPDES) requirements?

If a facility has a point source discharge, and is not operating in compliance with or has not applied for a 402 (NPDES) permit, *then it*

does not comply with this part of the Criterion. If a facility has a 402 permit but is in violation of that permit, *it does not comply with this part of the Criterion*.

The above determinations can be made in the office by contacting the State NPDES program (if the State has authority over the program) or the Regional Office of the Federal EPA.

3.3 Is there a discharge of dredged material or fill material to waters of the United States?

A 404 (dredge and fill) permit is required for the placement of any material for the purposes of fill into waters of the United States, as well as the discharge of dredged material for the purposes of disposal or fill. In general, there is a discharge of dredged or fill material to waters of the United States when:

- the primary purpose of the facility is for filling and the filling is conducted within the waters of the United States.
- The primary purpose of the facility is for disposal and there is a dike, levee or other containment structure constructed within the waters of the United States to prepare an area to receive waste material. (In this case, the dike, levee or other containment structure constitute fill material.)

The determination of whether this discharge is to the waters of the United States is obvious in many cases. Permit information or field inspection can be used to determine the location of the filling or diking with respect to any waters of the United States. There will be circumstances where the determination will not be obvious, particularly in areas that are not inundated at all times of the year. Examples might be:

- some wetlands
- mudflats and sandflats
- intermittent freshwater streams (refer to the Floodplains Chapter, for guidance on the minimum size that must be considered based on the "headwaters" of the stream).

In these instances guidance as to whether the area is "waters of the United States" or as to where the boundaries of the area are might be obtained through:

- District office of the Corps of Engineers (see Figure 3-2)
- Wetland maps, including State, local and National Wetland Inventory maps
- Maps resulting from the Coastal Management Zone Act
- United States Forest Service
- United States Geological Survey
- Soil Conservation Service
- Examination of the prevalent vegetation near the solid waste boundary for vegetation typically adapted for life in saturated soil conditions (hydrophytes).
- Title 33 - Navigation and Navigable Waters, Regulatory Programs of the Crops of Engineers, FR 42(138):37122-37164

Wherever it is determined that there is a discharge of dredged or fill material to waters of the United States, a 404 permit is required. If no permit is required, proceed to Section 3.5 for the non-point source determination.

3.4 Does the facility violate the Section 404 requirements?

If a facility discharges dredged or fill material into waters of the United States and is not in complaince with or has not applied for a 404 (dredge and fill) permit, *then it does not comply with this part of the Criterion.*

The above determination can be made from in-house permit records, by contacting the District Office of the Corps of Engineers, or the owner or operator of the facility.

It should be noted that the Corps of Engineers issues 3 types of 404 permits:

- Individual, issued through district office
- General (200 existing), issued through district office

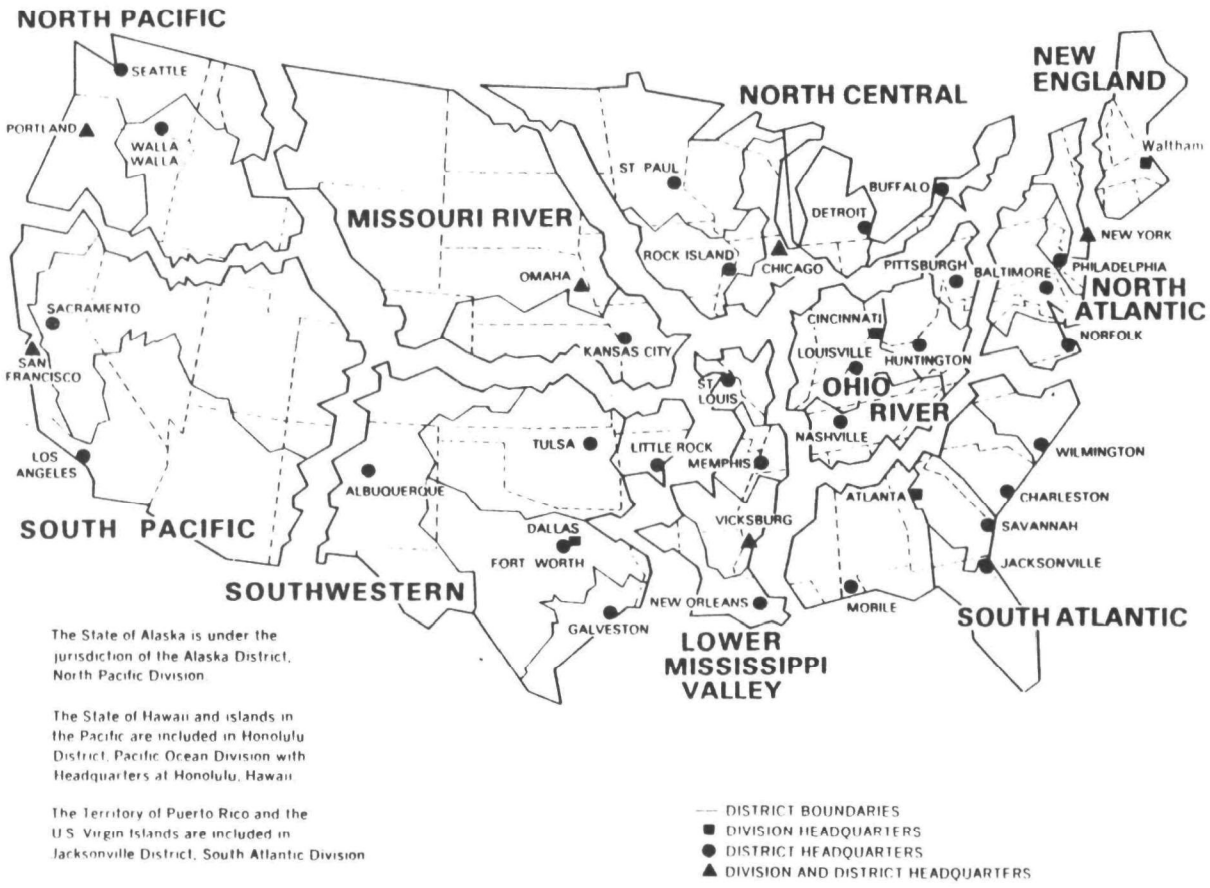

FIGURE 3-2 DISTRICT OFFICES OF THE U.S. ARMY CORPS OF ENGINEERS

- Nationwide permits or exemptions. Information on these can be obtained from the District Engineer's Office or by consulting FR 42(138); Title 33, Regulatory Programs of the Corps of Engineers.

As a result, some facilities or discharges of dredged or fill material might not have an individual permit, but might comply under a general or nationwide permit.

3.5 Is there a non-point source discharge from the facility?

Surface impoundments usually do not have non-point source discharges unless there is leakage, frequent spillage or overtopping. Some landspreading facilities and landfills might not have non-point source discharges where runoff and other water are totally contained within the site and evaporated or discharged as a point source. *These facilities may be assumed to comply with any non-point source requirements.* It is assumed that all other facilities have a non-point source discharge.

3.6 Does the facility cause non-point source polluting of the waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been developed and approved by the Administrator under Section 208 of the Clean Water Act, as amended?

This assessment should begin by determining if the facility is located in an area with an approved 208 plan (see Table 3-1). This can be done by contacting the State office that is in charge of preparing and implementing the 208 plan. If a facility is not located in an area with an approved 208 plan, *the facility is in compliance with this part of the Surface Water Criterion.*

If a facility is located in an area with an approved 208 plan, obtain a copy of the 208 plan and the applicable legal requirements implementing the 208 plan.

Applicable requirements under 208 are normally control methods, measures or practices to prevent or reduce water pollution, referred

TABLE 3-1

STATUS OF 208 PLANS - OCTOBER 1, 1979

Reg/State/Area	State Cert	EPA App
I CONNECTICUT		
MAINE		
Greater Portland	X	X
Southern Maine	X	X
Northern Maine	X	X
Androscoggin	X	X
Southern Kennebec	X	X
MASSACHUSETTS		
Berkshire County		
Cape Cod		
Martha's Vineyard	X	X
Northern Middlesex		
Old Colony	X	X
Metro Boston		
Central Mass		
Montachusetts		
Southeastern Mass	X	X
NEW HAMPSHIRE		
S. Rockingham		
Lakes Region		
RHODE ISLAND	XP	XP
VERMONT	XP	XP
II NEW JERSEY		
Mercer County	X	
Middlesex	X	
Ocean County		
Cape May		
Sussex County		
Atlantic County		
Tri-County	X	X
II NEW YORK		
Nassau-Suffolk, L.I.	X	
Westchester		
Erie-Niagara		
New York City		
Southern Tier		
Central New York		
VIRGIN ISLANDS		
PUERTO RICO		
North Metro		
III DELAWARE		
New Castle County	X	X
Sussex County		
DISTRICT OF COLUMBIA		
Metro Washington	XP	
MARYLAND	XP	
Baltimore	X	X
PENNSYLVANIA		
Southwestern Penna		
Delaware Valley (Philadelphia)		
VIRGINIA		
Hampton Roads		
Roanoke	X	X
Richmond-Crater		
Rappahannock	X	X
Southwest Virginia		
WEST VIRGINIA	XP	
B-C-K-P	X	
IV ALABAMA	XP	XP
Birmingham		
West Alabama	X	X
South Alabama		
FLORIDA	X	XP
Bay County	X	
Orlando	X	X
Volusia County	X	X
Brevard County	X	
Palm Beach County	X	
Pensacola	X	
Sarasota	X	
Broward County	X	X
Tampa Bay	X	X
Metro Dade County	X	X
Tallahassee-Leon	X	X
C. Florida (Bartow)	X	X
GEORGIA	X	X
Macon-Bibb	X	X
Savannah	X	X
Atlanta	X	X
KENTUCKY		
Louisville	X	X
MISSISSIPPI	XP	XP
Tennessee Valley		
NORTH CAROLINA	X	XP
Triangle J (Raleigh)	X	X
Land of Sky (Asheville)	X	

P - Partial _____ State *Addition this reporting period TOTAL 141 Certified 95 Approved

(continued)

TABLE 3-1

STATUS OF 208 PLANS - OCTOBER 1, 1979
(continued)

Reg/State/Area	State Cert	EPA App
IV SOUTH CAROLINA	X	XP
Central Midlands	X	
Appalachian		
Low Country	X	
Charleston	X	X
Waccamaw	X	X
TENNESSEE	X	XP
Memphis	X	X
Knoxville	X	X
Chattanooga	X	
Mid-Cumberland	X	X
First Tenn-Va	X	
V ILLINOIS		
Southwestern Metro		
Northeastern (Chic)	X	X
Greater Egypt		
INDIANA		
Northwestern	X	
South Bend		
Muncie		
Indiana Heartland		
West Central		
MICHIGAN		
Detroit	X	X
Kalamazoo	X	X
Flint	X	X
Jackson	X	X
Saginaw	X	X
W. MI Shoreline	X	X
Grand Rapids	X	X
Lansing	X	X
MICHIGAN (continued)		
Eastern Upper Penin	X	X
Northwest (Traverse)	X	X
Northeast (Gaylord)	X	X
Western Upper Penin	X	X
Southwestern	X	X
Central Upper Penin	X	X
MINNESOTA		
Metro St. Paul		
OHIO		
OKI (Cincinnati)	X	X
Toledo	X	X
Miami Valley	X	
Eastgate (Youngstown)	X	X
Northeast (Akron)	X	X
Northeast (Cleveland)	X	X
WISCONSIN		
Milwaukee		
Madison		
Fox Valley (Neenah)		
VI ARKANSAS	X	
Metro Little Rock		
Pine Bluff		
Arkhoma (Ft. Smith)	X	
LOUISIANA		
NEW MEXICO	X	X
OKLAHOMA	X	
Indian Nations	X	X
Oklahoma City		
VI TEXAS	X	X
North Central	X	
Southeast	X	
Houston-Galveston	X	
Alamo Area	X	
Coastal Bend	X	
Lower Rio Grande	X	
Texarkana		
Central Texas	X	
VII IOWA	XP	XP
Central (Des Moines)	X	X
Chariton Valley		
KANSAS	X	
Mid America	X	
MISSOURI		
East-West Gateway	X	
Ozark Gateway		
NEBRASKA		
VIII COLORADO		
Pikes Peak	X	X
Pueblo	X	X
Denver	X	X
Colorado West		
Northwest		
Larimer-Weld	X	X
MONTANA		
Mid-Yellowstone		
Flathead	X	
Yellowstone-Tongue	X	
Blue Ribbons	X	

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(continued)

TABLE 3-1

STATUS OF 208 PLANS - OCTOBER 1, 1979
(continued)

Reg/State/Area	State Cert	EPA App
VIII NORTH DAKOTA	X	
Lewis & Clark	X	
SOUTH DAKOTA	X	X
Sixth District (Rapid City)	X	
Southeastern	X	
UTAH		
Mountainland	X	X
Uintah Basin	X	X
Salt Lake	X	X
Weber River	X	X
Southeastern		
Five County		
WYOMING		
Powder River		
Southwest		
Teton County		
INDIAN TRIBES		
Blackfoot		
Cheyenne		
Ft. Peck		
Ft. Belknap		
Wind River		
Three Tribes		
Turtle Mountain		

Reg/State/Area	State Cert	EPA App
IX ARIZONA		
Tucson	X	X
Central Arizona	X	X
District 4	X	X
Southeastern	X	X
Northern (Flagstaff)		
Maricopa (Phoenix)	X	
CALIFORNIA	X	
Ventura	X	X
Monterey Bay	X	X
San Diego	X	X
San Francisco	X	X
Los Angeles	X	X
Sacramento	X	
Tahoe	X	X
HAWAII	X	X
NEVADA	X	X
Washoe (Reno)	X	X
Carson County	X	
Clark Co (Las Vegas)	X	X
TRUST TERRITORIES	X	
GUAM	X	
NEVADA INDIAN TRIBE		

Reg/State/Area	State Cert	EPA App
X ALASKA		
Anchorage		
IDAHO		
Southeast		
Ada		
Panhandle		
OREGON	X	
Columbia (Portland)	X	X
Mid Willamette	X	X
Lane	X	X
Rogue Valley	X	X
WASHINGTON	XP	XP
Clark County	X	X
Seattle	X	X
Snohomish	X	X
INDIAN TRIBE		
Shoshone		

P - Partial _____ State *Addition this reporting period TOTAL 141 Certified
95 Approved

to as Best Management Practices. These might include treatment requirements, operating and maintenance procedures, schedules of activities, prohibitions of activities, and other management practices to control plant site runoff, spillage, leaks, sludge or waste disposal or drainage from raw material storage.

Determine by office review if any requirements have been placed on the solid waste disposal facility. Field inspection will be necessary to determine if these requirements have or have not been violated. If the facility does not meet its 208 requirements, *then it does not comply with this part of the Criterion.*

If 208 requirements have not been placed on the solid waste disposal facility, *the facility is in compliance with the Surface Water Criterion.*

Chapter 3

SURFACE WATER

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is there a point source discharge of pollutants to waters of the United States?

☐ YES (Continue to 2)

- ☐ Facility has a Section 402 (NPDES) permit
- ☐ Landfill with a discharge from a leachate collection system
- ☐ Landfill with a discharge from an on-site leachate treatment system
- ☐ Landfill with a direct discharge of solid waste into waters of the U.S.
- ☐ Surface impoundment with a discharge from a pipe or outfall
- ☐ Surface impoundment with a discharge from an eroded channel
- ☐ Surface impoundment with a discharge from a spillway structure
- ☐ Surface impoundment located in waters of the U.S.
- ☐ Landspreading operations with a discharge from an outfall pipe, or channel that drains the landspreading area where the waste is not incorporated into the soil
- ☐ Landspreading operations located in waters of the U.S. where waste is not applied for enhancement of vegetative growth

☐ NO (Go to 2)

2. Does the facility violate requirements for NPDES permits established pursuant to Section 402 of the Clean Water Act?

☐ YES (Does not comply - continue to 3)

- ☐ Facility has a 402 permit, but is in violation of the permit
- ☐ Facility has not applied for a 402 permit

☐ NO (Continue to 3)

- ☐ Facility operates according to 402 permit requirements
- ☐ Facility has applied for a 402 permit

3. Is there a discharge of dredged material or fill material to waters of the United States?

☐ YES (Continue to 4)

☐ NO (Go to 5)

4. Does the facility violate requirements established pursuant to Section 404 of the Clean Water Act?

☐ YES (Does not comply - continue to 5)

- ☐ 404 permit, but is in violation of that permit
- ☐ Facility has not applied for a 404 permit

☐ NO (Continue to 5)

- ☐ Facility operates in compliance with its 404 permit
- ☐ Facility has applied for a 404 permit

5. Is there a non-point source discharge from the facility?

☐ YES (Does not comply - continue to 6)

- ☐ Surface impoundment with spillover, overtopping, or leakage
- ☐ Other _____

☐ NO (Continue to 6)

- ☐ Landfill or landspreading facility that totally contains runoff or other water
- ☐ Other _____

6. Does the facility cause non-point source polluting of the waters of the U.S. that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been developed and approved by the Administrator under Section 208 of the Clean Water Act, as amended?

☐ YES (COMPLIES)

- ☐ Facility not in an area with an approved 208 plan
- ☐ Facility in an area with an approved 208 plan and complies with all applicable requirements
- ☐ No 208 requirements have been placed on the facility

☐ NO (Does not comply)

CHAPTER 4

GROUND WATER

1.0 Criterion and Definitions

§ 257.3–4 Ground Water.

(a) A facility or practice shall not contaminate an underground drinking water source beyond the solid waste boundary or beyond an alternative boundary specified in accordance with paragraph (b) of this section.

(b) Only a State with a solid waste management plan approved by the Administrator pursuant to Section 4007 of the Act may establish an alternative boundary to be used in lieu of the solid waste boundary. A State may specify such a boundary only if it finds that such a change would not result in contamination of ground water which may be needed or used for human consumption. This finding shall be based on analysis and consideration of all of the following factors:

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

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

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

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

(5) The availability of alternative drinking water supplies;

(6) The existing quality of the ground water including other sources of contamination and their cumulative impacts on the ground water; and

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

(c) As used in this section:

(1) "Aquifer" means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of ground water to wells or springs.

(2) "Contaminate" means introduce a substance that would cause:

(i) The concentration of that substance in the ground water to exceed the maximum contaminant level specified in Appendix I, or

(ii) An increase in the concentration of that substance in the ground water where the existing concentration of that substance exceeds the maximum contaminant level specified in Appendix I.

(3) "Ground water" means water below the land surface in the zone of saturation.

(4) "Underground drinking water source" means:

(i) An aquifer supplying drinking water for human consumption, or

(ii) An aquifer in which the ground water contains less than 10,000 mg/l total dissolved solids.

(5) "Solid waste boundary" means the outermost perimeter of the solid waste (projected in the horizontal plane) as it would exist at completion of the disposal activity.

Appendix I

The maximum contaminant levels promulgated herein are for use in determining whether solid waste disposal activities comply with the ground-water criteria (§ 257.3–4). Analytical methods for these contaminants may be found in 40 CFR Part 141 which should be consulted in its entirety.

1. *Maximum contaminant levels for inorganic chemicals.* The following are the maximum levels of inorganic chemicals other than fluoride:

Contaminant	Level (milligrams per liter)
Arsenic	0.05
Barium	1
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05

The maximum contaminant levels for fluoride are:

Temperature[1] degrees Fahrenheit	Degrees Celsius	Level (milligrams per liter)
53 7 and below	12 and below	2 4
53 8 to 58 3	12 1 to 14 6	2 2
58 4 to 63 8	14 7 to 17 6	2 0
63 9 to 70 6	17 7 to 21 4	1 8
70 7 to 79 2	21 5 to 26 2.	1 6
79 3 to 90 5	26 3 to 32 5	1 4

[1] Annual average of the maximum daily air temperature.

2. *Maximum contaminant levels for organic chemicals.* The following are the maximum contaminant levels for organic chemicals:

	Level (milligrams per liter)
(a) Chlorinated hydrocarbons	
Endrin (1 2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0 0002
Lindane (1,2 3,4,5,6-Hexachlorocyclohexane, gamma isomer	0 004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl) ethane)	0 1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67 to 69 percent chlorine)	0 005
(b) Chlorophenoxys:	
2 4-D (2,4-Dichlorophenoxy-acetic acid)	0 1
2 4 5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0 01

3 *Maximum microbiological contaminant levels.* The maximum contaminant level for coliform bacteria from any one well is as follows:

(a) using the membrane filter technique.

(1) Four coliform bacteria per 100 milliliters if one sample is taken, or

(2) Four coliform bacteria per 100 milliliters in more than one sample of all the samples analyzed in one month.

(b) Using the five tube most probable number procedure, (the fermentation tube method) in accordance with the analytical recommendations set forth in "Standard Methods for Examination of Water and Waste Water", American Public Health Association, 13th Ed. pp. 662–668, and using a Standard sample, each portion being one fifth of the sample:

(1) If the standard portion is 10 milliliters, coliform in any five consecutive samples from a well shall not be present in three or more of the 25 portions, or

(2) If the standard portion is 100 milliliters, coliform in any five consecutive samples from a well shall not be present in five portions in any of five samples or in more than fifteen of the 25 portions.

4 *Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity.* The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5 pCi/l;

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15 pCi/l.

Proposed Amendment

5. *Maximum contaminant levels for other than health effects*

The following are the maximum levels for odor, taste and miscellaneous contaminants:

Contaminant	Level
Chloride	250 mg/l
Color	15 Color units.
Copper	1 mg/l
Foaming agents	0 5 mg/l
Iron	0 3 mg/l
Manganese	0 05 mg/l
Odor	3 Threshold odor-No
pH	6 5–8 5
Sulfate	250 mg/l
TDS	500 mg/l
Zinc	5 mg/l

2.0 Inventory Procedure

Facility compliance (or non-compliance), for the purpose of the Inventory, will be based on the results of monitoring for contamination, except in those cases where ground water contains more than 10,000 mg/l total dissolved solids and is not being used as a human drinking water source. Since the time involved precludes immediate monitoring of all facilities, the procedure includes the ranking of facilities according to their contamination potential so that a monitoring priority can be assigned. The process consists of:

(a) Elimination from further consideration (compliance) of those facilities at which the ground water contains more than

10,000 mg/l TDS and is not being used as a human drinking water source.

(b) Ranking of the remaining facilities based on their contamination potential, considering the type of facility, hydrogeologic conditions, and operating procedures.

(c) Determination of compliance based on monitoring to detect actual contamination.

The compliance decision flow chart is presented in Figure 4-1.

3.0 Resolution of Decision Flow Chart Questions

3.1 Does ground water contain more than 10,000 mg/l TDS and is it not being used as a human drinking water source?

The ground water in question is that contained in the shallowest geologic formation (aquifer) capable of yielding usable quantities of ground water. The natural or background concentration of TDS in the ground water may be determined from existing ground water data and reports. Such reports should cover an area that includes the facility and should give average TDS concentrations for the ground water of concern. Sources of information are:

- USGS "Water Resources Investigations" reports for the area
- State water, natural resources, or geologic survey reports
- City or county health agency or water agency
- Local drilling contractors' records
- Records of drilling from site permit data.

If not available from the above sources, TDS concentrations may be determined by testing the ground water. Standard sampling and analysis procedures to be used may be found in the references listed below. Samples should be drawn from the nearest existing well(s), if any, pumping from the ground water source of concern.

(1) Standard Methods for the Examination of Water and Wastewater, 13th Edition, American Public Health Association, 1971.

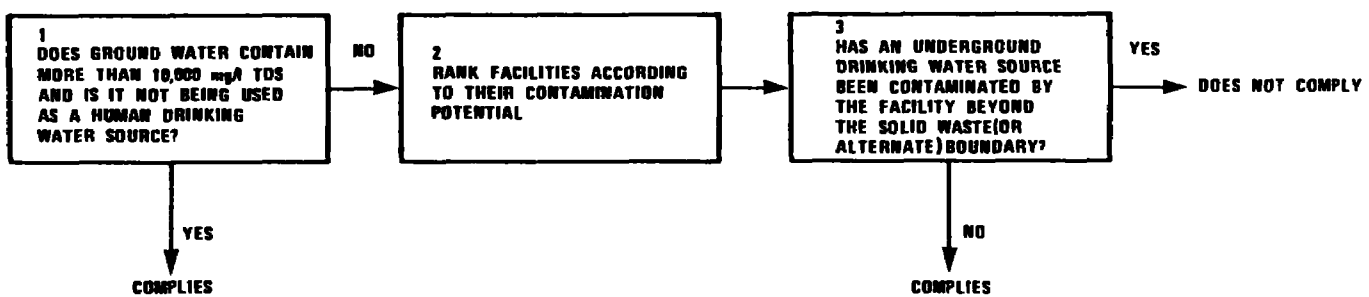


FIGURE 4-1 FLOWCHART-GROUND WATER

(2) Manual of Methods for Chemical Analysis of Water and Wastes, Environmental Protection Agency, 1974. (EPA-625/6-74-003)

(3) 1978 Annual Book of ASTM Standards, Part 23 (Water: Atmospheric Analysis), ASTM, Philadelphia, Pennsylvania.

After making the determination, proceed as follows:

(1) If the ground water contains less than 10,000 mg/l TDS, continue to Section 3.2.

(2) If the ground water contains more than 10,000 mg/l TDS and is not being used as a human drinking water source, *then the facility complies with this Criterion.*

If reports or sources of information indicate no usable quantities of ground water present beneath the site, *the facility complies with this Criterion.* If there are no data available and no wells exist, continue to the next Section (3.2).

3.2 Rank Facilities According to their Contamination Potential

Facilities remaining after the elimination step must be monitored for contamination. However, it is not possible to monitor all sites at once; therefore, they will be ranked, and given a monitoring priority, based on hydrogeologic conditions, operating procedures, and facility type.

3.2.1 Sole Source Aquifers

Top priority for monitoring must be assigned to those facilities located in recharge areas of sole source aquifers. The five sole source aquifers designated to date by EPA are described in the following issues of the Federal Register.

San Antonio, Texas area; FR 12-16-75
Spokane, Washington area; FR 2-9-78
Northern Guam; FR 4-26-78
Nassau and Suffolk County, New York; FR 6-21-78
Fresno, California; FR 9-10-79

If the facility is located in a recharge area of one of these aquifers, ranking is not necessary. The facility should be given top priority for monitoring. Therefore, proceed to Section 3.3.

3.2.2 Ranking Procedure for Landfills

The ranking procedure for landfills not located in the recharge zone of a sole source aquifer is based on aquifer and unsaturated zone characteristics. The procedure was developed from documented landfill case studies, discriminant analysis techniques, and the Surface Impoundment Assessment technique, and is intended to assign the highest priority to those facilities that have the highest contamination potential with respect to ground water. The assigned monitoring priority may be modified to a slight extent by consideration of certain facility design or operational measures.

The ranking procedure requires the input of three (3) values that describe the facility and its hydrogeologic setting (Figure 4-2). Methods for estimating these values are as follows:

(1) Unsaturated zone thickness, meters.

(a) For uniform soils, use the minimum distance from the bottom of the landfill to the seasonal high level of the ground water in an unconfined aquifer, or to the top of a confined aquifer, whichever is shallowest. Perched aquifers should also be considered if they are capable of supplying usable quantities of water.

(b) Neglect the thickness of any highly-fractured rock layers.

(c) For layered series of soils or rock having similar hydrologic properties (permeability), use the entire thickness.

(d) For equally thick layers of soils or rock having dissimilar hydrologic properties (greater than 2 orders of magnitude permeability difference), use only the thickness of the least permeable layer. This layer must be continuous under the entire facility and at least 1 meter thick. Otherwise, utilize the thickness of the more permeable strata.

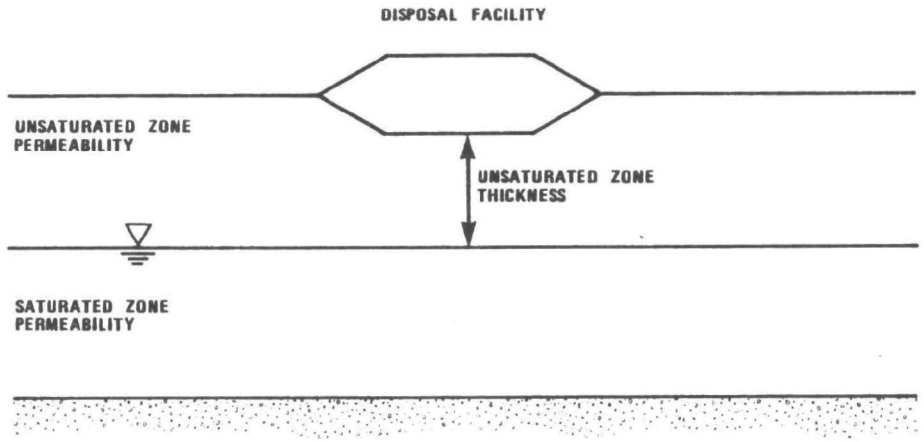


FIGURE 4-2 VARIABLES FOR RANKING

(e) For layers of soils or rock with different thickness and hydrologic properties, two options are available. Either use the thickness of the layer with the least permeability, or use the total combined thickness with a weighted permeability (calculated in the next step, 3.2.2(2)).

(2) Unsaturated zone permeability, cm/sec.

(a) For the soil or rock selected in (1), select an appropriate permeability from Table 4-1.

(b) If the permeability is available from permit or site investigation data, utilize that value rather than Table 4-1.

(c) For multi-layered sequences requiring a weighted permeability, use the following equation:

$$K_w = \frac{T_1 + T_2 + T_3 + \ldots T_n}{T_1/K_1 + T_2/K_2 + T_3/K_3 + \ldots T_n/K_n}$$

where T = thickness of each layer in meters

K = permeability of each layer in cm/sec

Note: if several layers with widely varied hydrologic properties are present, the equation may produce an erroneously high number for the low-permeability thickness. This should be considered in such a situation.

(3) Saturated zone permeability, cm/sec.

(a) For a uniform soil or rock aquifer, select the appropriate permeability from Table 4-1.

(b) For layered sequences of soil or rock, select the appropriate permeability from Table 4-1 for the uppermost saturated layer. If the upper layer is less permeable than an underlying stratum and is less than 1 meter in thickness, select the permeability from Table 4-1 for the underlying layer.

TABLE 4-1

REPRESENTATIVE PERMEABILITIES OF EARTH MATERIALS

Soil Type:	Gravel, coarse to medium sand	Fine to very fine sand	Clayey sand, coarse to medium silt	Fine silt, clayey silt	Sandy clay, silty clay	Clay
Rock Type:	Limestone (fractured cavernous) Evaporites Basalt lava	Fractured igneous and metamorphic rock Poorly cemented sandstone	Moderately cemented sandstone Fractured shale	Well-cemented sandstone Mudstone	Siltstone	Unfractured shale, igneous and metamorphic rock
Representative Permeability (cm/sec)	10^{1} - 10^{-2}	10^{-2} - 10^{-4}	10^{-4} - 10^{-5}	10^{-5} - 10^{-6}	10^{-6} - 10^{-7}	10^{-7} - 10^{-8}

(c) If the permeability is available form other information sources such as ground water reports or permit data, utilize that value rather than Table 4-1.

The facility's ranking (monitoring priority) is obtained from Table 4-2 utilizing the above three values.

(4) Modification to the ranking.

After considering the above factors, the investigator may choose to modify the monitoring priority slightly, after considering certain site-specific characteristics. These characteristics are described below. If a change in priority is deemed appropriate, the following guidance should be observed:

(a) The modification may be used to move a facility from a high monitoring priority to a medium monitoring priority, or vice versa.

(b) The modifications should rarely be used to move a facility from a medium monitoring priority to a low monitoring priority.

(5) Site specific characteristics.

(a) Initial quality and use of ground water.

Ground water beneath the facility may be used for human consumption; used for other purposes; or not currently used. Facilities overlying ground water that is currently used as drinking water or that are close to drinking water wells should have the highest monitoring priority.

(b) Infiltration.

The quantity of leachate generated is dependent on the amount of infiltration through the waste mass. While it is difficult to predict the relative impact on ground water quality based on leachate quantity, in general it may be assumed that facilities with greater infiltration should have higher priorities. In dry areas of the United States with no recharge to ground water (no leachate is likely to be produced due to infiltration) and where no water is added from other sources, all but those landfills where the waste

TABLE 4-2

MONITORING PRIORITY

Saturated Zone Permeability (cm/sec)	Unsaturated Zone Thickness (m)	Unsaturated Zone Permeability (cm/sec)	Monitoring Priority
$>10^{-4}$	<1	NA*	High
	1-3	$>10^{-4}$	High
		$10^{-4} - 10^{-6}$	Medium
		$<10^{-6}$	Low
	3-10	$>10^{-4}$	High
		$10^{-4} - 10^{-6}$	Medium
		$<10^{-6}$	Low
	>10	$>10^{-2}$	High
		$10^{-2} - 10^{-4}$	Medium
		$<10^{-4}$	Low
$10^{-4} - 10^{-6}$	<1	NA	High
	1-3	$>10^{-4}$	High
		$10^{-4} - 10^{-6}$	Medium
		$<10^{-6}$	Low
	3-10	$>10^{-2}$	High
		$10^{-2} - 10^{-6}$	Medium
		$<10^{-6}$	Low
	>10	$>10^{-4}$	Medium
		$<10^{-4}$	Low
$<10^{-6}$	<1	NA	High
	1-3	$>10^{-4}$	Medium
		$10^{-4} - 10^{-6}$	Medium
		$<10^{-6}$	Low
	>3	$>10^{-4}$	Medium
		$10^{-4} - 10^{-6}$	Low
		$<10^{-6}$	Low

* NA = Not applicable.

is within 1 meter of ground water may be assigned a lower priority. General estimates of infiltration can be obtained using Figure 4-3. High net infiltration areas should be assigned higher priority. Judgment should be used based on local conditions, especially in the West. However, the investigator is cautioned against greatly modifying the monitoring priority with this factor, since even a small amount of leachate can have an impact on ground water quality.

(c) Liners and leachate collection systems.

Facilities that have taken measures to predict and control leachate migration through synthetic liners and/or leachate collection usually constitute less of a contamination potential than facilities without these measures. There might be concern if the liners leak. Adjustment of priorities where liners and collection systems are installed will have to be based on the State experience with the particular facility.

(d) Karst terrain.

Karst areas are characterized by solution channels and fractured limestone. Contaminants may reach the water table relatively undiluted, and may travel quickly to other areas. For this reason, facilities located in karst terrain should have a slightly higher monitoring priority even in situations where the water table is very deep.

(e) Floodplains.

Facilities located on a floodplain may be underlain by somewhat permeable material and a shallow ground water system that discharges into a stream or river. These facilities may be subject to reverse discharge into the facility or extreme infiltration by flood waters, and any leachate released into the ground water will discharge into the river or stream. However, many of these facilities may have some form of flood protection, or they may be designed to control ground water discharge. The investigator must consider the pros and cons of a facility located in a floodplain and

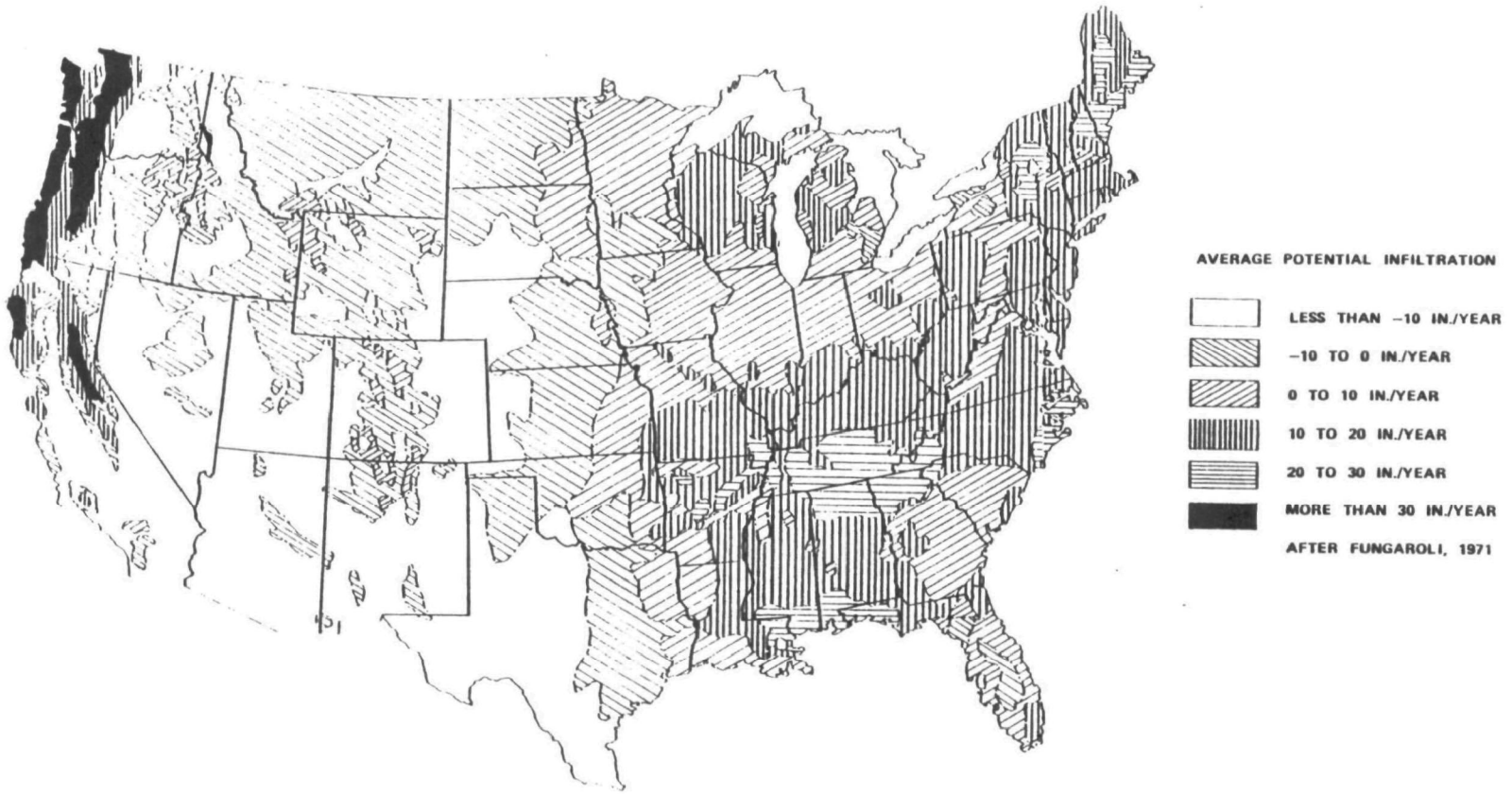


FIGURE 4-3 GENERAL ESTIMATES OF INFILTRATION

FIGURE 4-3 (CONTINUED) NORMAL ANNUAL RUNOFF IN THE UNITED STATES, IN INCHES. (U.S. GEOLOGICAL SURVEY)

and determine if it should be assigned a higher or lower monitoring priority.

(f) Operational quality.

If the facility is operating under a State permit, then the investigator should determine if all the conditions relative to ground water protection specified in the permit are being met in the daily operation of the facility. If they are not, it may be appropriate to assign higher monitoring priority. Also, other operating practices that might enhance or reduce leachate generation (such as accepting a large amount of liquid waste, or not diverting runoff from the working area) should be evaluated by the investigator.

(g) Waste type.

The case histories utilized in the discriminant analysis included facilities that had handled "hazardous" waste and failed to indicate any change in contamination potential based on waste type, especially when the facility ranking was based on the secondary standards that are now proposed as an amendment to the Criteria. Therefore, there should be no change in monitoring priority based on waste type except for those facilities handling non-water soluble, non-decomposable inert solids. Facilities handling such waste should be assigned a lower priority.

3.2.3 Ranking of Surface Impoundments

The ranking procedure for surface impoundments is based on the Surface Impoundment Assessment (SIA) System now in use by the EPA. The procedure considers hydrogeologic characteristics and assigns a rating for each of several parameters. The ratings are then entered into a table and a monitoring priority is read from the table.

Following the instructions in A Manual for Evaluating Contamination Potential of Surface Impoundments (SIA Manual) (EPA-570/9/78-003), complete Steps 1 and 2 for rating the unsaturated and saturated zones

at the facility location. Using these values, enter Table 4-3 to find the monitoring priority. The data necessary for completing these steps may already be available from another State Agency or the EPA Office of Drinking Water, if the Surface Impoundment Assessment is being done or has been completed for the facility.

The monitoring priority may be modified to some extent by site specific characteristics. Applicable ranking guidance contained in Section 3.2.2 should be used to modify the ranking of surface impoundments.

Liquid depth and base linings are of concern in estimating infiltration. Waste type must be taken into account as explained in Step 4 of the SIA Manual, rather than as discussed for landfills. Table 4-3 is based on moderate (4-7) waste hazard potential ratings. Therefore, facilities handling wastes with higher waste hazard potentials (8-9) should be assigned a higher priority, and those with wastes with lesser ratings (1-3) should be assigned a lower priority.

3.2.4 Ranking of Landspreading Facilities

In general, most landspreading facilities do not constitute a serious ground water pollution problem, although contamination has been known to occur. These facilities should be ranked as follows:

(a) Those disposal facilities which handle sewage sludge only, and which apply sludge at rates greater than the crop or vegetative nitrogen demand, will use Section 3.2.2 and Table 4-2 to determine a priority.

(b) Those facilities handling other wastes which contain concentrations of any metal or organic constituent in excess of those listed in the Criterion, Appendix I, should also use section 3.2.2 and Table 4-2 to determine a priority.

(c) All other landspreading facilities should be given a low priority for monitoring.

TABLE 4-3

MONITORING PRIORITY* - SURFACE IMPOUNDMENTS

Saturated Zone Rating	Unsaturated Zone Rating	Monitoring Priority
6A,6A, 3A	9A-9K, 6B, 7B, 8B, 7C, 5D	High
	6C, 4D, 3E, 1F	Medium
	All others	Low
4C, 3C, 1C	9C-9K, 8B, 9A, 9B, 7B, 7C	High
	6C, 6B, 5D, 4D	Medium
	All others	Low
2E, 1E, 0E	9E-9K, 9A-9D, 8B, 7B, 6B	High
	7C, 5D	Medium
	All others	Low

*Based on moderate waste hazard potential

Guidance for Ranking of Landspreading Facilities Handling Sewage Sludge

To determine whether the sludge nitrogen (N) is being applied in excess of crop or vegetative demand, it is preferable to obtain an analysis of NH_4-N content, NO_3-N content, and organic nitrogen content of the sludge. If this is not available, use the following average values:

	lbs available / ton of sludge
where sludge is surface applied:	
anaerobically digested	21
aerobically digested	13
other - calculate	
where sludge is incorporated in the soil:	
anaerobically digested	37
aerobically digested	17
other - calculate	

Calculations:

- Obtain the N requirement from Table 4-4. (A)
- Calculate the available N in the sludge:
  - where sludge is incorporated into the soil:
    percent NH_4-N in sludge x 20 = lb NH_4-N/ton of sludge (B)
  - where sludge is surface applied:
    percent NH_4-N in sludge x 10 = lb NH_4-N/ton of sludge (B)
    percent organic N x 2 = lb organic N/ton of sludge (C)
- Determine any residual sludge N in the soil from Table 4-5.(E)
- Calculate the sludge application rate necessary for crop demand:

$$\text{Rate (tons/acre)} = \frac{(A)}{(B) + (C)}$$

If the sludge application rate is greater than the nitrogen demand rate calculated in Step 4, then the facility should be assigned a priority from section 3.2.2 and Table 4-2. Otherwise, a low monitoring priority may be assumed.

TABLE 4-4

ANNUAL NITROGEN (N) DEMANDS OF CROPS*

Crop	Yield/acre	N (lb/acre)
Corn	150 bu	185
Corn silage	32 tons	200
Soybeans	50 bu	257†
Grain sorghum	4 tons	250
Wheat	60 bu	125
Oats	100 bu	150
Barley	100 bu	150
Alfalfa	8 tons	450†
Orchard grass	6 tons	300
Brome grass	5 tons	166
Tall fescue	3.5 tons	135
Bluegrass	3 tons	200

* Values reported are from reports by the Potash Institute of America and are for the total above-ground portion of the plants. For the purpose of estimating nutrient requirements for any particular crop year, complete crop removal can be assumed.

† Legumes obtain N from symbiotic N_2 fixation so fertilizer N is not necessary. Where crop yields are less, reduce the nitrogen demand by the ratio of the reduced yield to that listed in the table.

Guidance for Facilities Handling Other Waste

Landspreading facilities that dispose of other wastes will be ranked using Table 4-2. "Other wastes" here means wastes or sludges that contain concentrations of any metal or organic constituent in excess of those listed in the Criterion, Appendix I. Facilities that accept such waste usually receive an analysis of the sludge from which the metals and organics content may be determined. If no such analysis is available, the investigator must obtain a representative sample of the sludge and have it analyzed for those parameters listed in Appendix I.

If the concentrations of metals or organics are in excess of those listed in the Criterion, Appendix I, assign the facility a monitoring priority based on Section 3.2.2 and Table 4-2. If concentrations are not exceeded, assign the facility a low priority.

3.3 Has an underground drinking water source been contaminated by the facility beyond the solid waste (or alternate) boundary?

To determine if a facility does not comply with the Criterion, ground water monitoring must be conducted. Reference should be made to Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities (EPA-530/SW-611) for guidance on evaluation of existing monitoring systems, and on design and installation of new monitoring systems.

Facilities that receive a high monitoring priority in the previous section (3.2) should be monitored first, followed by medium-priority facilities. Low priority facilities should be monitored after all other facilities have been evaluated. The monitoring wells should be placed to detect contamination beyond the solid waste boundary, unless an alternate boundary has been specified by the State in accordance with the Criterion. If no alternate boundary has been specified, the solid waste boundary is to be used.

3.3.1 Evaluating Existing Monitoring Systems

If the facility has an adequate existing monitoring system that is correctly placed with respect to the solid waste or alternate boundary, this system may be used for the purpose of the Inventory.

If a facility has a monitoring system with wells downgrandient to the applicable solid waste or alternate boundary, this system may be used for a non-compliance determination if contamination is detected in accordance with Section 3.3.4.

The adequacy of the existing monitoring system must be evaluated, preferably with the assistance of a hydrogeologist. Obtain drilling logs for each well in the system and a map of the site showing well locations. The objective of the system is to obtain representative samples of ground water and to detect contamination in underground drinking water sources beyond the appropriate boundary. Generally, the uppermost aquifers will be of concern. Consider these factors:

(a) Number and location of wells.

The system should have at a minimum one well hydraulically upgradient from the site and at least two wells downgradient. The static water levels reported for the wells should indicate the local hydraulic gradient. The downgradient wells should be located as close as is practicable to the solid waste (or alternate) boundary without being drilled through the waste.

Wells located in waste should not be used for determinations. Upgradient and downgradient wells should be located so that samples are obtained from the same horizon of water-bearing material. When downgradient wells are being evaluated, local variations in the hydraulic gradient (such as may be caused by a nearby pumping well or a ground water mound beneath the facility) should be considered, as well as any vertical gradients.

For a compliance determination, existing wells inside the solid waste boundary may be used when no contamination is detected. Otherwise, additional wells will have to be installed at, or in close proximity to, the applicable boundary.

(b) Construction of wells.

Well casings should be a minimum of two inches in diameter, preferably four inches, to allow for ease of pumping and sampling, A bentonite clay or cement seal or plug should be in place around the casing, finished at the surface with a cement or earth mound

sloped away from the well to prevent surface drainage down the casing. The top of the well should be covered with a locking cap and protected against vandalism and destruction by mobile equipment. Sufficient labeling should be present indicating the well location and number. Casing and well screens should be plastic, unless the waste type involved contains organic pollutants or is corrosive to plastic. In these cases it will be necessary to use steel well casing. Metal well parts may give false readings in metal analyses. Determine, from the driller's log, if drilling mud or additives were used during well construction. If they were, ensure that the wells were properly developed (flushed) and that all traces of drilling mud were removed.

If, in the estimation of the investigator, the existing system is adequate, proceed to 3.3.3.

3.3.2 New Monitoring Systems

If a new monitoring well or additions to an existing system must be installed at the site, the system must be designed and installed considering additional items:

(a) Test borings or geophysical studies may have to be made to determine the water table gradient and location. Well locations can then be based on this information.

(b) Wells should be drilled or augered without the use of drilling mud, if possible. If hydraulic mud is used, the well must be flushed properly.

(c) A well screen of sufficient length and correct slot size must be installed. Plastic screens are recommended for most applications, except when plastic is not compatible with the waste type, or when casing lengths exceed 50 feet. (The weight of the casing may compress the screen and close the slots.) A gravel pack should be installed around the screen to avoid picking up sediment when the well is pumped.

(d) The downgradient wells should be placed to sample ground water at the point where contamination is most likely. This

depends to a large extent on the site hydrogeology and facility type and construction. Examples are included in EPA-530/SW-611. Upgradient wells should then be set to sample from the same water-bearing horizon(s).

(e) If monitoring will be conducted at an alternate boundary and this boundary is removed from the facility, monitoring wells should be installed at several points between the boundary and the facility. This will assist the investigator in determining whether any contamination observed at the alternate boundary is originating at the facility.

(f) Wells should not be installed in areas where waste has been or will be deposited.

(g) Resistivity or similar methods might prove useful in locating monitoring wells.

3.3.3 Monitoring Parameters and Sampling

Ground water can be monitored for the specific contaminants (MCL's) listed in the Criteria, or for tracers or indicators of potential contamination. The following monitoring parameters are suggested as part of the program because of their mobility and persistence, their known association with the waste type, and their inclusion in the Criteria and the proposed amendment. Additional or other parameters may be used at State discretion if experience indicates the parameter to be useful in contamination evaluations. Determinations of non-compliance for the Inventory can only be made on the basis of the contaminants contained in the final Criteria. Analytical methods for the following parameters are referenced in Appendix I of the Criterion.

(a) Landfills - Total dissolved solids (TDS), chloride, iron, manganese (particularly for municipal landfills). Additional contaminants may be added, or some of the above removed, depending on the variety of waste type and the prevalence of a contaminant in a particular waste, e.g., copper and chromium should be added for metal plating wastes. Refer to Table 4-6.

(b) Surface Impoundments - Total dissolved solids and at least three additional contaminants listed in the final Criteria that

TABLE 4-6

CONSTITUENTS IN INDUSTRIAL AND MUNICIPAL WASTEWATER HAVING SIGNIFICANT POTENTIAL FOR GROUND-WATER CONTAMINATION[3,4])

MINING (SIC 10, 11, and 12)

Metal and Coal Mining Industry (SIC 10, 11, and 12)

ph	Zinc	Magnesium
Sulfate	Tin	Silver
Nitrate	Vanadium	Manganese
Chloride	Radium	Calcium
Total dissolved solids	Phenol	Potassium
Phosphate	Selenium	Sodium
Copper	Iron	Aluminum
Nickel	Chromium	Gold
Lead	Cadmium	Fluoride
	Uranium	Cyanide

PAPER AND ALLIED PRODUCTS (SIC 26)

Pulp and Paper Industry (SIC 261 and 262)

COD/BOD	Phenols	Nitrogen
TOC	Sulfite	Phosphorus
pH	Color	Total dissolved solids
Ammonia	Heavy metals	Biocides

CHEMICALS AND ALLIED PRODUCTS (SIC 28)

Organic Chemicals Industry (SIC 286)

COD/BOD	Alkalinity	Phenols
pH	TOC	Cyanide
Total dissolved solids	Total phosphorus	Total nitrogen
	Heavy metals	

(continued)

TABLE 4-6

(continued)

CHEMICALS AND ALLIED PRODUCTS (SIC 28) - (continued)

Inorganic Chemicals, Alkalies, and Chlorine Industry (SIC 281)

Acidity/alkalinity	Chlorinated benzenoids and polynuclear aromatics	Chromium
Total dissolved solids		Lead
Chloride	Phenols	Titanium
Sulfate	Fluoride	Iron
COD/BOD	Total phosphorus	Aluminum
TOC	Cyanide	Boron
	Mercury	Arsenic

Plastic Materials and Synthetics Industry (SIC 282)

COD/BOD	Phosphorus	Ammonia
pH	Nitrate	Cyanide
Phenols	Organic nitrogen	Zinc
Total dissolved solids	Chlorinated benzenoids and polynuclear aromatics	Mercaptans
Sulfate		

Nitrogen Fertilizer Industry (SIC 2873)

Ammonia	Sulfate	COD
Chloride	Organic nitrogen compounds	Iron, total
Chromium	Zinc	pH
Total dissolved solids	Calcium	Phosphate
Nitrate		Sodium

Phosphate Fertilizer Industry (SIC 2874)

Calcium	Acidity	Mercury
Dissolved solids	Aluminum	Nitrogen
Fluoride	Arsenic	Sulfate
pH	Iron	Uranium
Phosphorus	Cadmium	Vanadium
		Radium

(continued)

TABLE 4-6

(continued)

PETROLEUM AND COAL PRODUCTS (SIC 29)

Petroleum Refining Industry (SIC 291)

Ammonia	Chloride	Nitrogen
Chromium	Color	Odor
COD/BOD	Copper	Total phosphorus
pH	Cyanide	Sulfate
Phenols	Iron	TOC
Sulfide	Lead	Turbidity
Total dissolved solids	Mercaptans	Zinc

PRIMARY METALS (SIC 33)

Steel Industry (SIC 331)

pH	Cyanide	Tin
Chloride	Phenols	Chromium
Sulfate	Iron	Zinc
Ammonia	Nickel	

ELECTRIC, GAS, AND SANITARY SERVICES (SIC 49)

Power Generation Industry (SIC 491)

COD/BOD	Copper	Phosphorus
pH	Iron	Free chlorine
Polychlorinated biphenols	Zinc	Organic biocides
Total dissolved solids	Chromium	Sulfur dioxide
Oil and grease	Other corrosion inhibitors	Heat

Municipal Sewage Treatment (SIC 495)

pH	Nitrate	Sulfate
COD/BOD	Ammonia	Copper
TOC	Phosphate	Lead
Alkalinity	Chloride	Tin
Detergents	Sodium	Zinc
Total dissolved solids	Potassium	Various Organics

are mobile in the soil and intrinsic to the waste type. Refer to Table 4-6.

(c) Landspreading Facilities

(1) Sewage Sludge - Total dissolved solids, nitrate, chloride and at least one additional contaminant listed in the final Criteria which has high levels in the sludge.

(2) Other Wastes - Total dissolved solids and at least three additional contaminants listed in the final Criteria that are mobile and intrinsic to the waste type. Refer to Table 4-6.

A parameter might also be selected because the concentration in the background water is already at or above the level specified in the Criteria.

Sampling technique in ground-water monitoring is very important, and standard methods such as those outlined in Handbook for Monitoring Industrial Wastewater (USEPA, 1973) or Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities (EPA-530/SW-611) should be used. A brief set of guidelines follows:

(a) Check equipment and make arrangements with the laboratory and for sample transportation.

(b) Measure the static water level in the well.

(c) Flush the well to remove standing water. An amount equal to five times the volume of the casing should be removed in high-yield formations (in low permeability strata, one volume will suffice).

(d) Allow the well to recharge to the static water level (may require more than one day).

(e) Clean and/or flush sampling equipment with distilled or drinking water between samples.

(f) Where appropriate, filter sample during collection. Non-aerated conditions must be maintained; therefore, do not allow the water to bubble or splash into the sample container and filter.

(g) Preserve the sample and pack in ice, if necessary, for shipment.

(h) Clean equipment. Make sure well is securely capped.

3.3.4 Interpretation of Data

Casual interpretation of ground water monitoring data can sometimes be misleading. Several types of variation can be introduced into ground water monitoring data. Sampling error can be reduced by adhering to the practices outlined in Section 3.3.3. The effects of natural fluctuation in ground water quality can be reduced by increasing sampling frequency. The sampling interval should be based on seasonal factors, the distance to the wells from the waste deposit, and the rate of ground-water movement. Measurement error can be reduced by splitting a sample and evaluating the analysis of each split with the Student t-test, as outlined in Appendix 4-1.

Two options are suggested for data interpretation. The first option utilizes indicator parameters or tracers and is designed to provide a quick, low-cost indication of potential contamination. The second option is based on the Criteria MCL's only.

Option 1:

(a) Analyze upgradient samples for parameters suggested in Section 3.3.3, depending on the facility type. Note: if more than one upgradient well is sampled, use the well that is clearly upgradient, based on flow direction and location with respect to the facility. If this determination cannot be made, use the mean value of all upgradient wells.

(b) Analyze downgradient wells for the same parameter(s), and compare the highest concentration(s) with the upgradient value.

(c) If downgradient concentration(s) are less than upgradient, *the facility complies with the Criterion.*

(d) If downgradient concentration(s) are greater than upgradient, the procedures in Option 2 must be followed.

Option 2:

(a) Analyze downgradient samples for all parameters suspected to be released by the facility (see Section 3.3.3 and Table 4-6).

If this is not known, analyze for all parameters in Appendix 1.

(b) If the highest downgradient concentrations do not exceed the MCL's, *the facility complies with the Criterion.*

(c) If the highest downgradient concentrations exceed the MCL's, analyze upgradient samples for the same parameters. Note: if more than one upgradient well is sampled, use the well that is clearly upgradient based on flow direction and location with respect to the facility. If this determination cannot be made, use the mean value of all upgradient wells.

(d) If the upgradient value does not exceed the MCL's, *the facility does not comply.*

(e) If the upgradient value exceeds the MCL's, additional monitoring should be done to detect significant increases in downgradient concentrations. Statistical evaluation is recommended (see Appendix 4-1).

When the evaluations are being made, caution should be exercised in evaluating the initial analyses of iron and manganese or other contaminants which might result from a well casing or disturbance of the soil. Also, in areas where there are other potential sources of contamination such as industrial activity, sewers, septic systems, and disposal facilities, contamination may originate from another upgradient source. Careful checking of upgradient well results, over a period of time, should be done to determine that the facility is actually the source of contamination.

APPENDIX 4-1

APPLICATION OF STUDENT t-TEST TO MONITORING DATA

APPLICATION OF STUDENT t-TEST TO MONITORING DATA

The t-test is a method of comparing two samples to determine if there is a significant difference between them. The test relies on the assumption of normality and that sample pairs be observed under the same conditions. The test uses sample means in its comparison; therefore, it is essential that each sample be split for several analyses (as the number of splits approaches 1, the validity of the test approaches "zero").

The data are processed as shown in this example:

Upgradient wells: #1 Downgradient wells: #3

#2 - well cap tampered with; do not use. #4

Samples Split for 5 Analyses Each, Analyzed for Chloride

Analysis	Well #1	Difference From $Mean_1$	Well #3	Difference From $Mean_3$	Well #4	Difference From $Mean_4$
1	75 ppm	2	295 ppm	32	300	16
2	105	32	220	43	297	13
3	31	42	246	17	260	24
4	64	9	271	8	275	9
5	92	19	284	21	289	5
	$mean_1$=73	sum_1=104	$mean_3$=263	sum_3=121	$mean_4$=284	sum_4=67

Calculate S_0, the sample variance (using one ugradient and one downgradient well).

$$S_0 = \frac{(sum_1)^2 + (sum_3)^2}{n_1 + n_2 - 2}$$

n_1 = no. of splits, well #1

n_2 = no. of splits, well #3

$$= \frac{(104)^2 + (121)^2}{5 + 5 - 2}$$

$$= 3,182$$

Calculate t:

$$t = \frac{\text{mean}_1 - \text{mean}_3}{S_0\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$= \frac{73 - 263}{3{,}182\sqrt{\frac{1}{5} + \frac{1}{5}}}$$

$$= 0.094 \text{ (disregard signs)}$$

Compare t with the number opposite the value of $(n_1 + n_2-2)$ in Table 4-1-1. If t is less than this number, there is no significant difference between the samples.

TABLE 4-1-1

t DISTRIBUTION AT 95 PERCENT CONFIDENCE LEVEL

$n_1 + n_2-2$	t	$n_1 + n_2-2$	t
1	12.706	11	2.201
2	4.303	12	2.179
3	3.182	13	2.160
4	2.776	14	2.145
5	2.571	15	2.131
6	2.447	16	2.120
7	2.365	17	2.110
8	2.306	18	2.101
9	2.262	19	2.093
10	2.228	20	2.086

Chapter 4

GROUND WATER

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Does ground water contain more than 10,000 mg/l TDS, and is it not being used as a human drinking water source?

☐ YES (COMPLIES)

- ☐ Ground water is not present beneath the site
- ☐ Ground water has more than 10,000 mg/l TDS, TDS =_____ and is not used as a human drinking water source
- ☐ Ground water is not present in usable quantities beneath the site

☐ NO (Continue to 2)

- ☐ Ground water has less than 10,000 mg/l TDS
- ☐ Ground water is being used as a drinking water source

2. Rank facility according to its contamination potential.

Landfills

- ☐ Facility overlies sole source aquifer (high priority)
- ☐ Facility has a history of leachate problems (high priority)
- ☐ Ranking from Table 4-2
  - Saturated zone permeability _____ cm/sec
  - Unsaturated zone thickness _____ m
  - Unsaturated zone permeability_____ cm/sec
- ☐ Facility is in an area where precipitation is exceeded by evaporation plus transpiration (low priority)

☐ High priority

☐ Medium priority

☐ Low priority

Surface Impoundments

Ranking from Table 4-3

Saturated zone rating _____

Unsaturated zone rating _____

☐ High priority

☐ Medium priority

☐ Low priority

Landspreading Facilities

- ☐ Sludge nitrogen is being applied in excess of crop or vegetative demand (high priority)
- ☐ Ranking from Table 4-2 for industrial waste facilities

☐ High priority

☐ Medium priority

☐ Low priority

3. Has an underground drinking water source been contaminated by the facility beyond the solid waste (or alternate boundary)?

☐ YES (Does not comply)

- ☐ Monitoring shows contamination of a drinking water source
  Contaminating substances and concentrations_____
  _____
  _____

☐ NO (COMPLIES)

- ☐ Facility does not overlie a drinking water source
- ☐ Monitoring shows no contamination beyond the solid waste (or alternate boundary)

CHAPTER 5

ENDANGERED AND THREATENED SPECIES

1.0 Criterion and Definitions

§ 257.3-2 Endangered species.

(a) Facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.

(b) The facility or practice shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17.

(c) As used in this section:

(1) "Endangered or threatened species" means any species listed as such pursuant to Section 4 of the Endangered Species Act.

(2) "Destruction or adverse modification" means a direct or indirect alteration of critical habitat which appreciably diminishes the likelihood of the survival and recovery of threatened or endangered species using that habitat.

(3) "Taking" means harassing, harming, pursuing, hunting, wounding, killing, trapping, capturing, or collecting or attempting to engage in such conduct.

2.0 Inventory Procedure

The approach to the endangered species criterion for the purpose of the inventory is as follows:

(a) Eliminate from further consideration (i.e. complies) if the facility is not located: (1) within a listed critical habitat, or (2) within a portion of endangered or threatened species range.

(b) Eliminate from further consideration (i.e. complies) if the facility has passed an environmental assessment which considered the facility's impacts upon endangered and threatened species and critical habitats.

(c) Determine if the facility results in the destruction or adverse modification of the critical habitat of an endangered or threatened species as identified by 50 CFR Part 17.

(d) Determine if the facility causes or contributes to the taking of an endangered or threatened species of plants, fish, or wildlife.

Figure 5-1 presents the compliance decision flow chart.

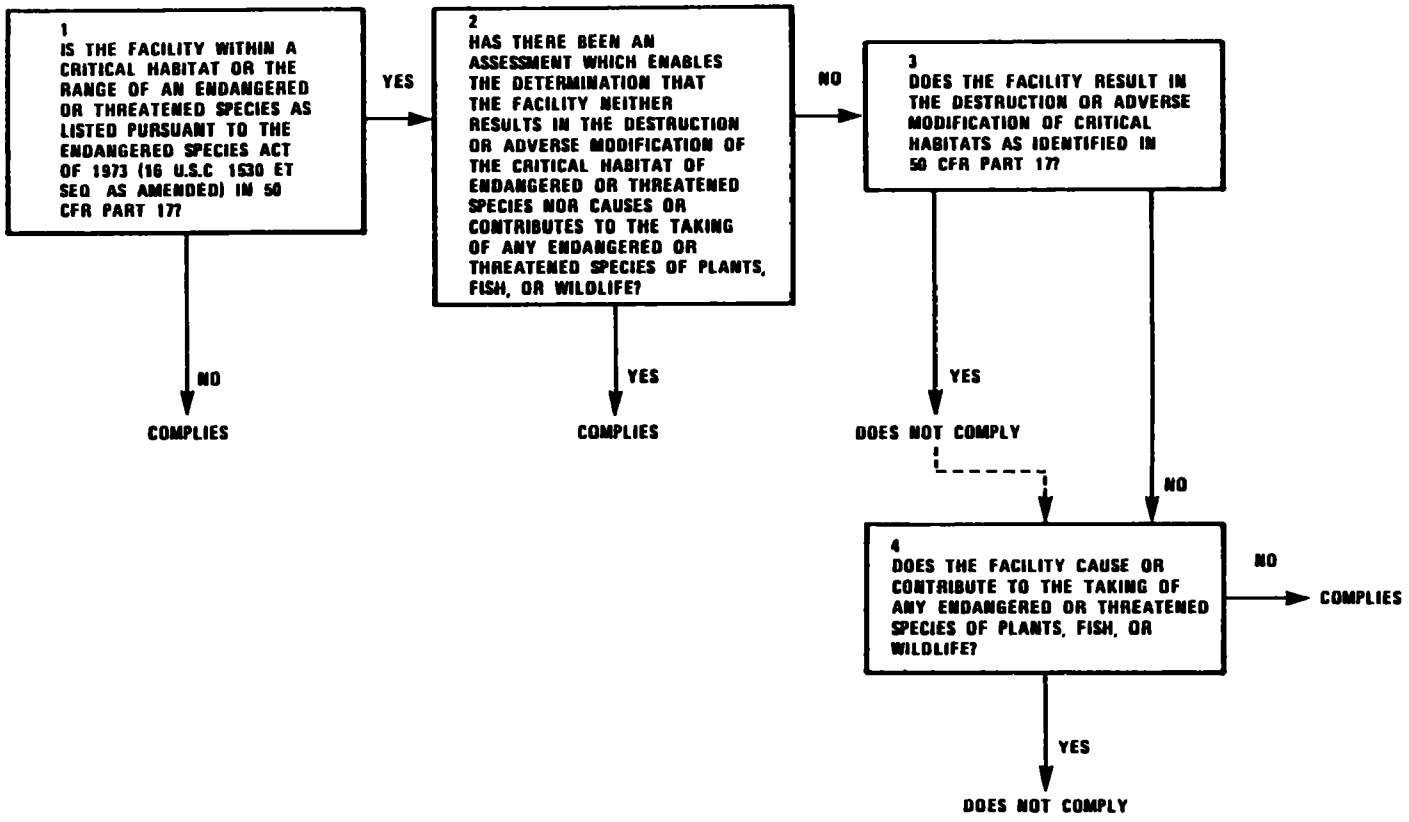
3.0 Resolution of Decision Flow Chart Questions

3.1 Is the facility within a critical habitat or the range of an endangered or threatened species as listed pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1530 et. seq. as amended) in 50 CFR Part 17?

This is determined by referring to the synopsis of the 50 CFR Part 17 listings of endangered and threatened species (Appendix 5-A), and critical habitats (Appendix 5-B), promulgated by the Office of Endangered Species (OES) of the Fish and Wildlife Service, U.S. Department of Interior. Discussions should be held with the State agency or agencies involved in management, control, and regulation of plants, fish, or wildlife and/or the OES to determine where the species is actually known to occur within the State. OES assistance may be necessary to clarify those instances where the range is not State specific and to ensure that the listing is current. This information from the State agencies or the OES should be compiled on maps delineating known areas of concern for each species.

The evaluation is made by simply comparing the facility location to the State map. If the facility is not located in a critical habitat nor within the range of an endangered or threatened species as identified by the OES or State agency, *then the facility complies with the Endangered Species Criterion.*

3.2 Has there been an assessment which enables the determination that the facility neither results in the destruction or adverse modification of the critical habitat of endangered or threatened species nor causes or contributes to the taking of any endangered or threatened species of plants, fish, or wildlife?



NOTE DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOWCHART QUESTION

FIGURE 5-1 FLOW CHART–ENDANGERED SPECIES

There are several instances where previous evaluations may enable this determination to be made for a specific facility.

(a) If the State has a cooperative agreement with the OES under Section 6(c) of the Endangered Species Act whereby the State endangered species program maintains an active and adequate program for the conservation of endangered species and threatened species in accordance with the ESA, check with the State endangered species agency or agencies for a previous assessment of the facility. Where the facility has passed the State endangered species program's assessment of the facility's likely impact upon endangered and threatened. . . species and critical habitats, *then the facility is in compliance with this Criterion.* When no State cooperative agreement exists under the ESA but an equivalent assessment has been made for the facility during the permit process and it passed, *then the facility is in compliance with this Criterion.* Such an assessment is usually made as part of the State's review, inspection, or permit procedures for various State programs or through the State comments on a Federal permit application by the facility (i.e. a Clean Water Act Section 404 permit). This question is resolved by checking past records of the facility.

(b) Where the facility is on Federal land or Federal money is involved in the construction or operation of the facility, an assessment of the facility's impacts on endangered or threatened species might have been made by the Office of Endangered Species, a State having a cooperative agreement, or the involved Federal agency. If the facility passed this assessment *then the facility complies with this Criterion.* Check the past records of the facility with the Office of Endangered Species or the involved Federal agency to determine this.

(c) Where the facility has an individual permit under Section 404 of the Clean Water Act, and the environmental assessment conducted prior to the issuance of the permit contained an assessment that the facility was unlikely to adversely impact upon endangered and

threatened species and critical habitats, *then the facility is in compliance with this criterion.* This can be determined by checking the records of the facility. If necessary, consult with the appropriate Army Corps of Engineers District or the State 404 permitting agency (where applicable).

(d) If the facility has been evaluated for the Endangered Species Act provisions (according to (a), (b), or (c) above) and if the facility passed as a result of a settlement made to prevent adverse impact, and the facility complies with this settlement, *then, for the purpose of the Inventory, the facility complies with this Criterion.*

(e) In addition, for the purpose of the Inventory, if ESA evaluations have been made nearby with no adverse impacts noted and the appropriate State wildlife agencies indicate that the same situation exists at the facility under consideration, *then the facility complies with this Criterion.* This past environmental assessment determination will have to be done through State discretion based on the circumstances. Normally, the facility will have records or information about this assessment.

3.3 Does the facility result in the destruction or adverse modification of the critical habitat as identified in 50 CFR Part 17?

The mere location of a facility within a critical habitat does not necessarily mean that the facility will result in the destruction or adverse modification of that habitat (e.g., a facility located in a valley may be within the critical habitat of an endangered bat, but the bat may only exist in caves near the ridge tops, remaining unaffected by the facility below).

If the facility is in a critical habitat and no previous assessments have been made, the State must conduct its own assessment in order to make a determination. This assessment should be carried out in consultation with or assistance from the appropriate State agencies (endangered species or fish and wildlife offices), regional OES office,

university study team, or private consultant. If a Federal Agency is involved through lending aid, project permit or other activities, check with that Federal Agency to see if the OES determination has been or will be made. Determinations will be facility specific and made on the best judgment of the evaluator(s). The factors to be considered in making a determination are:

- type of critical habitat
- size of critical habitat and size of facility
- sensitivity of critical habitat to adverse impacts
- species characteristics for which the critical habitat has been designated (e.g., requirements for food, harborage, water, reproduction, etc.)
- proximity of facility to critical habitat (e.g., location of facility vis-a-vis species)
- facility design and operational characteristics

Where it is determined that a facility does not directly or indirectly result in the destruction or adverse modification of a critical habitat in a manner which appreciably diminishes the likelihood of the survival and recovery of the threatened and endangered species using that habitat, *then the facility complies with this portion of the criterion.*

3.4 Does the facility cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife?

If it has been determined that the facility results in the destruction or adverse modification of a critical habitat, *then the facility results in the taking of the subject endangered species, and the facility does not comply with this part of the criterion.*

If the facility is located within the portion of the range where the species is endangered or threatened, and no previous study has been conducted, the facility must be evaluated for the taking of endangered or threatened species. Assistance should be obtained as listed in 3.3 of this chapter.

The decision determining the effects of disposal facilities on endangered or threatened species will be facility specific and made on the best judgment of the evaluator(s).

(a) The factors to be considered in making a determination are:

- type of species or species habitat
- species characteristics (e.g., nesting and breeding behavior; range; food, water, and harborage needs; growth cycles)
- sensitivity of species or habitat to adverse environmental impacts
- proximity of facility to species or species habitat
- facility size, design, and operational characteristics

(b) Specific factors for determining whether a facility is causing or contributing to the "taking" of endangered or threatened species are:

- harassing, harming, pursuing, hunting, wounding, killing, trapping, capturing, or collecting of species (this constitutes a "taking" and non-compliance with this criterion)
- loss or adverse modification of habitat (including air and water pollution impacts)
- infringement on breeding, nesting, and feeding activities
- interference with species movement

The latter three factors may or may not constitute a "taking" and require careful consideration and expert consultation on the factors listed in (a) before making the determination.

APPENDIX 5-A

LIST OF ENDANGERED AND THREATENED SPECIES

federal register

WEDNESDAY, JANUARY 17, 1979
PART II

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

LIST OF ENDANGERED AND THREATENED WILDLIFE AND PLANTS

Republication

[4310-55-M]

Title 50—Wildlife and Fisheries

CHAPTER I—UNITED STATES FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

Republication of the List of Species

[NOTE: This document is reprinted from the issue of Monday, December 11, 1978 (43 FR 58030).]

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Republication of the U.S. List of Endangered and Threatened Wildlife and Plants.

SUMMARY: The Service hereby issues a republication of the list of Endangered and Threatened Wildlife and Plants. An annual publication of this list is required under the Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 Stat. 884).

DATE: This list is inclusive of September 30, 1978.

ADDRESSES: Comments concerning this republication should be sent to the Director (OES), U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240.

FOR FURTHER INFORMATION CONTACT:

Mr. Keith M. Schreiner, Associate Director—Federal Assistance, Washington, D.C. 20240, telephone 202-343-4646.

SUPPLEMENTARY INFORMATION: The list incorporates species officially listed as Endangered or Threatened since the republication of the list in the FEDERAL REGISTER, July 14, 1977 (42 FR 36420). These new species are African elephant, San Clemente loggerhead shrike, San Clemente sage sparrow, giant anole, Mona boa, Mona ground iguana, island night lizard, New Mexican ridge-nosed rattlesnake, Atlantic salt marsh snake, eastern indigo snake, green sea turtle, loggerhead turtle, Olive (Pacific) Ridley sea turtle, pine barrens tree frog, golden coqui, Alabama cavefish, slender chub, spotfin chub, leopard darter, slackwater darter, yellowfin madtom, little kern golden trout, greenback cutthroat trout, Chittenango ovate amber snail, flat-spired three-toothed snail, Iowa Pleistocene snail, noonday snail, painted snake coiled forest snail, Stock Island tree snail, Virginia fringed mountain snail, tan riffle shell, Socorro isopod, Virginia round-leaf birch, Contra Costa wallflower, McDonald's rock cress, Santa Barbara Island live forever, Rydberg milkvetch, hairy rattleweed, San Clemente broom, Hawaiian wild broadbean, unnamed *Phacelia*, San Diego pogogyne, persistent trillium, San Clemente Island bushmallow, Eureka evening-primrose, Antioch Dunes evening primrose, Crampton's orcutt grass, Eureka dune grass, Texas wild-rice, northern wild monkshood, San Clemente Island Larkspur, salt marsh bird's-beak, San Clemente Island Indian paintbrush, and Furbish lousewart. Populations of both the gray wolf and the bald eagle have been reclassified. The Mexican duck has been removed from the list as directed by the rulemaking published in the July 25, 1978, FEDERAL REGISTER (43 FR 32258-32261). Errors detected in the FEDERAL REGISTER, July 14, 1977 (42 FR 36420) list have been corrected, and some scientific names have been changed to reflect current usage.

Dated: November 20, 1978.

LYNN A. GREENWALT,
Director, Fish and Wildlife Service.

1. The table in 50 CFR 17.11 is revised to read as follows:

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
MAMMALS:							
Bat, gray	Myotis grisescens	NA	Central and South-eastern USA	Entire	E	13	NA
Bat, Hawaiian hoary	Lasiurus cinereus semotus	NA	USA (Hawaii)	Entire	E	2	NA
Bear, brown or grizzly	Ursus arctos horribilis	USA - 48 conterminous states	Holarctic	Entire	T	9	17.40(b)
Cougar, eastern	Felis concolor couguar	NA	Eastern North America	Entire	E	6	NA
Deer, Columbian white-tailed	Odocoileus virginianus leucurus	NA	USA (Washington, Oregon)	Entire	E	1	NA
Deer, key	Odocoileus virginianus clavium	NA	USA (Florida)	Entire	E	1	NA
Ferret, black-footed	Mustela nigripes	NA	USA (Western), Western Canada	Entire	E	1,3	NA
Fox, Northern Swift	Vulpes velox hebes	NA	USA (Northern Plains), Canada	Entire	E	3	NA
Fox, San Joaquin kit	Vulpes macrotis mutica	NA	USA (California)	Entire	E	1	NA
Jaguarundi	Felis yagouaroundi cacomitli	NA	USA (Texas), Mexico	Entire	E	15	NA
Jaguarundi	Felis yagouaroundi tolteca	NA	USA (Arizona), Mexico	Entire	E	15	NA
Manatee, West Indian (Florida)	Trichechus manatus	NA	USA (Southeastern), Caribbean Ocean, South America	Entire	E	1,3	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
MAMMALS:							
Mouse, salt marsh harvest	Reithrodontomys raviventris	NA	USA (California)	Entire	E	2	NA
Otter, Southern Sea	Enhydra lutris nereis	NA	California	Entire	T	21	NA
Panther, Florida	Felis concolor coryi	NA	Florida	Entire	E	1	NA
Prairie Dog, Utah	Cynomys parvidens	NA	USA (Utah)	Entire	E	6	NA
Pronghorn, Sonoran	Antilocapra americana sonoriensis	NA	USA (Arizona), Mexico	Entire	E	1,3	NA
Rat, Morro Bay kangaroo	Dipodomys heermanni morroensis	NA	USA (California)	ENTIRE	E	2	NA
Squirrel, Delmarva Peninsula fox	Sciurus niger cinereus	NA	USA (Maryland)	Entire	E	1	NA
Wolf, gray	Canis lupus	USA (48 conterminous State other than MN), Mexico	AZ, ID, MI, MT, NM, ND, OR, TX, WA, WI, WY, MX	Entire	E	1,6,13 15,35	NA
Wolf, gray	Canis lupus	MN	Northern Minnesota	Entire	T	35	17.40(d)
Wolf, red	Canis rufus	NA	Texas, Louisiana	Entire	E	2	NA
BIRDS:							
Akepa, Hawaii (honeycreeper)	Loxops coccinea coccinea	NA	USA (Hawaii)	Entire	E	2	NA
Akepa, Maui (honeycreeper)	Loxops coccinea ochracea	NA	USA (Hawaii)	Entire	E	2	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
BIRDS:							
Akialoa, Kauai (honeycreeper)	Hemignathus procerus	NA	USA (Hawaii)	Entire	E	1	NA
Akiapolaau (honeycreeper)	Hemignathus wilsoni	NA	USA (Hawaii)	Entire	E	1	NA
Albatross, short-tailed	Diomedea albatrus	NA	North Pacific Ocean: Japan, Soviet Union, USA	Entire	E	3	NA
Bobwhite, masked (quail)	Colinus virginianus ridgwayi	NA	USA (Arizona), Mexico (Sonora)	Entire	E	1,3	NA
Condor, California	Gymnogyps californianus	NA	USA (OR,CA), Mexico (Baja California)	Entire	E	1	NA
Coot, Hawaiian	Fulica americana alai	NA	USA (Hawaii)	Entire	E	2	NA
Crane, Mississippi sandhill	Grus canadensis pulla	NA	USA (Mississippi)	Entire	E	6	NA
Creeper, Hawaiian	Loxops maculata mana	NA	USA (Hawaii)	Entire	E	10	NA
Creeper, Molokai (Kakawahie)	Loxops maculata flammea	NA	USA (Hawaii)	Entire	E	2	NA
Creeper, Oahu (Alauwahio)	Loxops maculata maculata	NA	USA (Hawaii)	Entire	E	2	NA
Crow, Hawaiian (Alala)	Corvus tropicus	NA	USA (Hawaii)	Entire	E	1	NA
Curlew, Eskimo	Numenius borealis	NA	Alaska to Argentina	Entire	E	1,3	NA
Dove, Palau ground	Gallicolumba canifrons	NA	West Pacific Ocean: USA (Palau Islands)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
BIRDS:							
Duck, Hawaiian (Koloa)	Anas wyvilliana	NA	USA (Hawaii)	Entire	E	1	NA
Duck, Laysan	Anas laysanensis	NA	USA (Hawaii)	Entire	E	1	NA
Eagle, bald	Haliaeetus leucocephalus	NA	North America south to northern Mexico	(conterminous States other than WA, OR, MN, WI, MI)	E	1,34	
Eagle, bald	Haliaeetus leucocephalus	NA	North America south to northern Mexico	USA (WA, OR, MN, WI, MI)	T	1,34	17.41(a)
Falcon, American peregrine	Falco peregrinus anatum	NA	Canada, USA, Mexico	Entire	E	2,3	NA
Falcon, Arctic peregrine	Falco peregrinus tundrius	NA	Alaska to Greenland, south to South America	Entire	E	2,4	NA
Finch, Laysan (honeycreeper)	Telespyza (=Psittirostra) cantans	NA	USA (Hawaii)	Entire	E	1	NA
Finch, Nihoa (honeycreeper)	Telespyza (=Psittirostra) ultima	NA	USA (Hawaii)	Entire	E	1	NA
Flycatcher, Tinian monarch	Monarcha takatsukasae	NA	Western Pacific Ocean:USA	Entire	E	3	NA
Gallinule, Hawaiian	Fallinula chloropus sandvicensis	NA	USA (Hawaii)	Entire	E	1	NA
Goose, Aleutian Canada	Brauta canadensis leucopareia	NA	Western USA (AK, WA, OR, CA), Japan	Entire	E	1,4	NA
Goose, Hawaiian (Nene)	Branta sandvicensis	NA	USA (Hawaii)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
BIRDS.							
Hawk, Hawaiian (Io)	Buteo solitarius	NA	USA (Hawaii)	Entire	E	1	NA
Honeycreeper, crested (Akohekohe)	Palmeria dolei	NA	USA (Hawaii)	Entire	E	1	NA
Kite, Everglade (snail kite)	Rostrhamus sociabilis plumbeus	NA	USA (Florida)	Entire	E	1	NA
Megapode, La Perouse's	Megapodius laperouse	NA	Western Pacific Ocean: USA (Palau Islands, Marianas Islands)	Entire	E	4	NA
Millerbird, Nihoa (willow warbler)	Acrocephalus familiaris kingi	NA	USA (Hawaii)	Entire	E	1	NA
Nukupuu (honeycreeper)	Hemignathus lucidus	NA	USA (Hawaii)	Entire	E	2	NA
Ou (honeycreeper)	Psittirostra psittacea	NA	USA (Hawaii)	Entire	E	1	NA
Owl, Palau	Otus podargina	NA	Western Pacific Ocean: USA (Palau Islands)	Entire	E	4	NA
Palila (honeycreeper)	Psittirostra bailleui	NA	USA (Hawaii)	Entire	E	1	NA
Parrot, Puerto Rican	Amazona vittata	NA	USA (Puerto Rico)	Entire	E	1	NA
Parrotbill, Maui (honeycreeper)	Pseudonestor xanthophrys	NA	USA (Hawaii)	Entire	E	1	NA
Pelican, brown	Pelecanus occidentalis occidentalis	NA NA	USA, West Indies, Central and South America: Coastal	Entire	E	2,4	NA
Petrel, Hawaiian dark-rumped	Pterodroma phaeopygia sandwichensis	NA	USA (Hawaii)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
BIRDS.							
Pigeon, Puerto Rican plain	Columba inornata wetmorei	NA	USA (Puerto Rico)	Entire	E	2	NA
Poo-uli	Melamprosops phaeosoma	NA	USA (Hawaii)	Entire	E	10	NA
Prairie chicken, Attwater's greater	Tympanuchus cupido attwateri	NA	USA (Texas)	Entire	E	1	NA
Rail, California clapper	Rallus longirostris obsoletus	NA	USA (California)	Entire	E	2	NA
Rail, light-footed clapper	Rallus longirostris levipes	NA	USA (California), Mexico (Baja California)	Entire	E	2	NA
Rail, Yuma clapper	Rallus longirostris yumanensis	NA	Mexico (Sonora), USA (Arizona, California)	Entire	E	1	NA
Shearwater, Newell's Manx	Puffinus puffinus newelli	NA	USA (Hawaii)	Entire	T	10	NA
Shrike, San Clemente loggerhead	Lanius ludovicianus mearnsi	NA	USA (California)	Entire	E	26	NA
Sparrow, Cape Sable	Ammospiza maritima mirabilis	NA	USA (Florida)	Entire	E	1	NA
Sparrow, dusky seaside	Ammospiza maritima nigrescens	NA	USA (Florida)	Entire	E	1	NA
Sparrow, San Clemente sage	Amphispiza belli clementae	NA	USA (California)	Entire	T	26	NA
Sparrow, Santa Barbara song	Melospiza melodia graminea	NA	USA (California)	Entire	E	6	NA
Starling, Ponape mountain	Aplonis pelzelni	NA	Western Pacific Ocean: USA (Caroline Islands)	Entire	E	4	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
BIRDS:							
Stilt, Hawaiian	Himantopus himantopus knudseni	NA	USA (Hawaii)	Entire	E	2	NA
Tern, California least	Sterna albifrons browni	NA	Mexico, USA (California)	Entire	E	2,4	NA
Thrush, large Kauai	Phaeornis obscurus myadestina	NA	USA (Hawaii)	Entire	E	2	NA
Thrush, Molokai (Olomau)	Phaeornis obscurus rutha	NA	USA (Hawaii)	Entire	E	2	NA
Thrush, small Kauai (Puaiohi)	Phaeornis palmeri	NA	USA (Hawaii)	Entire	E	1	NA
Warbler (wood), Bachman's	Vermivora bachmanii	NA	Cuba, USA (Southeastern)	Entire	E	1,4	NA
Warbler (wood), Kirtland's	Dendroica kirtlandii	NA	USA, West Indies: Bahama Islands	Entire	E	1,4	NA
Whip-poor-will, Puerto Rican	Caprimulgus noctitherus	NA	USA (Puerto Rico)	Entire	E	6	NA
White-eye, Ponape great	Rukia sanfordi	NA	Western Pacific Ocean: USA (Caroline Islands)	Entire	E	4	NA
Woodpecker, ivory billed	Campephilus principalis	NA	Cuba, USA (Southcentral and southeastern)				
Woodpecker, red-cockaded	Picoides (=Dendrocopos) borealis	NA	USA (Southcentral and Southeastern)	Entire	E	3	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
REPTILES:							
Alligator, American	Alligator mississippiensis	Wherever found in the wild, except in those areas where it is listed as Threatened, as set forth below.	Southeastern United States	Entire	E	11	NA
Alligator, American	Alligator mississippiensis	In the wild in Florida and in certain areas of Georgia, Louisiana, (except in Cameron, Vermillion, and Calcasieu Parishes), South Carolina and Texas, as set forth in Sec. 17.42(a)(2)(iv).	U.S. FL and certain areas of GA, LA (except in Cameron, Vermillion and Calcasieu Parishes), SC and TX	Entire	T	20	20 17.42(a)
Alligator, American	Alligator mississippiensis	In the wild in Cameron, Vermillion and Calcasieu Parishes in LA.	U.S. (Cameron, Vermillion, and Calcasieu Parishes in LA).	NA	T(S/A)	11	17.42(a)
Boa, Mona	Epicrates monensis monensis	NA	USA (Puerto Rico)	Entire	T	33	NA
Boa, Puerto Rico	Epicrates inornatus	NA	USA (Puerto Rico)	Entire	E	2	NA
Crocodile, American	Crocodylus acutus	Florida	USA (South Florida and Florida keys)	Entire	E	10	NA
Iguana, Mona ground	Cyclura stejnegeri	NA	USA (Puerto Rico: Mona Island)	Entire	T	33	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
REPTILES:							
Lizard, blunt-nosed leopard	Crotaphytus silus	NA	USA (California)	Entire	E	1	NA
Lizard, Island night	Klauberina riversiana	NA	USA (California)	Entire	T	26	NA
Rattlesnake, New Mexican ridge-nosed	Crotalus willardi obscurus	NA	USA (New Mexico), Mexico	Entire	T	43	NA
Snake, Atlantic salt marsh	Nerodia fasciata taeniata	NA	USA (Florida)	Entire	T	30	NA
Snake, eastern indigo	Drymarchon corais couperi	NA	USA (FL,GA,MS,SC,AL)	Entire	T	32	NA
Snake, San Francisco garter	Thamnophis sirtalis tetrataenia	NA	USA (California)	Entire	E	1	NA
Turtle, green sea	Chelonia mydas	Breeding colony populations in Florida and on the Pacific coast of Mexico	All State waters of Florida including Hutchison and Jupiter Islands and Pacific Coast of Mexico including the Gulf of California	Entire	E	42	NA
AMPHIBIANS.							
Coqui, golden	Eleutherodactylus jasperi	NA	USA (Puerto Rico)	Entire	T	29	NA
Salamander, desert slender	Batrachoseps aridus	NA	USA (California)	Entire	E	6	NA
Salamander, Red Hills	Phaeognathus hubrichti	NA	USA (Alabama)	Entire	T	19	NA
Salamander, Santa Cruz long-toed	Amoystoma macrodactylum croceum	NA	USA (California)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
AMPHIBIANS: (continued)							
Salamander, Texas blind	Typhlomolge rathbuni	NA	USA (Texas)	Entire	E	1	NA
Toad, Houston	Bufo houstonensis	NA	USA (Texas)	Entire	E	2	NA
Treefrog, Pine Barrens	Hyla andersonii	Florida	USA (Florida)	Entire	E	29	NA
FISHES:							
Bonytail, Pahranagat	Gila robusta jordani	NA	USA (Nevada)	Entire	E	15	NA
Cavefish, Alabama	Speoplatyrhinus poulsoni	NA	USA (Alabama)	Entire	T	28	NA
Chub, humpback	Gila cypha	NA	USA (AZ,UT,WY)	Entire	E	1	NA
Chub, Mohave	Gila mohavensis	NA	USA (California)	Entire	E	2	NA
Chub, slender	Hybopsis cahni	NA	USA (TN,VA)	Entire	T	28	17.4
Chub, spotfin	Hybopsis monacha	NA	USA (VA,TN,NC)	Entire	T	28	17.44
Cisco, longjaw	Coregonus alpenae	NA	USA (Lakes Michigan, Huron and Erie)	Entire	E	1	NA
Cui-ui	Chasmistes cujus	NA	USA (Nevada)	Entire	E	1	NA
Dace, Kendall Warm Springs	Rhinichthys osculus thermalis	NA	USA (Wyoming)	Entire	E	2	NA
Dace, Moapa	Moapa coriacea	NA	USA (Nevada)	Entire	E	1	NA
Darter, bayou	Etheostoma rubrum	NA	USA (Mississippi)	Entire	T	10	17.44
Darter, fountain	Etheostoma fonticola	NA	USA (Texas)	Entire	E	2	NA
Darter, leopard	Percina pantherina	NA	USA (AR,OK)	Entire	T	31	17.44
Darter, Maryland	Etheostoma sellare	NA	USA (Maryland)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
FISHES:							
Darter, Okaloosa	Etheostoma okaloosae	NA	USA (Florida)	Entire	E	6	NA
Darter, slackwater	Etheostoma boschungi	NA	USA (AL,TN)	Entire	T	28	17.44
Darter, snail	Percina tanasi	NA	USA (Tennessee)	Entire	E	12	NA
Darter, watercress	Etheostoma nuchale	NA	USA (Alabama)	Entire	E	2	NA
Gambusia, Big Bend	Gambusia gaigei	NA	USA (Texas)	Entire	E	1	NA
Gambusia, Clear Creek	Gambusia heterochir	NA	USA (Texas)	Entire	E	1	NA
Gambusia, Pecos	Gambusia nobilis	NA	USA (Texas)	Entire	E	2	NA
Killifish, Pahrump	Empetrichythys latos	NA	USA (Nevada)	Entire	E	1	NA
Madtom, Scioto	Noturus trautmani	NA	USA (Ohio)	Entire	E	10	NA
Madtom, yellowfin	Noturus flavipinnis	NA	USA (TN,VA)	Entire	T	28	17.44(c)
Pike, blue	Stizostedion vitreum glaucum	NA	USA (Lakes Erie and Ontario)	Entire	E	1	NA
Pupfish, Comanche Springs	Cyprinodon elegans	NA	USA (Texas)	Entire	E	1	NA
Pupfish, Devil's Hole	Cyprinodon diabolis	NA	USA (Nevada)	Entire	E	1	NA
Pupfish, Owens River	Cyprinodon radiosus	NA	USA (California)	Entire	E	1	NA
Pupfish, Teopa	Cyprinodon nevadensis calidae	NA	USA (California)	Entire	E	2	NA
Pupfish, Warm Springs	Cyprinodon nevadensis pectoralis	NA	USA (Nevada)	Entire	E	2	NA
Squawfish, Colorado River	Ptychocheilus lucius	NA	USA (AR,CA,CO, NM,UT,WY)	Entire	E	1	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
FISHES:							
Stickleback, unarmored three-spine	Gasterosterus aculeatus williamsoni	NA	USA (California)	Entire	E	2	NA
Sturgeon, shortnose	Acipenser brevirostrum	NA	USA (Atlantic Coast of US and Canada)	Entire	E	1	NA
Topminnow, Gila	Poeciliopsis occidentalis	NA	USA (Arizona), Mexico	Entire	E	1	NA
Trout, Arizona	Salmo apache	NA	USA (Arizona)	Entire	T	8	17.44(a)
Trout, Gila	Salmo gilae	NA	USA (New Mexico)	Entire	E	1	NA
Trout, greenback cutthroat	Salmo clarki stomias	NA	USA (Colorado)	Entire	T	1,38	NA
Trout, Lahontan cutthroat	Salmo clarki henshawi	NA	USA (California, Nevada)	Entire	T	8	17.44(a)
Trout, little kern golden	Salmo aquabonita whitei	NA	USA (California)	Entire	T	37	17.44(e)
Trout, Paiute cutthroat	Salmo clarki seleniris	NA	USA (California)	Entire	T	8	17.44(a)
Woundfin	Plagopterus argentissimus	NA	USA (Arizona, Nevada, Utah)	Entire	E	2	NA
SNAILS:							
Snail, Chittenango ovate amber	Succinea chittenangoensis	NA	USA (New York)	New York	T	41	NA
Snail, flat-spired three-toothed	Triodopsis platysayoides	NA	USA (West Virginia)	Entire	T	41	NA
Snail, Iowa Pleistocene	Discus macclintocki	NA	USA (Iowa)	Entire	E	41	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
SNAILS:							
Snail, noonday	Mesodon-clarki nantahala	NA	USA (North Carolina)	Entire	T	41	NA
Snail, painted snake coiled forest	Anguispira picta	NA	USA (Tennessee)	Entire	T	41	NA
Snail, Stock Island tree	Orthalicus reses	NA	USA (Florida)	Entire	T	41	NA
Snail, Virginia	Polygyriscus virginianus	NA	USA (Virginia)	Entire	T	41	NA
CLAMS:							
Pearly mussel, Alabama lamp	Lampsilis virescens	NA	USA (Alabama)	Entire	E	15	NA
Pearly mussel, Appalachian monkey-face	Quadrula sparsa	NA	USA (VA,TN)	Entire	E	15	NA
Pearly mussel, birdwing	Conradilla caelata	NA	USA (VA,TN)	Entire	E	15	NA
Pearly mussel, Cumberland bean	Villosa (=Micromya) trabalis	NA	USA (Kentucky)	Entire	E	15	NA
Pearly mussel, Cumberland monkey-face	Quadrula intermedia	NA	USA (VA,TN)	Entire	E	15	NA
Pearly mussel, Curtis	Epioblasma (=Dysnomia) florentina curtisi	NA	USA (Missouri)	Entire	E	15	NA
Pearly mussel, dromedary	Dromus dromas	NA	USA (VA,TN)	Entire	E	15	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened Or Endangered	Status	When Listed	Special Rules
CLAMS:							
Pearly mussel, green-blossom	Epioblasma (=Dysnomia) torulosa gubernaculus	NA	USA (VA,TN)	Entire	E	15	NA
Pearly mussel, higgin's eye	Lampsilis higginsi	NA	USA (MN,WI,IL,MO)	Entire	E	15	NA
Pearly mussel, orange-footed	Plethobasis cooperianus	NA	USA (AL,TN)	Entire	E	15	NA
Pearly mussel, pale lilliput	Tosolasma (=Carunculina) cylinderella	NA	USA (AL,TN)	Entire	E	15	NA
Pearly mussel, pink mucket	Lampsilis orbiculata orbiculata	NA	USA (LA,WV,TN)	Entire	E	15	NA
Pearly mussel, Sampson's	Epioblasma (=Dysnomia) sampsoni	NA	USA (IN,IL)	Entire	E	15	NA
Pearly mussel, tubercled-blossom	Epioblasma (=Dysnomia) torulosa torulosa	NA	USA (KY,IL,TN,WV)	Entire	E	15	NA
Pearly mussel, turgid-blossom	Epioblasma (=Dysnomia) turgidula	NA	USA (Tennessee)	Entire	E	15	NA
Pearly mussel, white cat's eye	Epioblasma (=Dysnomia) sulcata delicata	NA	USA (OH,MI,IN)	Entire	E	15	NA
Pearly mussel, white wartyback	Plethobasis cicatricosus	NA	USA (AL,TN)	Entire	E	15	NA
Pearly mussel, yellow-blossom	Epioblasma (=Dysnomia) florentina florentina	NA	USA (Tennessee)	Entire	E	15	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
CLAMS:							
Pigtoe, fine-rayed	Fusconaia cuneolus	NA	USA (VA,AL,TN)	Entire	E	15	NA
Pigtoe, rough	Pleurobema plenum	NA	USA (KY,VA,TN)	Entire	E	15	NA
Pigtoe, shiny	Fusconaia edgariana	NA	USA (VA,AL,TN)	Entire	E	15	NA
Pocketbook, fat	Potamilus (=Proptera) capax	NA	USA (AR,MO)	Entire	E	15	NA
Riffle shell clam, tan	Epioblasma walkeri	NA	USA (TN,VA,KY)	Entire	E	15	NA
CRUSTACEANS:							
Isopod, Socorro	Exosphaeroma thermophilus	NA	USA (New Mexico)	Entire	E	36	NA
INSECTS:							
Butterfly, Bahama swallowtail	Papilio andraemon bonhotei	USA	USA (Florida) Bahamas	USA	T	13	17.47
Butterfly, El Segundo blue	Shijimiaeoides battoides allyni	NA	USA (California)	Entire	E	14	NA
Butterfly, Lange's metalmark	Apodemia mormo langei	NA	USA (California)	Entire	E	14	NA
Butterfly, Lotis blue	Lycaeides argyrognomon lotis	NA	USA (California)	Entire	E	14	NA
Butterfly, mission blue	Icaricia icarioides missionensis	NA	USA (California)	Entire	E	14	NA
Butterfly, San Bruno elfin	Callophrys mossii bayensis	NA	USA (California)	Entire	E	14	NA
Butterfly, Schaus swallowtail	Papilio aristodemus ponceanus	NA	USA (Florida)	Entire	T	13	17.47

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
INSECTS:							
Butterfly, Smith's blue	Shijimiaeoides enoptes smithi	NA	USA (California)	Entire	E	14	NA
PLANTS:							
	Betulaceae, Birch family:						
Virginia round-leaf birch	Betula uber	NA	USA (Virginia)	Entire	E	39	NA
	Brassicaceae, Mustard family:						
McDonald's rock cress	Arabis macdonaldiana	NA	USA (California)	Entire	E	44	NA
Contra Costa wall-flower	Erysimum capitatum var. angustatum	NA	USA (California)	Entire	E	39	NA
	Crassulaceae, Stonecrop family:						
Santa Barbara Island liveforever	Dudleya traskiae	NA	USA (California)	Entire	E	39	NA
	Fabaceae, Pea family:						
Rydberg milk-vetch	Astragalus perianus	NA	USA (Utah)	Entire	T	39	NA
hairy rattleweed	Baptisia arachnifera	NA	USA (Georgia)	Entire	E	39	NA
San Clemente broom	Lotus scoparius ssp. traskiae	NA	USA (California)	Entire	E	26	NA
Hawaiian wild broad-bean	Vicia menziesii	NA	USA (Hawaii)	Entire	E	39	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
PLANTS:							
	Hydrophyllaceae, Waterleaf family:						
Unnamed phacelia	Phacelia argillacea	NA	USA (Utah)	Entire	E	44	NA
	Lamiaceae, Mint family:						
San Diego pagagyne	Pogogyne abramsii	NA	USA (California)	Entire	E	44	NA
	Liliaceae, Lily family:						
Persistent trillium	Trillium persistens	NA	USA (GA,SC)	Entire	E	39	NA
	Malvaceae, Mallow family:						
San Clemente Island bushmallow	Malacothaemus clementinus	NA	USA (California)	Entire	E	26	NA
	Onagraceae, Evening primrose family:						
Eureka evening-primrose	Oenothera avita ssp. eurekensis	NA	USA (California)	Entire	E	39	NA
Antioch Dunes evening primrose	Oenothera deltoides ssp. howellii	NA	USA (California)	Entire	E	39	NA
	Poaceae, Grass family:						
Crampton's Orcutt grass	Orcuttia mucronata	NA	USA (California)	Entire	E	44	NA

(continued)

SYNOPSIS OF 50 CFR PART 17 LISTINGS OF ENDANGERED AND THREATENED SPECIES
(continued)

17.11 - Endangered and Threatened Wildlife

Species			Range				
Common Name	Scientific Name	Population	Known Distribution	Portion of Range Where Threatened or Endangered	Status	When Listed	Special Rules
PLANTS:							
	Poaceae, Grass family:						
Eureka dune grass	Swallenia alexandrae	NA	USA (California)	Entire	E	39	NA
Texas wild-rice	Zizania texana	NA	USA (Texas)	Entire	E	39	NA
	Ranunculaceae, Buttercup family:						
Northern wild monkshood	Aconitum noveboracense	NA	USA (California)	Entire	T	39	NA
San Clemente Island Larkspur	Delphinium kinkiense	NA	USA (California)	Entire	T	26	NA
	Scrophulariaceae, Snapdragon family:						
San Clemente Island paintbrush	Castilleja grisea	NA	USA (California)	Entire	E	26	NA
salt marsh bird's beak	Cordylanthus maritimus ssp. maritimus	NA	USA (California), Mexico	Entire	E	44	NA
Furbish lousewort	Pedicularis furbishiae	NA	USA (ME), Canada (New Brunswick)	Entire	E	39	NA

APPENDIX 5-B

CRITICAL HABITATS

CRITICAL HABITATS

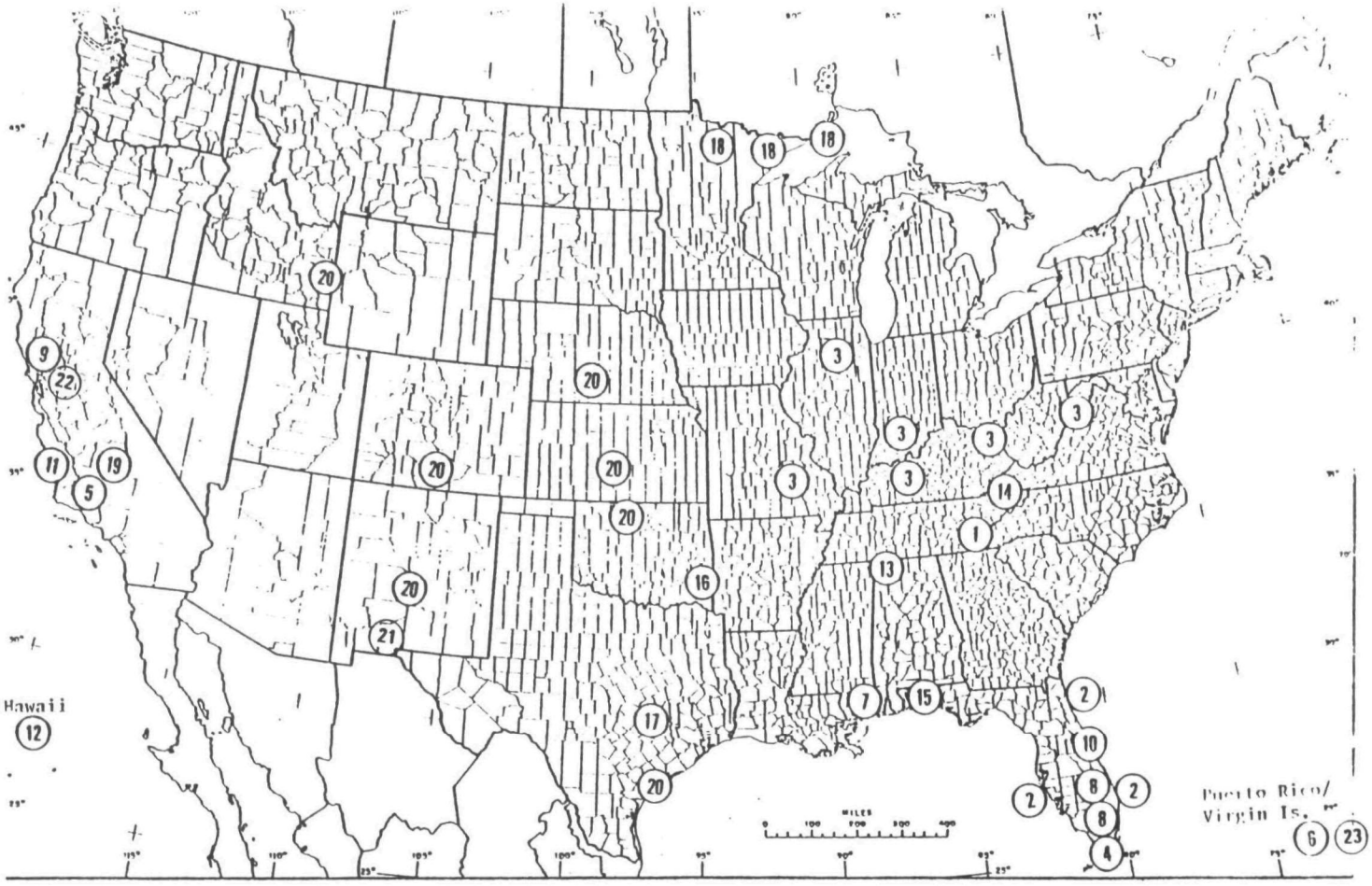
Species	Date of Federal Register	Map Index Loc.
Snail darter (No Map Available)	04/01/76	1
Florida manatee (No Map Available)	09/24/78	2,4,10
Indian bat (No Map Available)	09/24/76	3,1
American crocodile	09/24/76	4
California condor (No Map Available)	09/24/76	5,19
Yellow-shouldered blackbird	11/19/76	6
St. Croix lizard	06/03/77	6
Giant anole	07/21/77	6
Mississippi sandhill crane	08/08/77	7
Everglade Kite	08/11/77	8
American Peregrine falcon	08/11/77	9
Cape Sable seaside sparrow	08/11/77	4
Dusky seaside sparrow	08/11/77	10
Morror Bay kangaroo rat	08/11/77	11
Palila	08/11/77	12
Alabama caveifsh (No Map Available)	09/09/77	13
Slackwater darter	09/09/77	13
Slender chub	09/09/77	14
Spotfin chub	09/09/77	1
Yellowfin madtom	09/09/77	14
Florida Pine Barrens treefrog	11/11/77	15
Golden coqui	11/11/77	6
Leopard darter	01/27/78	16
Houston toad	01/31/78	17
Mona boa	02/03/78	6
Mona ground iguana	02/03/78	6
Gray wolf	03/09/78	18
Little Kern golden trout	04/13/78	19
Whooping crane	05/15/78	20

(continued)

CRITICAL HABITATS (continued)

Species	Date of Federal Register	Map Index Loc.
New Mexico ridge-nosed rattlesnake	08/04/78	21
Conta Costa wallflower and Antioch Dune evening primrose	08/31/78	22
Leatherback sea turtle	09/26/78	23

Source: Office of Endangered Species, DOI, October 1979.



CRITICAL HABITATION LOCATION

Chapter 5

ENDANGERED SPECIES

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is the facility within a critical habitat or the portion of the range where endangered or threatened for an endangered or threatened species as listed pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1530 et seq. as amended) in 50 CFR Part 17?

   ☐ YES (Continue to 2)

   ☐ NO (COMPLIES)

2. Has there been an assessment which enables the determination that the facility neither results in the destruction or adverse modification of the critical habitat of endangered or threatened species, nor causes or contributes to the taking of any endangered or threatened species of plants, fish, or wildlife?

   ☐ YES (COMPLIES)

   - ☐ Facility has passed assessment made by State, according to facility records
   - ☐ Facility has passed assessment made by OES or other Federal agency
   - ☐ Facility has an individual 404 Permit with an assessment section
   - ☐ Facility has passed evaluation as a result of settlement made to prevent adverse impact
   - ☐ Nearby assessments have indicated comparable situation at facility is not a problem

   ☐ NO (Continue to 3)

3. Does the facility result in the destruction or adverse modification of a critical habitat?

   Factors considered:

   Type of critical habitat_____

   Size of critical habitat_____

   Sensitivity of critical habitat to adverse impacts_____

   _____

   Critical habitat species characteristics_____

   _____

   Proximity of facility to critical habitat_____

   Facility design and operational characteristics_____

   _____

☐ YES (Does not comply - Continue to 4)

☐ NO (Continue to 4)

4. Does the facility cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife?

Factors considered:
Type of species and species habitat_____
Species characteristics_____
_____
Sensitivity of species and species habitat to adverse impacts_____
_____
Proximity of facility_____
Facility size, design, and operational characteristics_____
_____
_____

Adverse impacts considered:
Harassing, harming, pursuing, hunting, wounding, killing, trapping, capturing, or collecting species (direct violation of ESA, does not comply) _____
Adverse modification or loss of habitat (including air & water pollution)_____
_____
Infringement on breeding, nesting, and feeding activities_____
_____
Interference with species movement_____
_____

☐ YES (Does not comply)

☐ NO (COMPLIES)

DISEASE

CHAPTER 6(a)

DISEASE: VECTORS

1.0 Criterion

(a) *Disease Vectors* The facility or practice shall not exist or occur unless the on-site population of disease vectors is minimized through the periodic application of cover material or other techniques as appropriate so as to protect public health.

(c) As used in this section:

(2) "Disease vector" means rodents, flies, and mosquitoes capable of transmitting disease to humans.

(3) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(4) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede vectors' access to the waste.

2.0 The approach for compliance with the Disease Criterion for purposes of the Inventory is as follows:

(a) For rodents and flies, procedures to evaluate landfills and landspreading facilities are presented. Rodents and flies are not of concern, at surface impoundments because they are not attracted to such facilities. For purposes of the Inventory the rodent of concern is the rat.

(b) For mosquitoes, procedures for evaluation of all three facility types are presented.

(c) Facilities which landspread sewage sludge and septic tank pumpings are covered in Section 6(b) and are not subject to this section.

The compliance decision flow chart is presented in Figure 6(a)-1.

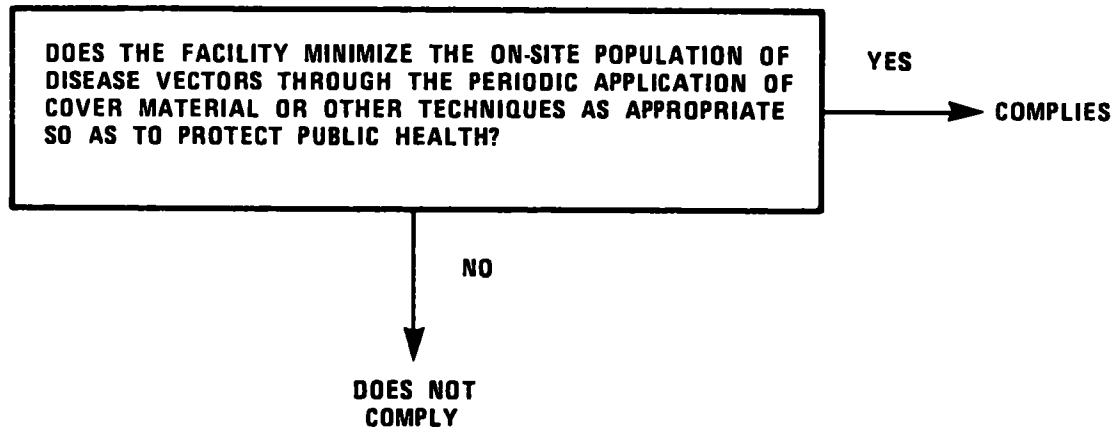


FIGURE 6(a)-1 FLOW CHART–DISEASE VECTORS

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2.1 Definitions

"Putrescible wastes" means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for disease vectors.

3.0 Resolution of Decision Flow Chart Question:

Does the facility minimize the on-site population of disease vectors through the periodic application of cover material or other techniques as appropriate so as to protect public health?

(a) Rats and Flies

(1) Landfills

- Rats and flies are only of concern at facilities which accept wastes attractive to these vectors. If a facility does not accept putrescible wastes and is not a breeding ground or habitat for rats *the facility complies*.

- For facilities which accept putrescible wastes, the primary control technique is the application of periodic cover material. To determine if the facility practices this technique, it will be necessary to assess the history of the facility through records of inspections and complaints and to make a final inspection. If both the records and the field inspection indicate that daily cover is being practiced *the facility complies*. The state can determine that the application of adequate cover is being practiced even if during certain times of the year it is less than daily due to weather conditions.

- If the cover practice is less than daily, then other techniques such as:

repellants,
insecticides or rodenticides,
composting or processing,
predatory or reproductive control,

may be considered sufficient control to determine compliance.

- If the cover practice is less than daily (due to conditions other than weather) and the above techniques are not used or are determined by the state to be insufficient to minimize the rats and flies at the facility, *the facility does not comply.*

(2) Landspreading

When putrescible wastes, such as food processing wastes, are landspread there is a potential for the attraction of rats and flies. The preferred method of controlling these vectors is to incorporate the waste material into the soil. It may also be necessary to treat some wastes with a process, such as biological digestion or composting (see 6(b) Appendix 2), to render the material less attractive to the vectors. In some cases, treatment may be acceptable in lieu of incorporation. If only non-putrescible wastes are being applied, *the facility complies.*

The actual determination of the presence of rats and flies will be made by inspecting the facility for evidence of these vectors and evaluating past inspection and complaint records. If the waste is incorporated and/or treated sufficiently or there is no evidence of these vectors, *the facility complies.*

If the facility practices a technique such as the application of rodenticide or insecticide which controls these vectors to the satisfaction of the state, the facility complies. If there is evidence of rats or flies or past

inspections indicate there is a problem with these vectors and no attempt is being made to control them, *the facility does not comply*.

(b) Mosquitoes

(1) Landfills and Landspreading Facilities

The presence of standing water is the only mosquito attractant associated with landfills and landspreading facilities. If water is allowed to stand for more than three days, it can be used by mosquitoes for breeding. Some places water will tend to collect include:

- depressions over the surface
- open containers
- tires stored in a separate area of the fill
- ponds from excavating soil
- leachate storage
- siltation basins

If a facility is operated so as to minimize standing water, mosquitoes will be controlled and *the facility complies*. A facility can also comply, regardless of standing water, if an insecticide spraying program exists which the state determines is sufficient to protect the public health. To decide that a facility does not comply with the criterion it will be necessary to determine that standing water exists, that it supports a population of mosquito larvae, and that the resultant population of adult mosquitoes is sufficient to be a hazard to the public health.

(2) Surface Impoundments

A surface impoundment can serve as a breeding site for mosquitoes. If present, the larvae will be found near the edge of the impoundment and near vegetation or organic debris. The mosquito potential can be minimized by operational controls such as agitating the surface

or varying the level of the water. Also the presence of other aquatic organisms which feed on mosquito larvae or compete for food will restrict the population. Adult mosquitoes can be controlled with an insecticide program.

The facility complies with this Criterion if mosquito larvae are not observed at the facility or the mosquito population is restricted by the above techniques to the satisfaction of the state.

The facility does not comply if the State determines it to pose a public health problem due to the mosquito population.

Chapter 6(a)

DISEASE: VECTORS

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Does the facility minimize the on-site population of disease vectors through the periodic application of cover material or other techniques as appropriate so as to protect public health?

☐ YES (COMPLIES)

Rats and Flies

Landfills

☐ Facility applies daily cover
☐ Facility is not one which applies daily cover
Type of facility _____
Reason why daily cover is not necessary _____
_____
Schedule for application of cover _____
☐ Facility practices other techniques
- Repellants
- Insecticides or rodenticides
- Composting or processing
- Predatory or reproductive control

Landspreading

☐ Is waste material putrescible?
☐ Is the waste material incorporated into the soil?

Mosquitos

Landfills and Landspreading

☐ No visual observation of mosquitoes, mosquito larvae, or flies
☐ Waste is incorporated
☐ Waste is properly treated prior to application
☐ No presence or potential for standing water
☐ Records of inspections show no evidence of disease vector problems

Chapter 6(a)

DISEASE: VECTORS

Criterion Compliance Decision

(continued)

Mosquitos (continued)

Surface Impoundments

- ☐ Facility provides environmental control techniques
- ☐ Varying water level
- ☐ Agitation of water
- ☐ Removal of vegetation
- ☐ Presence of aquatic life
- ☐ No visual observation of mosquito larvae
- ☐ Effective insecticide program

☐ NO (Does not comply)

CHAPTER 6(b)

DISEASE:
SEWAGE SLUDGE AND SEPTIC TANK PUMPINGS

1.0 Criterion and Definitions

(b) *Sewage sludge and septic tank pumpings (Interim Final).* A facility or practice involving disposal of sewage sludge or septic tank pumpings shall not exist or occur unless in compliance with paragraphs (b) (1), (2) or (3) of this section.

(1) Sewage sludge that is applied to the land surface or is incorporated into the soil is treated by a Process to Significantly Reduce Pathogens prior to application or incorporation. Public access to the facility is controlled for at least 12 months, and grazing by animals whose products are consumed by humans is prevented for at least one month. Processes to Significantly Reduce Pathogens are listed in Appendix II, Section A. (These provisions do not apply to sewage sludge disposed of by a trenching or burial operation.)

(2) Septic tank pumpings that are applied to the land surface or incorporated into the soil are treated by a Process to Significantly Reduce Pathogens (as listed in Appendix II, Section A), prior to application or incorporation, unless public access to the facility is controlled for at least 12 months and unless grazing by animals whose products are consumed by humans is prevented for at least one month. (These provisions do not apply to septic tank pumpings disposed of by a trenching or burial operation.)

(3) Sewage sludge or septic tank pumpings that are applied to the land surface or are incorporated into the soil are treated by a Process to Further Reduce Pathogens, prior to application or incorporation, if crops for direct human consumption are grown within 18 months subsequent to application or incorporation. Such treatment is not required if there is no contact between the solid waste and the edible portion of the crop; however, in this case the solid waste is treated by a Process to Significantly Reduce Pathogens, prior to application; public access to the facility is controlled for at least 12 months; and grazing by animals whose products are consumed by humans is prevented for at least one month. If crops for direct human consumption are not grown within 18 months of application or incorporation, the requirements of paragraphs (b) (1) and (2) of this section apply. Processes to Further Reduce Pathogens are listed in Appendix II, Section B.

(c) As used in this section:

(1) "Crops for direct human consumption" means crops that are consumed by humans without processing to minimize pathogens prior to distribution to the consumer.

(2) "Disease vector" means rodents, flies, and mosquitoes capable of transmitting disease to humans.

(3) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(4) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede vectors' access to the waste.

(5) "Trenching or burial operation" means the placement of sewage sludge or septic tank pumpings in a trench or other natural or man-made depression and the covering with soil or other suitable material at the end of each operating day such that the wastes do not migrate to the surface.

B Processes to Further Reduce Pathogens

Composting: Using the within-vessel composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the static aerated pile composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the windrow composting method, the solid waste attains a temperature of 55° C or greater for at least 15 days during the composting period. Also, during the high temperature period, there will be a minimum of five turnings of the windrow.

Heat dryng: Dewatered sludge cake is dried by direct or indirect contact with hot gases, and moisture content is reduced to 10 percent or lower. Sludge particles reach temperatures well in excess of 80° C, or the wet bulb temperature of the gas stream in contact with the sludge at the point where it leaves the dryer is in excess of 80° C.

Heat treatment: Liquid sludge is heated to temperatures of 180° C for 30 minutes.

Thermophilic Aerobic Digestion: Liquid sludge is agitated with air or oxygen to maintain aerobic conditions at residence times of 10 days at 55-60° C, with a volatile solids reduction of at least 38 percent.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

Any of the processes listed below, if added to the processes described in Section A above, further reduce pathogens. Because the processes listed below, on their own, do not reduce the attraction of disease vectors, they are only add-on in nature.

Beta ray irradiation: Sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Gamma ray irradiation: Sludge is irradiated with gamma rays from certain isotopes, such as ^{60}Cobalt and ^{137}Cesium, at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Pasteurization: Sludge is maintained for at least 30 minutes at a minimum temperature of 70° C.

Other methods: Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the reduction achieved by any of the above add-on methods.

A. Processes to Significantly Reduce Pathogens

Aerobic digestion: The process is conducted by agitating sludge with air or oxygen to maintain aerobic conditions at residence times ranging from 60 days at 15° C to 40 days at 20° C, with a volatile solids reduction of at least 38 percent.

Air Drying: Liquid sludge is allowed to drain and/or dry on under-drained sand beds, or paved or unpaved basins in which the sludge is at a depth of nine inches. A minimum of three months is needed, two months of which temperatures average on a daily basis above 0° C.

Anaerobic digestion: The process is conducted in the absence of air at residence times ranging from 60 days at 20° C to 15 days at 35° to 55° C, with a volatile solids reduction of at least 38 percent.

Composting: Using the within-vessel, static aerated pile or windrow composting methods, the solid waste is maintained at minimum operating conditions of 40° C for 5 days. For four hours during this period the temperature exceeds 55° C.

Lime Stabilization: Sufficient lime is added to produce a pH of 12 after 2 hours of contact.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

2.0 Inventory Procedure

This Criterion applies to all landspreading facilities where sewage sludge or septic tank pumpings are applied to the surface of the land or incorporated into the soil. The Criterion addresses the potential hazard of vectors and pathogen transmission by controlling public access, agricultural practices, and treatment procedures.

For the purpose of the Inventory, it will be necessary to interview the sewage treatment plant owner/operator, sewage sludge or septic tank pumpings hauler, and/or landspreading facility owner/operator to determine if the waste has been properly treated, access is controlled, and the prescribed agricultural practices are followed. The treatment facility and operating plans and records may need to be inspected, as well as the landspreading facility. Figure 6(b)-1 presents the compliance decision flow chart.

3.0 Resolution of Decision Flow Chart Questions

3.1 Are sewage sludge or septic tank pumpings applied to the surface of the land or incorporated into the soil?

(a) To determine the location of disposal sites for septic tank pumpings and sewage sludge, contact the appropriate government regulatory agency such as the State or local Health Department and the water pollution control agency. Should these agencies not have the appropriate information, contact the individual scavenger companies and sewage treatment plants for information on their disposal method and site.

(b) This Criterion is concerned with all landspreading facilities, including both food chain and non-food chain lands. Trenching or burial operations are not subject to these provisions.

3.2 Are crops planted for human consumption within 18 months after application of waste?

(a) The determination that crops grown for human consumption are not planted can be made if the crop grown is not ordinarily consumed by man or if the operating plan specifically precludes

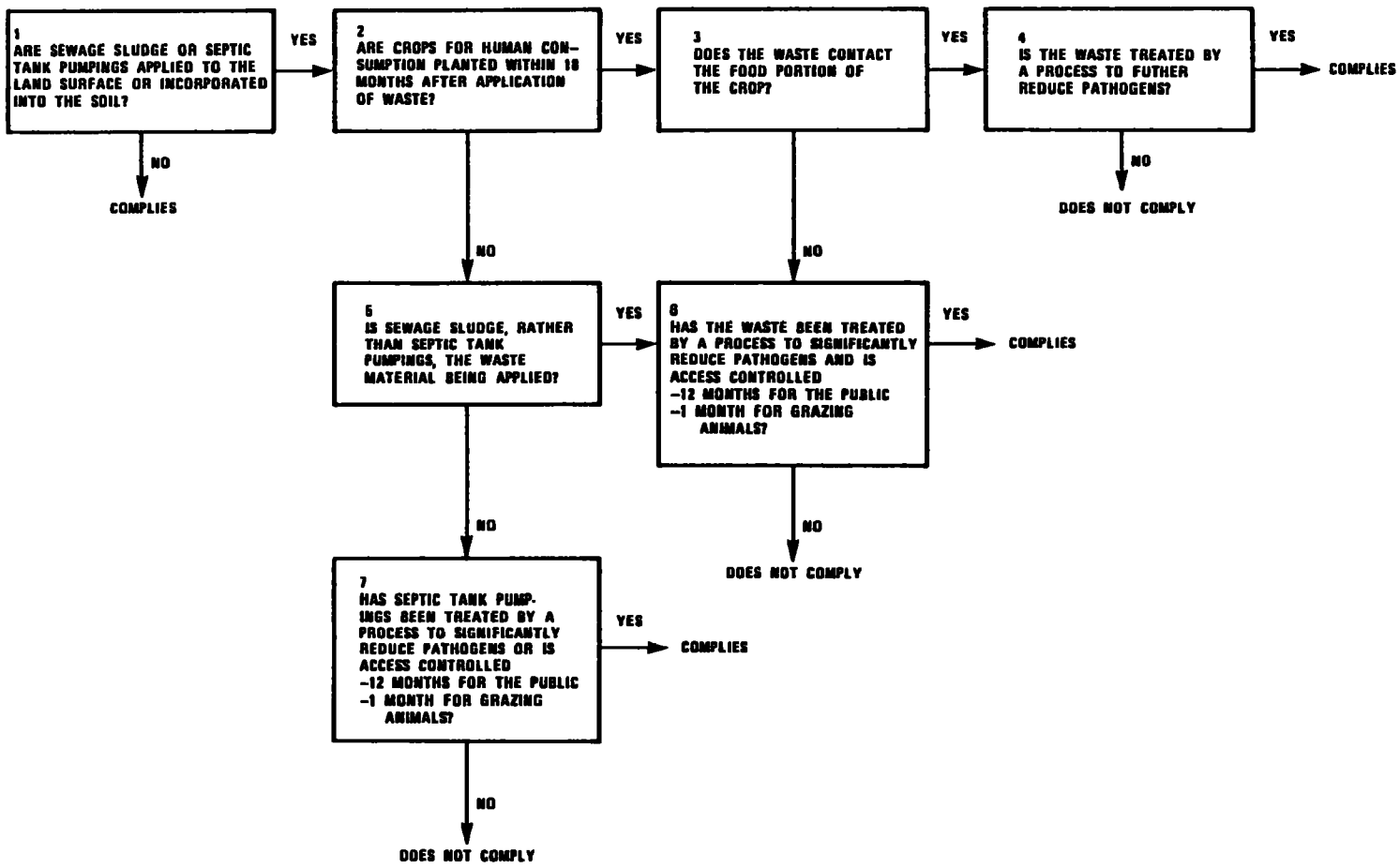

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FIGURE 6(b)-1 FLOW CHART–DISEASE–SEWAGE SLUDGE AND SEPTIC TANK PUMPINGS

the crop from this use. The determination must be made based on crops planted at the time of the Inventory as to whether they are grown for human consumption. If they are not for human consumption, proceed to 3.5.

(b) If the crops planted at the time of the Inventory are for human consumption, then it must be determined:

- when the crop was planted
- the date of the last waste application

The treatment plant operator is one source of information on sludge application dates and the facility farmer may have a record of when the crop was planted.

3.3 Does the waste contact the food portion of the crop?

Contact with the food portion can be either by direct application of the waste material to the growing crop or by rainfall splash subsequent to application. Therefore, the points of concern are the timing and method of application and the type of crop grown. Crops which bear the food portion close to the ground such as is the case with many vegetables should be considered to have contact between the food portion and the waste. Taller growing crops such as many grains and citrus fruits can be considered not to have contact with the waste so long as it is applied in a manner or at a time that direct contact does not occur.

If there is any question concerning the food portion of the crop, consult with:

- the facility operator
- the facility farmer or other local farmers
- buyers such as grain dealers and co-ops
- Agricultural Extension Service
- State Department of Agriculture
- State University Agriculture Department

3.4 Is the waste treated by a process to further reduce pathogens?

Acceptable processes for the further reduction of pathogens are listed in Appendix II, Section B of the Criteria. Verification that an accepted process for additional pathogen reduction is used must be obtained. Specific information should be available from the records of the sewage treatment plant or septic tank hauler where the material originated. Other sources of information are the State and local health and water pollution control agencies. If this verification cannot be made the presumption is that an appropriate additional pathogen reduction process has not been utilized.

3.5 Is sewage sludge the waste material being applied?

Sewage sludge and septic tank pumpings are treated somewhat differently by the Criterion. Determine which substance is being applied at the facility.

3.6 Has the sludge been treated by a process to significantly reduce pathogens and is access controlled - 12 months for the public, and 1 month for grazing animals whose products are consumed by man?

(a) Acceptable processes for reducing pathogens are listed in Appendix II, Section A, of the Criteria. Verification that an accepted process for pathogen reduction is used must be obtained. Specific information should be available from the records of the sewage treatment plant or septic tank hauler where the material originated. Other sources of information are the State and local health and water pollution control agencies. If this verification cannot be made the presumption is that an appropriate pathogen reduction process has not been utilized.

(b) Specific access controls are addressed in the access section of this manual. Where waste is applied to public access areas positive control measures should be taken; however, in the case of private farmland, this should not be necessary unless the area is subject to frequent trespass by the general public.

The farmer, his family and employees are considered "authorized persons" as covered in Chapter 2(d).

3.7 Has the waste been treated by a process to significantly reduce pathogens or is access prevented - 12 months for the public and 1 month for grazing animals whose products are consumed by man?

The requirements for septic tank pumpings are identical to those for sewage sludge as addressed by Question 3.6, except that either access must be controlled or a pathogen reduction process must be used rather than both.

Chapter 6(b)

SEWAGE SLUDGE AND SEPTIC TANK PUMPINGS

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Are sewage sludge or septic tank pumpings applied to the surface of the land or incorporated into the soil?

   ☐ YES (Continue to 2)

   ☐ NO (COMPLIES)

   ☐ Facility is a trenching or burial operation

2. Are crops planted for human consumption within 18 months after applicatior of waste?

   ☐ YES (Continue to 3)

   ☐ Crops grown at time of inventory are for human consumption
   ☐ Information from operating plan
   ☐ Past usage or crops in the vicinity
   ☐ Information from facility owner/operator

   ☐ NO (Continue to 5)

3. Does the waste contact the food portion of the crop?

   ☐ YES (Continue to 4)

   ☐ Direct application or rainfall splash
   ☐ Crops with food portion close to the ground
   ☐ Taller crops that receive application early in growing stage

   ☐ NO (Continue to 6)

4. Is the waste treated by a process to further reduce pathogens?

   ☐ YES (COMPLIES)

   ☐ Verification of acceptable process from appropriate source
   Source used _____

   ☐ NO (Does not comply - continue to 5)

   ☐ Verification cannot be made

Chapter 6(b)

SEWAGE SLUDGE AND SEPTIC TANK PUMPINGS

(Continued)

5. Is sewage sludge the waste material being applied?

   ☐ YES (Continue to 6)

   ☐ NO (Continue to 7)

6. Has the sludge been treated by a process to significantly reduce pathogens and is access controlled - 12 months for the public, and 1 month for grazing animals whose products are consumed by man?

   ☐ YES (Both reduction process and access control must be checked) (COMPLIES)

   - ☐ Verification of acceptable process from appropriate source
     Source used _____
   - ☐ Appropriate access controls are used in public access areas
   - ☐ Facility is on private farmland not subject to frequent trespass

   ☐ NO (Does not comply)

   - ☐ Verification cannot be made
   - ☐ No access controls are used
   - ☐ Facility is on private farmland subject to frequent trespass, and access is not controlled

7. Has the waste been treated by a process to significantly reduce pathogens or is access prevented - 12 months for the public and 1 month for grazing animals whose products are consumed by man?

   ☐ YES (COMPLIES)

   - ☐ Verification of acceptable process from appropriate source
     Source used _____
   - ☐ Access controlled

   ☐ NO (Does not comply)

FOOD CHAIN CROPS

CHAPTER 7

APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS

1.0 Criterion and Definitions

§ 257.3-5 Application to land used for the production of food-chain crops (interim final).

(a) *Cadmium.* A facility or practice concerning application of solid waste to within one meter (three feet) of the surface of land used for the production of food-chain crops shall not exist or occur, unless in compliance with all requirements of paragraph (a)(1) (i) through (iii) of this section or all requirements of paragraph (a)(2) (i) through (iv) of this section.

(1)(i) The pH of the solid waste and soil mixture is 6.5 or greater at the time of each solid waste application, except for solid waste containing cadmium at concentrations of 2 mg/kg (dry weight) or less.

(ii) The annual application of cadmium from solid waste does not exceed 0.5 kilograms per hectare (kg/ha) on land used for production of tobacco, leafy vegetables or root crops grown for human consumption. For other food-chain crops, the annual cadmium application rate does not exceed:

Time period	Annual Cd application rate (kg/ha)
Present to June 30, 1984	2.0
July 1, 1984 to Dec. 31, 1986	1.25
Beginning Jan. 1, 1987	0.5

(iii) The cumulative application of cadmium from solid waste does not exceed the levels in either paragraph (a)(1)(iii)(A) of this section or paragraph (a)(1)(iii)(B) of this section.

(A)

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)	
	Background soil pH <6.5	Background soil pH ≥6.5
<5	5	5
5-15	5	10
>15	5	20

(B) For soils with a background pH of less than 6.5, the cumulative cadmium application rate does not exceed the levels below: *Provided,* That the pH of the solid waste and soil mixture is adjusted to and maintained at 6.5 or greater whenever food-chain crops are grown.

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)
<5	5
5-15	10
>15	20

(2)(i) The only food-chain crop produced is animal feed.

(ii) The pH of the solid waste and soil mixture is 6.5 or greater at the time of solid waste application or at the time the crop is planted, whichever occurs later, and this pH level is maintained whenever food-chain crops are grown.

(iii) There is a facility operating plan which demonstrates how the animal feed will be distributed to preclude ingestion by humans. The facility operating plan describes the measures to be taken to safeguard against possible health hazards from cadmium entering the food chain, which may result from alternative land uses.

(iv) Future property owners are notified by a stipulation in the land record or property deed which states that the property has received solid waste at high cadmium application rates and that food-chain crops should not be grown, due to a possible health hazard.

(b) *Polychlorinated Biphenyls (PCBs).* Solid waste containing concentrations of PCBs equal to or greater than 10 mg/kg (dry weight) is incorporated into the soil when applied to land used for producing animal feed, including pasture crops for animals raised for milk. Incorporation of the solid waste into the soil is not required if it is assured that the PCB

content is less than 0.2 mg/kg (actual weight) in animal feed or less than 1.5 mg/kg (fat basis) in milk.

(c) As used in this section:

(1) "Animal feed" means any crop grown for consumption by animals, such as pasture crops, forage, and grain.

(2) "Background soil pH" means the pH of the soil prior to the addition of substances that alter the hydrogen ion concentration.

(3) "Cation exchange capacity" means the sum of exchangeable cations a soil can absorb expressed in milli-equivalents per 100 grams of soil as determined by sampling the soil to the depth of cultivation or solid waste placement, whichever is greater, and analyzing by the summation method for distinctly acid soils or the sodium acetate method for neutral, calcareous or saline soils ("Methods of Soil Analysis, Agronomy Monograph No. 9." C. A. Black, ed., American Society of Agronomy, Madison, Wisconsin. pp 891-901, 1965).

(4) "Food-chain crops" means tobacco, crops grown for human consumption, and animal feed for animals whose products are consumed by humans.

(5) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(6) "Pasture crops" means crops such as legumes, grasses, grain stubble and stover which are consumed by animals while grazing.

(7) "pH" means the logarithm of the reciprocal of hydrogen ion concentration.

(8) "Root crops" means plants whose edible parts are grown below the surface of the soil.

(9) "Soil pH" is the value obtained by sampling the soil to the depth of cultivation or solid waste placement, whichever is greater, and analyzing by the electrometric method. ("Methods of Soil Analysis, Agronomy Monograph No. 9," C.A. Black, ed., American Society of Agronomy, Madison, Wisconsin, pp. 914-928, 1965.)

2.0 Inventory Procedure

This Criterion is applicable only to facilities where solid waste is applied to land used for the production of food chain crops.

Although a facility may comply with this Criterion, it still must comply with all of the other criteria.

The approach to this Criterion is to divide the Criterion into its two areas of concern:

- Cadmium is addressed by two approaches: one controls the application rate and the other controls the crop and its marketing. Both approaches require control of pH.
- Polychlorinated Biphenyls (PCBs) are addressed by method of application.

The compliance decision flow charts are contained in Figures 7-1 and 7-2.

3.0 Resolution of Decision Flow Chart Questions

3.1 Is solid waste applied within one meter of the surface of land used for the production of food chain crops?

(a) "Applied within one meter of the surface of land" refers to waste being injected, spread on the surface, or plowed into the soil. For the purpose of the Inventory, landfills, regardless of cover depth, are not subject to these requirements.

(b) "Food chain crops" are tobacco, crops grown for human consumption, and animal feed for animals whose products are consumed by man.

(c) The land is to be considered "for the production of food chain crops," if the crop grown at the time of the Inventory is ordinarily ingested by man or by animals whose products are consumed by man, unless there is an operations or marketing plan which precludes the crop from this use. Specific information on the potential consumers or uses of particular crops should be available through any of the following sources:

- the facility operator
- the facility farmer or other local farmers
- buyers such as grain dealers and co-ops
- local Agricultural Extension Service
- State Department of Agriculture
- State University Agriculture Department

(d) If possible, perform the inspection during the growing season; however, if no crop is being grown at the time of the Inventory the determination can be made based on information from the operating plan, past usage of the facility, crops grown in the vicinity, or discussion with the owner, operator, or facility farmer.

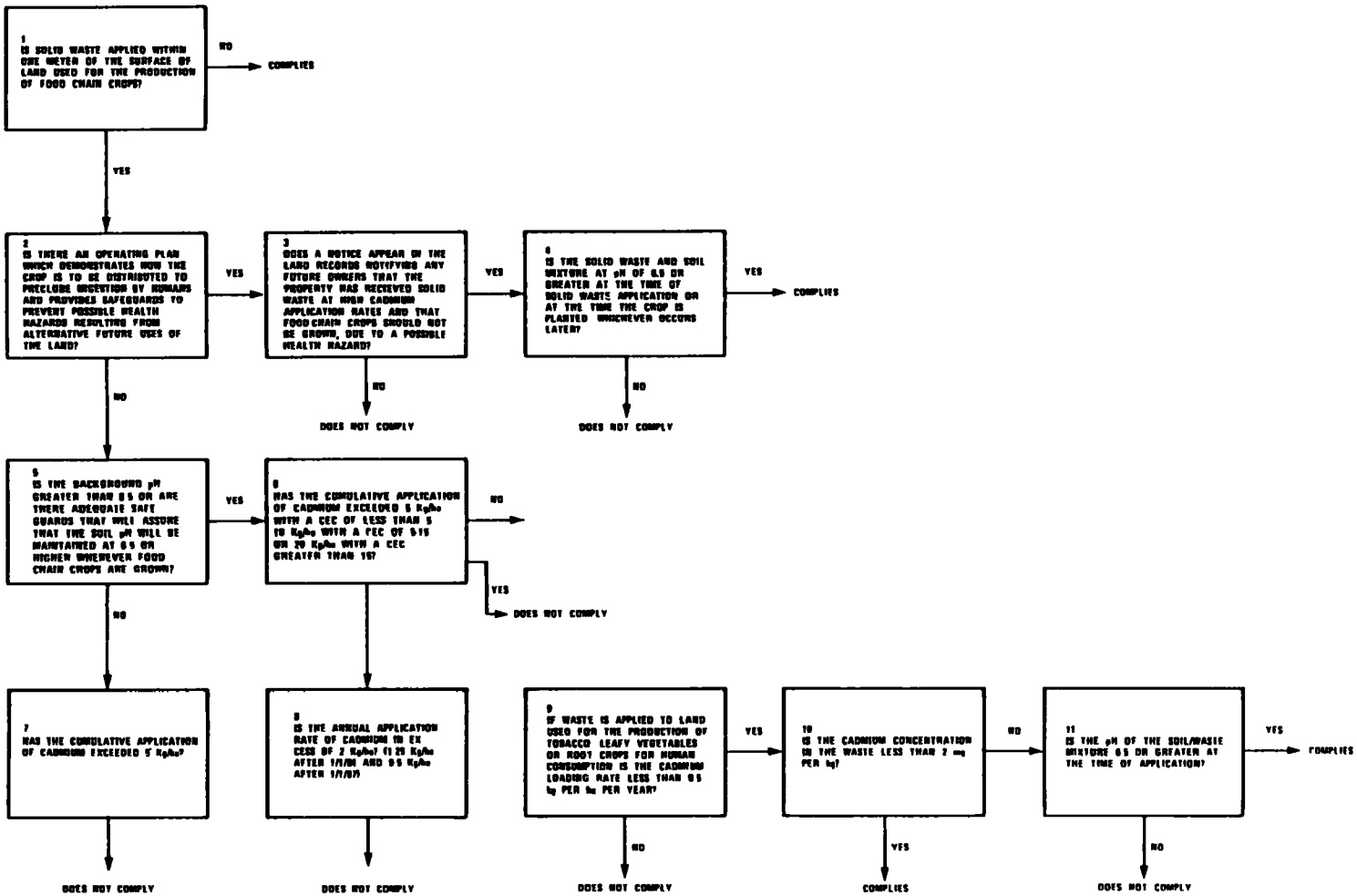

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FIGURE 7-1 APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS–CADMIUM

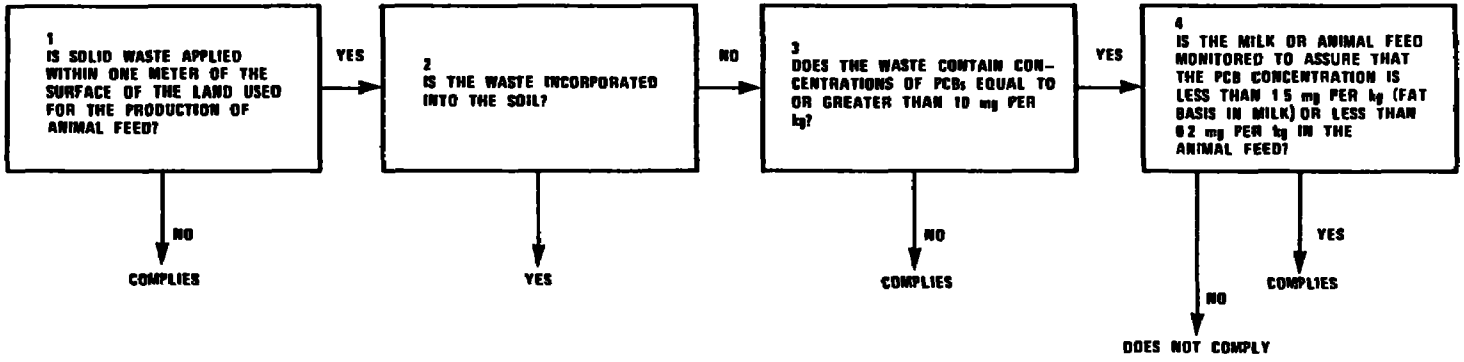


FIGURE 7 2 APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS–PCB

3.2 Is there an operating plan which demonstrates how the crop is to be distributed to preclude ingestion by humans and provides safeguards to prevent possible health hazards resulting from alternative future uses of the land?

(a) To determine if the facility is meeting this requirement, read the operating plan and discuss with the operator or facility farmer the chain of possession of the crop after harvest. To comply, the crop must be distributed so that there is no chance of ingestion by humans; for example, it could be sold directly to a dairy farm or feed lot where it would be fed to cattle. The operating plan must also describe the measures being taken to safeguard against possible health hazards from cadmium entering the food chain, which may result from alternative future land uses. Some future land uses, such as the establishment of vegetable farms or home vegetable gardens, could result in significant dietary increases of cadmium. Such provisions in the facility operating plan could include: dedication of the facility as a public park, placement of fresh top soil over the site, or removal of the contaminated soil. If the facility meets this requirement, continue through the crop control option (question 3.3). If it does not, continue through the application rate option (Question 3.5).

3.3 Does a notice appear in the land records notifying any future owners that the property has received solid waste at high cadmium application rates and that food chain crops should not be grown, due to a possible health hazard?

Obtain a copy of the land records from the owner or the State or local government land records department. If the notice does not appear, *the facility does not comply with the Criterion.*

3.4 Is the solid waste and soil mixture at pH 6.5 or greater at the time of solid waste application or at the time the crop is planted, whichever occurs later?

Obtain a sample of the soil where waste has been applied following the guidelines in Appendix 7-1. If the pH of the sample is 6.5 or higher or if the pH is close to this range and pH control is being attempted, *the facility complies; if not, the facility does not comply.*

3.5 Is the background soil pH greater than 6.5 or are there adequate safeguards to assure that the soil pH will be maintained at 6.5 or higher whenever food chain crops are grown?

The background soil pH refers to the pH of the soil prior to the addition of a substance that alters the hydrogen ion concentration. The primary sources of information on background soil pH will be the Soil Conservation Service maps and reports and the local Agricultural Extension Service. In the absence of information from these sources, a laboratory analysis must be performed. Obtain the sample from areas in the vicinity of the facility which have not been recently subjected to pH adjustment such as fence rows, fields that have been fallow for some time or forested areas.

The second way to comply with the pH greater than 6.5 requirement is to control the soil pH whenever food chain crops are grown. This method is intended only for facilities that are closely managed by the solid waste generator. The generator must clearly demonstrate long-term safeguards that will assure the soil pH will be maintained at 6.5 or higher whenever food chain crops are grown. Such safeguards could include a facility management plan which would consist of routine soil pH monitoring and liming the soil when necessary, or a statement in writing from the facility owner that this requirement will be met.

3.6 Has the cumulative application of cadmium exceeded 5 kg/ha with a CEC less than 5; 10 kg/ha with a CEC 5-15; or 20 kg/ha with a CEC greater than 15?

Section 257.3-5(a)(1)(iii) contains a matrix showing the maximum cumulative application of cadmium allowed for the described background soil pH and cation exchange capacity. Due to a general lack of accurate records and the rigor of determining compliance by other means

a screen has been developed. For the purpose of the inventory the maximum cumulative cadmium application has been converted from kilograms of cadmium per hectare of soil area to a soil cadmium concentration in milligrams per kilograms. The levels are listed in the table below:

Cation Exchange Capacity	Cumulative Loading Rate, kg/ha	Soil Cadmium Concentration, mg/kg
<5	5	2.27
5-15	10	4.5
>15	20	9.08

The conversion was made using a typical plow depth, soil density, and background cadmium concentration.

With the upper limits of the matrix stated in terms of soil cadmium concentrations, a comparison can be made with the current cadmium concentration to identify facilities that need additional soil monitoring and analysis to verify compliance.

(a) The soil cation exchange capacity (CEC) information may be available from the Soil Conservation Service or the local Agricultural Extension Service. In the absence of information from these sources, a laboratory analysis must be performed. Obtain the sample from areas in the facility which have been receiving solid waste (see Appendix 7-1).

(b) To determine the soil cadmium concentration, obtain a sample for analysis in the area to which waste is to be applied (see Appendix 7-1).

(c) If the analysis shows the cadmium concentration to be less than the soil concentrations given above, *the facility complies.*

(d) If the analysis shows the cadmium concentration to be in excess of the soil concentrations given above, further analysis will be necessary to prove non-compliance.

(e) Determine the cumulative cadmium loading as described in Appendix 7-1. If the application is determined to exceed the

rates listed in the Criterion, *the facility does not comply*. If it is less, *the facility complies*.

3.7 Has the cumulative application of cadmium exceeded 5 kg/ha?

Due to a general lack of accurate records and the rigor of determining compliance by other means a screen has been developed. For the purpose of the Inventory the maximum cumulative application has been converted from kilograms of cadmium per hectare of soil area to a soil cadmium concentration of 2.27 milligrams per kilogram. The conversion was made using a typical plow depth, soil density, and background cadmium level.

(a) To determine the soil cadmium concentration, obtain a sample from analysis in the area to which waste has been applied (see Appendix 7-1).

(b) If the analysis shows the cadmium concentration to be less than 2.27, *the facility complies*.

(c) If the analysis shows the cadmium concentration to be greater than 2.27, further analysis will be necessary to prove non-compliance.

(d) Determine the cumulative cadmium loading as described in Appendix 7-1. If the application is determined to exceed 5 kilograms per hectare, *the facility does not comply*. If it is less, *the facility complies*.

3.8 Is the annual application rate of cadmium in excess of 2 kg per ha (1.25 kg per ha after 1/1/84 and 0.5 kg per ha after 1/1/87)?

(a) Estimate the amount of waste which is applied to the facility in the past twelve months. It may be possible to obtain all this information from the operating records, or it may be necessary to analyze the waste for solids content and cadmium concentration (see Appendix 7-1), and obtain information from the operator on the total amount of material which would be expected to be applied in one year.

(b) With this information, compliance with the criterion can be determined from Figure 7-3.

3.9 If waste is applied to land used for the production of tobacco, leafy vegetables, or root crops for human consumption, is the cadmium loading rate less than 0.5 kg per ha per year?

(a) "Root crops" are plants whose edible parts are grown below the surface of the soil.

(b) Similarly, "leafy vegetables" are those whose leaves are ordinarily ingested by humans, such as lettuce and cabbage. If there is any question as to the use of any portion of the crop, information could be available through:

- the facility operator
- the facility farmer or other local farmers
- buyers such as grain dealers and co-ops
- local Agricultural Extension Service
- State Department of Agriculture
- State University Agriculture Department

(c) Estimate the total amount of waste which has been applied in the past twelve months and analyze the waste material for cadmium concentration (see Appendix 7-1). With this information compliance can be determined from Figure 7-4.

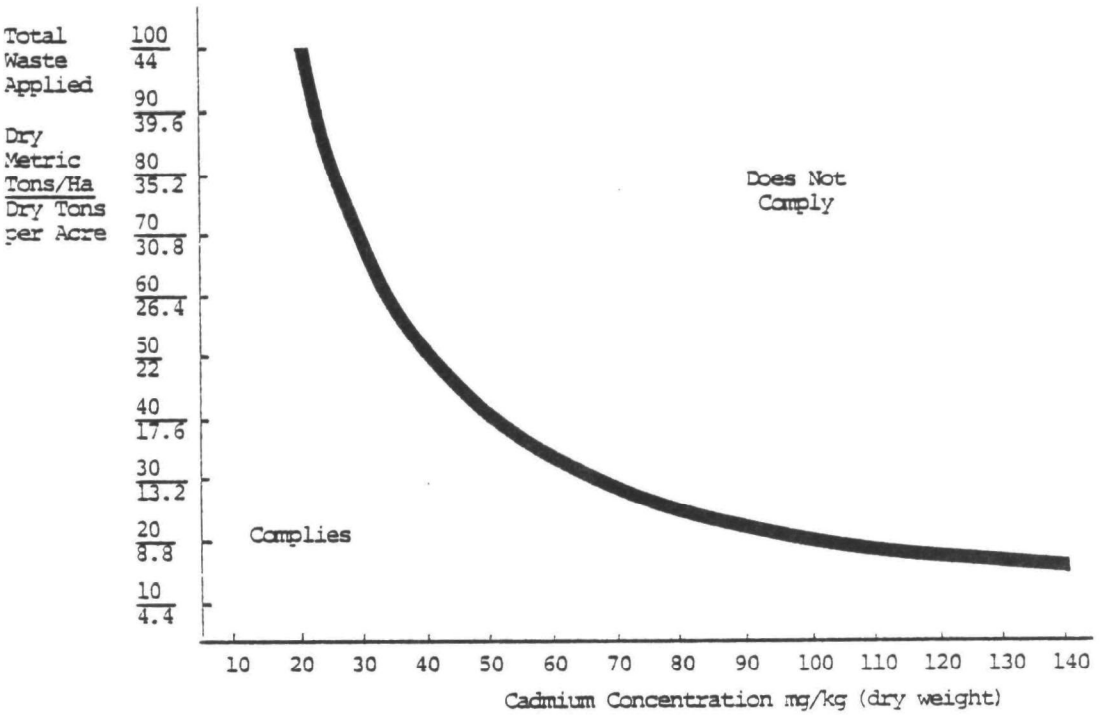
3.10 Is the cadmium concentration in the waste less than 2 mg per kg?

Obtain a sample of the waste as suggested in the sampling and analysis (see Appendix 7-1). If the analysis shows the waste to contain less than 2 mg per kg of cadmium, *the site complies*.

3.11 Is the pH of the soil/waste mixture 6.5 or greater at the time of application?

Obtain a sample of the soil/waste mixture in the area of the field that has received waste most recently (see Appendix 7-1). If the pH is 6.5 or greater, or if it is close to this range and pH control is being attempted, *then the facility complies*; continue to the Polychlorinated Biphenyls section of this Criterion.

FIGURE 7-3 ANNUAL CADMIUM APPLICATION DECISION GRAPH (2.0 Kg/ha) (EFFECTIVE UNTIL JUNE 30, 1984)

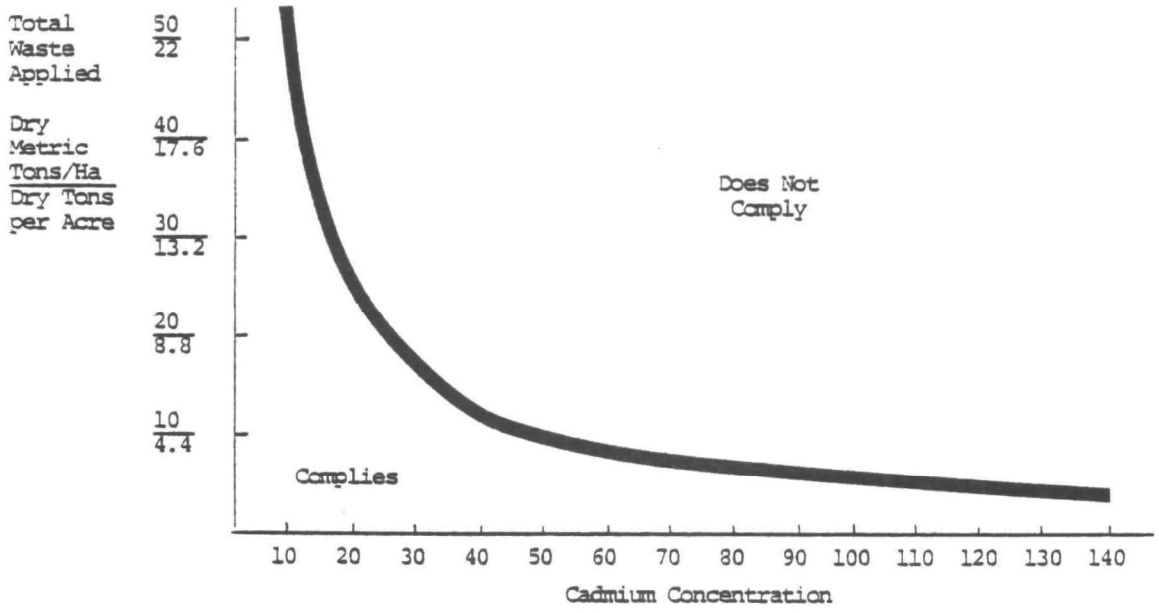


Note: If values are not on the chart then use the following equation to calculate the allowable loading rate.

$$\frac{500}{\text{Cd concentration mg/kg (dry weight)}} = \text{allowable loading rate MT/HA}$$

If the point falls clearly above the line, the facility does not comply. If the point falls clearly below the line, the facility complies. If however, the point falls on or near the line, it will be necessary to judge the reliability and accuracy of the information used in making the determination.

FIGURE 7-4 ANNUAL CADMIUM APPLICATION DECISION GRAPH FOR TOBACCO, LEAFY VEGETABLES, AND ROOT CROPS (0.5 Kg/ha) (DRY WEIGHT)



Note: If the point falls clearly above the line, the facility does not comply. If the point falls clearly below the line, it complies. However, if the point falls on or near the line, it will be necessary to judge the reliability and accuracy of the information used in making the determination. If values are not on the chart, then use the following equation to calculate the allowable loading rate:

$$\frac{2{,}000}{\text{Cd concentration (mg/kg) (dry weight)}} = \text{allowable loading rate MT/HA}$$

4.0 Resolution of Decision Flow Chart Questions (Table 7-2) (Polychlorinated Biphenyls)

4.1 Is solid waste applied within one meter of the surface of land used for the production of animal feed?

(a) "Applied within one meter of the surface of land," refers to waste being injected, spread on the surface, or plowed into the soil. For the purpose of the Inventory, landfills are not subject to these requirements regardless of cover depth.

(b) The land is to be considered "for the production of animal feed" if the crop grown at the time of the Inventory is ordinarily ingested by animals whose products are consumed by man, unless there is an operations or marketing plan which precludes the crop from this use. Specific information on the potential consumers or uses of particular crops should be available through any of the following sources:

- the facility operator
- the facility farmer or other local farmers
- buyers such as grain dealers and co-ops
- local Agricultural Extension Service
- State Department of Agriculture
- State University Agriculture Department

(c) If possible, perform the inspection during the growing season. However, if no crop is being grown at the time of the Inventory, the determination can be made based on information from the operating plan, past use of the facility, crops grown in the vicinity, or discussion with the owner, operator, or facility farmer. If solid waste is not being applied to land used for the production of animal feed, *this Criterion does not apply*; continue to the next Criterion.

4.2 Is the waste incorporated into the soil?

"Incorporate into the soil" means the injection or mixing of the solid waste into the soil. Some methods of incorporation

consist of chisel plow injectors, plow furrow cover equipment on tank trucks, surface spreading followed by plowing or discing; and flexible hose attachments on moldboard or disc plows. If the waste is incorporated into the soil, *the facility complies;* continue to the direct ingestion section of this Criterion.

4.3 Does the waste contain concentrations of PCBs equal to or greater than 10 mg/kg?

(a) Obtain a sample, following the suggestions in the Sampling and Analysis section of Appendix 7-1.

(b) If the lab analysis shows the PCB concentration to be less than 10 mg/kg, *the facility complies*. If it shows greater than 10 mg/kg, *the facility does not comply*.

(c) If the analysis shows PCBs to be greater than 50 ppm, other USEPA regulation applies. See CFR Part 761, Polychlorinated Biphenyls.

4.4 Is the milk or animal feed monitored to assure that the PCBs concentration is less than 1.5 mg/kg (fat basis) in the milk or less than 0.2 mg/kg in the animal feed?

To comply with this question, the animal feed and milk must be monitored at the time of sale or harvest. If no monitoring is done or if analysis shows that the limits are exceeded, *the facility does not comply*. If monitoring shows the crop to be within the limits, *the facility complies*. If limits are exceeded, State or Federal agencies should be consulted for guidance on disposition of the product.

APPENDIX 7-1

SAMPLING AND ANALYSIS

This Criterion will, in many cases, require sampling and analysis of the solid waste, the soil, the soil/waste mixture, and occasionally the crop. All of the analysis can be run from one sample of each material. Sampling may be far more critical in obtaining representative results than the method of analysis.

Solid Waste Sampling

Since it is difficult to get a truly representative sample of solid waste materials, the following suggestions are offered:

- utilize experienced personnel;
- take a composite sample from various points;
- take a large sample, mix well, and transfer to the lab sample container; and
- if in a mixing tank, sample where the waste is moving.

Experienced personnel are suggested, since there will be many varying situations and it will be necessary to choose the most representative sampling point.

Soil Sampling

The laboratory (e.g., agricultural extension service) can offer some guidance on sample size and sampling techniques, however, the following should always be followed:

(a) Divide fields into areas for sampling. Areas that have been used for different crops or that have a different soil appearance should be sampled separately. Each sampling area should not exceed ten acres.

(b) Composite samples should be taken from 15 to 20 locations. Each sample should be taken to a depth of six inches or the plow depth. Surface litter should be excluded.

(c) Mix the sample in a clean plastic bucket and place the quantity required by the laboratory in the sample container.

(d) Do not sample unusual areas in the field such as low spots, wet spots, old fence lines, or the edge of the field.

Sampling the Soil/Waste Mixture

The soil/waste mixture can be sampled following the suggestions under the Soil Sampling above if there is sufficient mixing. In many cases, mixing will be limited, such as where waste is injected or applied to the surface without incorporation. In such cases, it will be necessary to mix the material with a spade or similar instrument in the selected sampling spots. The material should be mixed to plow depth.

Laboratory Analysis

The laboratory selected should use accepted and approved techniques for all the required analyses. Some sources of acceptable methods of analysis are:

(a) Sampling and Analysis of Soils, Plants, Wastewaters, and Sludge, Suggested Standardization and Methodology; North Central Region Publication 230, Research Publication 170. (soil cadmium, waste cadmium)

(b) Various Food and Drug Administration publications. (PCB analysis for milk and animal feed)

(c) Manual of Methods for Chemical Analysis of Water and Wastes, EPA, 1974. (general reference)

(d) "Methods of Soil Analysis," C.A. Black (American Society of Agronomy), 1965. (soil pH and cation exchange capacity)

(e) Association of Official Analytical Chemists. (PCB analysis for milk, animal feed, and waste material)

Methodology approved by these sources or by other widely accepted groups or publications will be acceptable for the purpose of the Inventory.

Cumulative Cadmium Application

To determine the cumulative cadmium application, obtain an analysis of the background soil cadmium concentration, soil cadmium concentration where solid wastes have been applied, normal depth of tillage, and soil density.

(a) The background soil cadmium concentration refers to the cadmium concentration prior to the addition of solid waste. Obtain a soil

sample from areas in the vicinity of the facility with the same soil type which have not had solid waste applied to them. Such areas might include fence rows, forested areas, or fields which have not received solid waste (see Soil Sampling).

(b) To determine the soil cadmium concentration (mg/kg), obtain a representative sample from the zone of cultivation for analysis in the area to which waste is to be applied (see Sampling the Soil/Waste Mixture).

(c) To determine the normal depth of tillage, ask the operator what cultivation practices are used in the area to which waste is applied. To convert inches to the required meters, multiply by 0.025 (inches x 0.025 = meters).

(d) The soil density (kg/ha) may be available from the Soil Conservation Service or the local Agricultural Extension Service. In the absence of information from these sources, a laboratory analysis must be performed.

Calculate cumulative cadmium loading in kg/ha =

[Soil Cd Concentration (mg/kg)-Background (mg/kg)] {[Soil density (kg/m^3)] [depth of tillage (m)] [10,000 m^2/ha]}

Chapter 7

APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is solid waste applied within one meter of the surface of land used for food chain crops?

   ☐ YES (Continue to 2)

   ☐ NO (COMPLIES)

   ☐ The land is not used for the production of food chain crops
   ☐ Facility is a surface impoundment
   ☐ Facility is a landfill

2. Is there an operating plan which demonstrates how the crop is to be distributed to preclude ingestion by humans and provides safeguards to prevent possible health hazards resulting from alternative future uses of the land?

   ☐ YES (Continue to 3)

   ☐ Crop distribution is controlled to prevent ingestion by humans

   ☐ Operating plan describes safeguards against possible entry of cadmium into food chain
   Description_____

   ☐ NO (Go to 5)

3. Does a notice appear in the land records notifying any future owners that the property has received solid waste at high cadmium application rates and that food chain crops should not be grown, due to a possible health hazard?

   ☐ YES (Continue to 4)

   ☐ NO (Does not comply - continue to 4)

4. Is the solid waste and soil mixture at pH 6.5 or greater at the time of solid waste application or at the time the crop is planted, whichever occurs later?

   ☐ YES (COMPLIES)

   ☐ NO (Does not comply - continue to 5)

5. Is the background soil pH greater than 6.5 or are there adequate safeguards to assure that the soil pH will be maintained at 6.5 or higher whenever food chain crops are grown?

   ☐ YES (Continue to 6)

   - ☐ SCS maps or reports, or local agricultural extension service
   - ☐ Laboratory analysis
   - ☐ pH of soil is controlled whenever food chain crops are grown.

   ☐ NO (Go to 7)

6. Does the soil cadmium concentration exceed 5 kg/ha with a CEC of less than 5, or 10 kg/ha with a CEC of 5 to 15, or 20 kg/ha with a CEC greater than 15?

   ☐ YES (Does not comply)

   ☐ NO (COMPLIES - Go to 8)

7. Has the cumulative application of cadmium exceeded 5 kg/ha?

   - ☐ kg/ha cadmium in soil _____
   - ☐ kg/ha cumulative application _____

   ☐ YES (Does not comply - continue to 8)

   ☐ NO (COMPLIES - continue to 8)

8. Is the annual application rate of cadmium in excess of 2 kg/ha (1.25 kg/ha after 1/1/84 and 0.5 kg/ha after 1/1/87)?

   ☐ kg/ha/yr cadmium application rate _____ (see Figure 7-3)

   ☐ YES (Does not comply - continue to 9)

   ☐ NO (Continue to 9)

Chapter 7

APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS

(Continued)

9. If waste is applied to land used for the production of tobacco, leafy vegetables or root crops for human consumption, is the cadmium loading rate less than 0.5 kg/ha/year?

☐ Crop grown_____

☐ YES (Continue to 10)

☐ Land is not used for production of these crops
☐ Cadmium loading is less than 0.5 kg/ha/yr

☐ NO (Does not comply - continue to 10)

10. Is the cadmium concentration in the waste less than 2 mg/kg?

☐ mg/kg - cadmium concentration_____

☐ YES (COMPLIES - continue to 11)

☐ NO (Continue to 11)

11. Is the pH of the soil/waste mixture 6.5 or greater at the time of application?

☐ YES (COMPLIES- continue to 12)

☐ NO (Does not comply - continue to 12)

12. Is the waste incorporated into the soil?

YES (COMPLIES)

NO (Continue to 13)

13. Does the waste contain concentrations of PCB's equal to or greater than 10 mg/kg?

☐ YES (Continue to 14)

☐ Analysis indicates 10 mg/kg or more

☐ NO (COMPLIES)

☐ Analysis indicates less than 10 mg/kg
☐ No known significant source of PCB's

14. Is the milk or animal feed monitored to assure that the PCB concentrations are less than 1.5 mg/kg (fat basis) in milk, or less than 0.2 mg/kg in animal feed?

☐ YES (COMPLIES)

☐ NO (Does not comply)

CHAPTER 8

FLOODPLAINS

1.0 Criterion and Definitions

§ 257.3-1 Floodplains.

(a) Facilities or practices in floodplains shall not restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.

(b) As used in this section:

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

(2) "Floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, which are inundated by the base flood.

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

2.0 Inventory Procedure

The determination of facility compliance for the purposes of the Inventory consists of four parts:

(1) The elimination from further consideration (compliance) of those floodplain facilities which due to certain operational characteristics do not have a reasonable probability of posing a hazard;

(2) The elimination from further consideration (compliance) of facilities which are not located in the floodplain;

(3) The determination of whether a hazard is posed due to restriction of flow and reduction of temporary water storage capacity (flood hazard assessment);

(4) The determination of whether a hazard is posed due to washout of the solid waste (washout hazard assessment).

For those facilities requiring a flood hazard assessment in part 3, a ranking procedure for establishing priorities is included. Figure 8-1 presents the compliance decision flow chart.

2.1 Further Definitions

As used in this chapter:

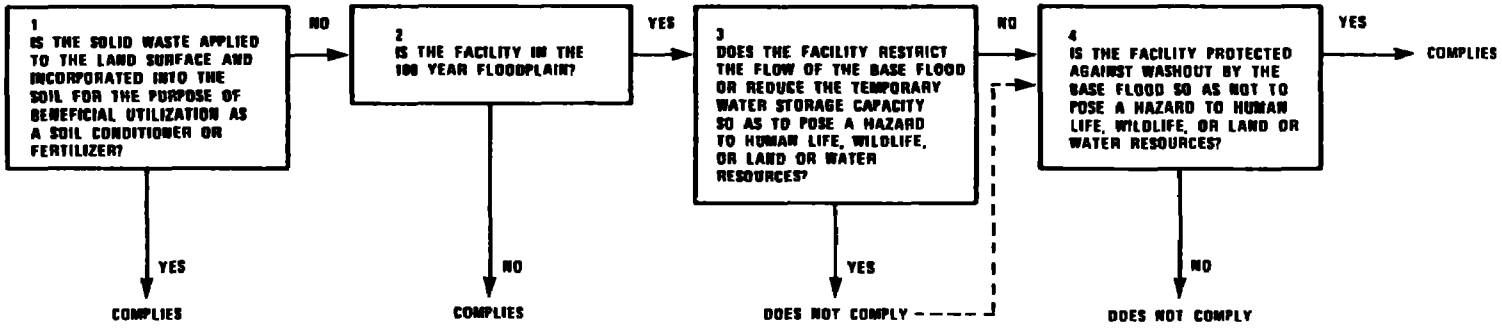
(a) "Pose a hazard" means to place human life, wildlife, or land or water resources in a position of jeopardy or risk, or to place in a position of being adversely impacted, i.e., impairment of use, reduction of value, or decreasing its ability to function as part of the natural system;

(b) "Wildlife" means all unrestrained and uncultivated animals that obtain the necessities of life from the natural environment without substantial aid from man at any point during their life cycle;

(c) "Land Resources" means the components of the land, including but not limited to: uplands, wetlands and submerged lands, soils, agricultural lands, vegetation, minerals, beaches and dunes, and amenities;

(d) "Water Resources" means those waters that are used or may be used in the future, for navigation, agriculture, recreation, fisheries, power production, municipal or industrial water supply, or the maintenance of natural biological communities; and

(e) "Headwaters" means the point on a non-tidal stream above which the average annual flow is less than five cubic feet per second.[1]



NOTE DASHED LINE INDICATES THE NEED TO CONTINUE TO THE NEXT FLOW CHART QUESTION

FIGURE B-1 FLOWCHART–FLOODPLAINS

3.0 Resolution of Decision Flow Chart Questions

3.1 Is the solid waste applied to the land surface and incorporated into the soil for the purpose of beneficial utilization as a soil conditioner or fertilizer?

Landspreading for the beneficial utilization of solid waste does not normally change the elevation of the natural land surface and therefore meets the flow restriction and temporary water storage requirements of the Criterion. At those facilities that incorporate the waste into the soil for the purpose of improving growth by utilization as a soil conditioner or fertilizer, it may be assumed that the erosion or washout potential is minimized by the enhanced vegetation. Therefore, for the purpose of the Inventory, *any landspreading facility that satisfies the following requirements complies with the Floodplain Criterion.*

(a) The waste is incorporated into the soil in accordance with the requirements of the criterion regarding application to land used for the production of food chain crops.

(b) The waste is used for a soil conditioner or fertilizer to improve vegetative growth.

(c) The waste disposal area is being used for vegetation at the time of the Inventory or will be during the next crop season.

NOTE: A landspreading facility which does not satisfy the above requirements should be evaluated for a washout hazard.

3.2 Is the facility located in the 100-year floodplain?

Checking the following situations in the sequence outlined is suggested as an initial step to determine whether a facility, or portion thereof, is located in a floodplain. It is assumed that the appropriate base and operating elevations of the facility are known.

(a) Where existing permits or operation applications state that no portion of the facility is in the 100-year floodplain, as defined by the Criterion, and the application is signed by

a responsible official or party, then for the purposes of the Inventory, *the facility complies with the Criterion.*

(b) Where existing 100-year floodplain maps indicate that no portion of the facility is in the 100-year floodplain, as defined by the Criterion, *the facility complies with the Criterion.* Production and availability of floodplain maps will vary from region to region. Maps are generally available from the following sources.

- State Flood Control Agencies or other departments
- Federal Emergency Management Agency (HUD) Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map (FHBM) (an example is shown in Figure 8-2).
- Local and Regional Planning and Zoning Agencies
- Soil Conservation Service - U.S. Department of Agriculture
- U.S. Army Corps of Engineers
- National Oceanic and Atmospheric Administration
- Federal Housing Administration (HUD)
- U.S. Geological Survey
- Bureau of Land Management - Department of the Interior
- Bureau of Reclamation - Department of the Interior
- Tennessee Valley Authority
- River Basin Commissions and Special Flood Control Districts
- Local and State agencies involved with public works construction, i.e., bridges, culverts, highways, channel improvements and urbanization studies.

(c) Where a facility is located a short distance between two points where the 100-year flood level is known, a reasonably accurate estimate of the flood level at the facility can be made by interpolating between the two known points based on the channel slope or the slope of other known floods through the entire reach. The points might consist of any combination of USGS gauge records, floodplain maps, historical records, or levels predicted for other uses such as bridge and highway design. This method should only be used where the entire

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM1	888.70	U.S. Geological Survey standard brass disk, stamped „Erie 1934" set in top of concrete post flush with ground located in the city park, 4.7 feet north of the centerline of Third Street, 146 feet east of the centerline of Butler Street.
RM2	890.23	Top of southwestern bolt on the top flange of fire hydrant at northeast corner of the intersection of Fifth Street and Massachusetts Street.
RM3	888.36	Top of railroad spike projecting from north side of power pole, approximately one foot above the ground, located at northwest corner of intersection of Seventh Street and Massachusetts Street.
RM4	891.21	Top of west bolt on the top flange of fire hydrant at southeast corner of the intersection of Wilder Street and Butler Street.
RM5	894.25	Top of southeastern bolt on the top flange of fire hydrant at southwest corner of intersection of State Street and Butler Street.
RM6	902.12	Top of southwestern bolt on the top flange of fire hydrant at southeast corner of intersection of Railroad Street and Butler Street.
RM7	888.53	Chiseled cross on east end of south headwall of Second Street over the Tributary to Puckets Run Creek.
RM8	892.68	Top of railroad spike head projecting from north side of power pole, approximately one foot above the ground, located at southeast corner of intersection of Canville Street and the Missouri, Kansas, Texas railroad tracks.

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
FLOOD FRINGE — FLOODWAY
100-Year Flood Boundary
500-Year Flood Boundary
Approximate 100-Year Flood Boundary
Cross Section Line
Elevation Reference Mark — $RM7_X$
River Mile — • M1.5

NOTES TO USER

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations without regard to economic, legal, or political factors.

This map was prepared to support minimum flood plain management regulations; it may not show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index to Map Panels.

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD BOUNDARY AND FLOODWAY MAP

CITY OF
FLOODVILLE,
MICHIGAN

EFFECTIVE
JULY 3 1978

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

FIGURE 8-2 FLOOD BOUNDARY AND FLOODWAY MAP

floodplain between the two points is fairly straight and uniform with respect to dimension and roughness. If the floodplain is not uniform, then this type of estimate should only be used as a quick indicator. If it can be verified with a conveyance calculation, it may be assumed to be accurate enough for the Inventory.

(d) Where the facility is located in a small unmapped drainage area, and it is apparently not in the backwater area of the floodplain of another larger drainage area, the facility complies if the contributing drainage area in acres as determined from topographic maps is less than:

43,560 ÷ Average annual runoff in inches (Figure 8-3)[1]

If the contributing drainage area is less than the figure derived from the equation, then it is considered a headwaters area with an average annual flow of less than 5 cubic feet per second. For For the purposes of the Inventory, *a facility in a headwaters area is in compliance with this Criterion.*

In the western portion of the country this might not be applicable because of highly irregular flows. Check with the District Office of the Corps of Engineers to determine whether this method is applicable or whether a "median" runoff rather than "average" runoff should be used.

(e) When none of the other determination methods apply, it is necessary to make an estimate of the 100-year flood level at the facility location. This estimating requires experience and knowledge of floodplain hydraulics and flood flow determination. The first step is to determine the flood flow at the facility location. The flood flow is then used to estimate the flood level. If the State Solid Waste Agency does not have experienced staff in this area, it is suggested that these estimates and some of the following determinations be made through consulting with one of the following:

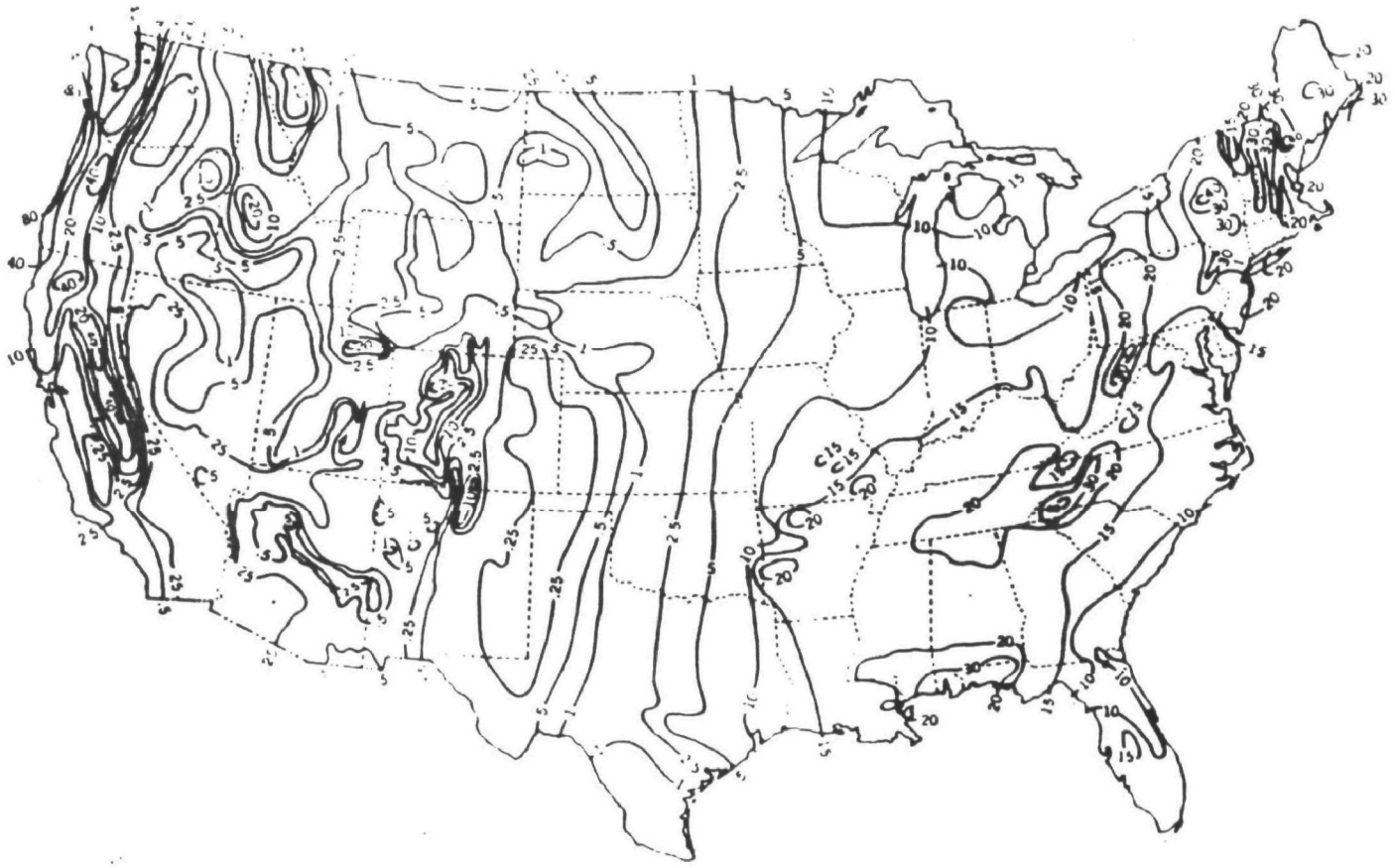


FIGURE 8-3 NORMAL ANNUAL RUNNOFF IN THE UNITED STATES, IN INCHES. (U.S. GEOLOGICAL SURVEY)

- The State Agency charged with flood protection or floodplain management;
- Any of the map source agencies previously listed with the necessary expertise; or
- A qualified professional firm.

The following guidance is provided for making estimates of flood flow and level.

3.2.1 Guidance for Determining the 100-year Flood Flow at the Facility Location

Determination of flood levels frequently requires that the flood flow be known at the facility location before the level can be estimated. Listed in order of preference, the following methods or sources can be used to obtain the flood flow:

(a) Existing discharge-probability analyses in the vicinity that may have been performed by State agencies or the USGS;

(b) The U.S. Soil Conservation PL 566 watershed plans;

(c) State Departments of Transportation or local public works offices, where there has been major construction in the vicinity;

(d) Procedures described in "Guidelines for Determining Flood Flow Frequency," Bulletin #17A, Water Resources Council, June 1977;[2]

(e) Recently calibrated regional prediction methods, usually regression equations which are based on factors such as watershed areas and stream slopes. These are available for a number of States and are available from State water agencies or possibly as technical manuals produced by the USGS;

(f) Transfer methods based on ratios of drainage areas, provided there is similarity between the two drainage areas and their temporary storage characteristics; and

(g) Interpolations between known flood flows from points upstream and downstream.

3.2.2 Guidance for Determining the 100-year Flood Level at the Facility Location

Once the flood flow is known at the location of the facility, a number of methods may be used to predict the flood level (disregarding any effects due to the facility).

Suggested procedures are:

(a) Flood profile computational methods, such as the Corps of Engineers HEC-2 (a computer model for predicting profiles of various flood frequencies);[3]

(b) Step backwater analysis conducted through a series of cross-sectional analyses between two points of known flood levels, performed when downstream conditions might control flood profiles at the facility location; and

(c) Where downstream conditions do not affect the flood level at the facility, simple conveyance calculations or normal depth computations, such as Mannings Equation, may be undertaken at the facility cross-section only.

NOTE: Where possible, the constants used to predict the flood level by the above methods sould be checked against a known historical event, or the flood level should be predicted using constants calibrated to an historical event.

Compare the estimated flood level with the elevation of the facility. If no portion of the facility is below the 100-year flood level, *then the facility complies with the Criterion*.

3.3 Does the facility restrict the flow of the base flood or reduce the temporary water storage capacity so as to pose a hazard to human life, wildlife or land or water resources?

This determination, when conducted for a specific site, is very complex, costly, and should only be made by a qualified professional. Therefore, for purposes of the Inventory, the approach for satisfying this decision flow chart question involves:

- Review of several special cases to see if the facility fits one of these cases, thereby complying with this portion of the Criterion,
- Ranking of the remaining facilities prior to an assessment of the flood hazard potential for each facility,
- Perform a flood hazard assessment (e.g., does the facility pose a hazard to human life, wildlife, or land or water resources).

3.3.1 Special Cases

Case 1 - If a facility is located in a State where the equivalent permit or review procedures have considered a facility's flood alteration impacts, and it has been concluded that the facility does not pose a hazard to human life, wildlife, or land or water resources, *then the facility complies with this portion of the Criterion*. This includes facility siting decisions made in accordance with regulatory floodway adoption procedures of the National Flood Insurance Program. Assuming that such an assessment procedure exists at the State or local level, the question can be resolved by checking the records. It may be necessary to contact other State or local agencies involved in floodplain analysis.

Case 2 - If a facility has an individual permit for the discharge of dredged or fill material (Section 404, Clean Water Act) and the review of the permit application included a flood hazard assessment equivalent to the assessment required in this section, and the facility is in compliance with the permit, *then the facility complies with this portion of the Criterion*. Either the Army Corps of Engineers or the State may have the 404 permit authority for a particular area. It will be necessary to consult with the Corps or the State 404 permit authority in order to determine if the flood hazard assessment is equivalent and to check on the facility's compliance with the permit. If the facility is not in compliance with its 404 permit, it will be necessary to make the assessment of the potential flood hazard outlined later.

Case 3 - If a facility has already filled the floodplain area, it encompasses to a level equal to or greater than the base flood height, or if it is completely diked to the base flood level, then continued vertical expansion and operation will not further alter the base flood flow or storage capacity so as to pose a hazard, *and it may be assumed to comply with this part of the Criterion.*

Where current information on the level of the facility is available, the question can be resolved by comparing the level of the facility or dikes to the base flood height. Where no information on the level of the facility is available, a trip to the facility will be required. It may help to look for local information on past floods, as a facility inundated by a lesser flood will obviously be inundated by the base flood, and a facility that is above a flood of greater magnitude (such as a 500-year flood) will also be above the base flood. This information will probably be in the form of local records, personal testimony, or watermarks on structures or vegetation. Where it is difficult to visualize the flood height, or a more accurate determination is necessary, on-site surveying may be required.

Case 4 - If the level of the facility is below the land surface grade of the floodplain (e.g., in a borrow pit or quarry), then the facility will not restrict the flood flow and it is unlikely to reduce the water storage capacity so as to pose a hazard, *and it therefore complies with this part of the Criterion.* The level of the facility is the top of the waste or dike, whichever is highest.

Where current information is available, this can be resolved in the office by referring to the records to determine the facility level relative to the land surface grade. Where the necessary information is not available or up to date, a trip to the facility will be required. A visual check of the facility level should be sufficient. Where a more accurate determination is necessary, on-site surveying may be required. Another possibility would be the analysis of aerial photography, if both available and recent.

Note: All facilities in the 100-year floodplain must also protect against washout of solid waste. Since surface impoundments need dikes to protect from washout by the 100-year flood, they cannot be below-grade. On the other hand, landfills located in the floodway fringe and which are below grade might meet the washout hazard requirement by covering the waste after each day's operation and protecting the surface as soon as each section (including intermediate levels) is completed. A landspreading facility which does not meet the requirements in Section 3.1 of this chapter will need to be evaluated for washout. If the facility uses dikes to protect from washout, then refer to Case 3.

Case 5 - If a facility is located in a floodplain where the stream or river is contained within its channel during the 100-year flood by a system of dikes, levees, berms, revetments, or other structures such that the floodplain is no longer subject to flooding, *then the facility may be assumed to comply with this part of the Criterion.*

Case 6 - If it can be determined by using any of the computational methods of Section 3.2.2, or equivalent procedures, that the base flood level may be raised more than one foot by the location and operation of the facility, then for the purpose of the Inventory, *it may be assumed that the facility does pose a hazard and does not comply with this portion of the Criterion.* A lesser change in the predicted level does not mean that the facility complies, as a flood hazard may still be posed. (The one-foot increase in the base flood level is the maximum increase allowed in the National Flood Insurance Program by FEMA.)

3.2.2 Ranking of Facilities Not Covered by the Special Cases

Any facility located in the 100-year floodplain restricts the flow of the base flood or reduces the temporary water storage capacity of the floodplain to some degree. Therefore, the question is whether the reduction or restriction "poses a hazard to human life, wildlife, or land or water resources." The procedures discussed

here are intended to provide guidance for the best possible resolution of the question.

Since assessing the flood hazard potential for a facility is complex and costly, it is necessary to establish a priority system.

(a) The first priority will be for those facilities within the boundaries of (1) a regulatory floodway as adopted under the National Flood Insurance Program of the Federal Emergency Management Agency, HUD, or (2) a "regulatory" floodway or equivalent mapped by a State or local government or other organization. Refer to Figures 8-2 and 8-4 for the floodway delineation.

(b) The remaining floodplain facilities are given priorities according to their relative flood hazard potential as determined by their floodplain and facility characteristics. Table 8-1 shows how these characteristics affect flood hazard potential. Since these characteristics are so interrelated and site-specific, no attempt was made to quantify them. The higher the hazard potential, the higher the assessment priority.

3.3.3 Flood Hazard Assessment

Once prioritization is completed, an assessment of the flood hazard must be made in order to resolve the Criterion question. The assessor should consider the following factors:

(a) base flood characteristics;
- flow
- velocity
- level
- cross-sectional areas of the floodplain

(b) floodplain topography;

(c) floodplain hydrogeology;

(d) facility characteristics;
- type (e.g., landfills, surface impoundments, landspreading)
- size (cross-sectional area of channel occupied by facility; volume - acreage and depth)

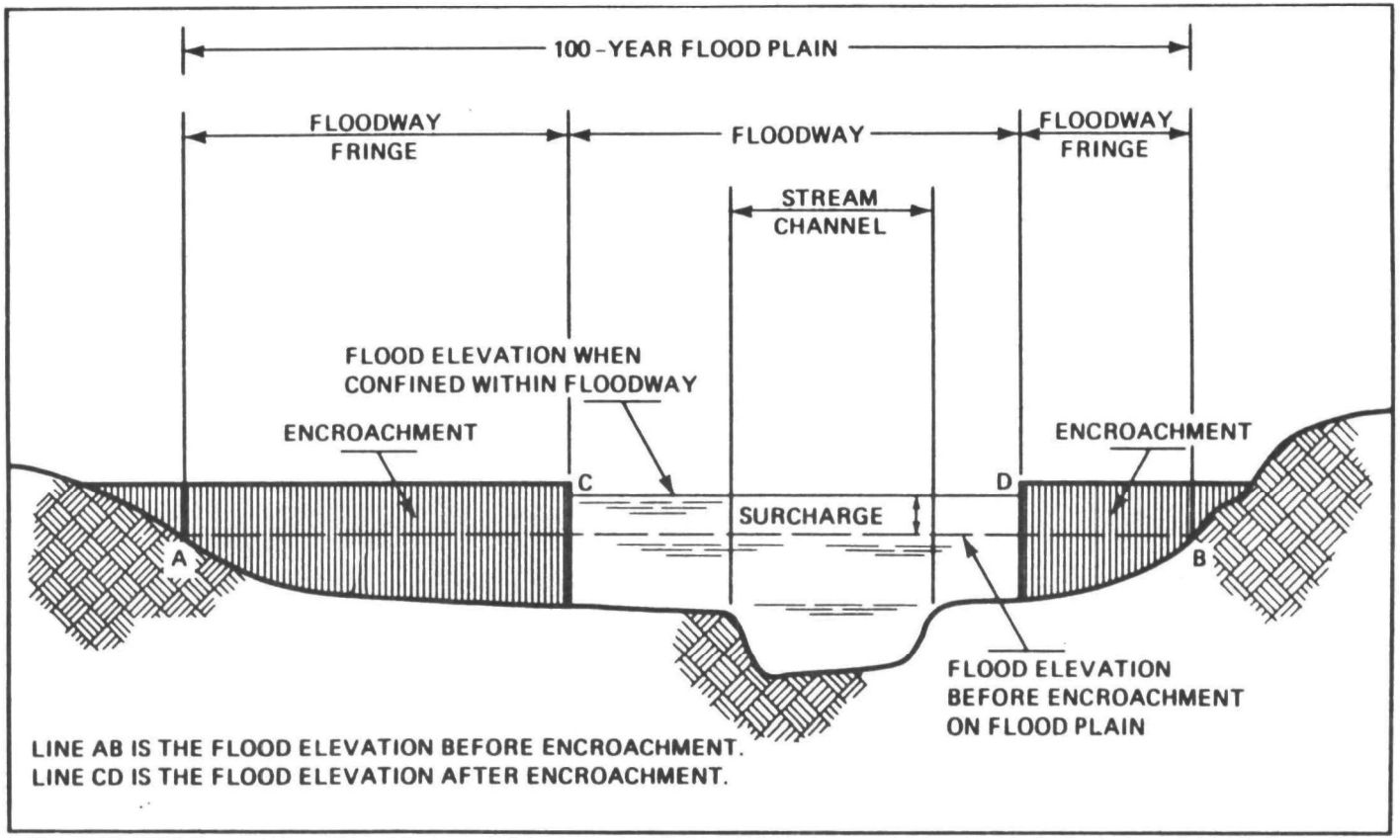


FIGURE 8-4 DIAGRAM OF THE 100 YEAR FLOODPLAIN

TABLE 8-1

FLOOD HAZARD RANKING

Floodplain Characteristics	Increasing Flood Hazard Potential → Low	High
(1) Location in the floodplain	flood fringe	floodway
(2) Size of watershed	small	large
(3) Shape of the floodplain	broad, shallow	narrow, v-shaped
(4) Percentage of the floodplain cross-section area occupied by the facility	small percent	large percent
(5) Volume of facility (acreage and depth)	small	large
(6) Flood flow velocity	low velocity	high velocity

- location in the floodplain (e.g., floodway or floodway fringe)
- washout prevention methods
- impacts on flooding (e.g., restricts flood flow)

(e) natural resources in and adjacent to the floodplain (i.e., wetlands, timber resources, soil, wildlife habitat, etc.);

(f) land use in and adjacent to the floodplain.

The flood hazard assessment can be made in-house if the professional expertise is available. Where the necessary expertise is not available, technical assistance should be solicited from the State agency charged with flood protection or floodplain management. If the State agencies are not in a position to provide the necessary technical assistance, there are several Federal agencies that may be consulted.

- Soil Conservation Service (USDA) - provides technical assistance in determining flood hazards, mainly through the Floodplain Management Assistance Program.
- Army Corps of Engineers - provides interpretation of floodplain data, develops new data, and provides guidance on assessing and minimizing flood hazards through the Flood Plain Management Services Program.
- National Oceanic and Atmospheric Administration (USDC) - provides floodplain information and interpretive assistance for specific points on larger rivers.
- Federal Insurance Administration (HUD) - conducts flood hazard studies (Flood Insurance Study Reports) for select areas, also maintains a listing of qualified consulting engineers.
- Geological Survey (USDI) - User Assistance Centers provide information on flood characteristics, interpretive information on flood frequency relationships, and identifies areas of potential flood hazard.

- Bureau of Reclamation (USDI) - flood hydrologists at regional offices can provide flooding information and interpretive assistance for locations associated with Bureau projects.
- Fish and Wildlife Service (USDI) - provides expertise on wildlife and habitat resource, preservation, and maintenance.
- Tennessee Valley Authority - provides technical assistance and flood data for the Tennessee Valley Watershed.
- Delaware River Basin Commission - provides interpretive assistance and flood data for the Delaware basin.
- Susquehanna River Basin Commission - provides general information and guidance on floodplain management.
- Additional sources of assistance and information are other river basin commissions, flood control districts, and regional and local planning agencies.

Where insufficient assistance is available from governmental agencies, the services of a qualified professional should be obtained.

When the flood hazard assessment concludes that the facility poses a hazard, *it does not comply with the Criterion*. All facilities, complying or not, must still be evaluated for their washout hazard.

3.4 Is the facility protected from washout by the base flood so as not to pose a hazard to human life, wildlife or land or water resources?

The criteria objective is to prevent any solid waste from being carried away by waters of the base flood. Therefore, to comply with this part of the Criterion, a facility must prevent washout by the base flood. A facility protected against inundation is not necessarily protected against washout of the waste. A facility can be inundated without washing out, and washed out without being inundated. The former occurs when waste is covered or held by vegetated soil, and the base flood inundates the surface but does not erode and wash out waste. The latter can occur when the facility is

diked or the waste covered up to the 100-year level, but the dike or covering is insufficient protection and the waste is eroded and carried away.

3.4.1 Special Cases

Two cases may be readily resolved without requiring a washout hazard assessment.

Case 1 - If a facility is located in a State (or has a 404 permit), where the equivalent permit, inspection, or review procedures require the facility to be protected from washout by the base flood, and the State, or 404 permit process, has determined that the facility is adequately protected, *then the facility complies with the washout part of the Criterion*. The question is resolved by checking the records of the facility.

Case 2 - If a facility suffers from washout by floods of lesser magnitude (such as a 50-year flood) than the base flood, then it can be concluded that the facility will also wash out in the base flood, and *thereby does not comply with this portion of the Criterion*. Determination of washout by lesser floods can be made by referring to past inspection records or a field check of the site for visible evidence of washout. Erosion due to surface runoff should not be considered evidence of washout due to flooding.

3.4.2 Washout Hazard Assessment

Where there has been no equivalent assessment or no evidence of washout by lesser floods, an evaluation of the washout protection will be necessary. This can be done on an in-house basis, in consultation with another State agency, or through the services of a consultant. Also, the Soil Conservation Service, USDA, might provide technical assistance in analyzing erosion and washout protection methods. Other Federal agencies, such as the U.S. Geological Survey and Army Corps of Engineers might also assist with such an evaluation.

The assessment of a facility's washout hazard potential should consider the following factors:

(1) types and effectiveness of washout protection used in each area of the facility below the 100-year flood level;

- dikes
- levees
- berms
- flexible linings
- vegetative cover
- riprap
- diversion of high velocity flows around the facility
- change in soil matrix by chemical alteration

(2) flood flow velocity; using a flood flow velocity of at least 2.5 times the average velocity over the entire floodplain cross-section for those portions of the facility in the floodway and a minimum value of 1.0 times the average velocity over the entire floodplain corss-section for those portions of the facility in the floodway fringe.

That is: $\bar{v} = Q/A$ where

$\bar{v}$ = average velocity

Q = 100-year flood flow (cfs)

A = cross-sectional area of floodplain

Matrices comparing the types of washout protection with different flood flow velocities by showing the efficiencies of each type at different velocities are available in references 4 and 5. These matrices can be used to help evaluate the adequacy of protection for each facility.

If a washout hazard assessment determines that a facility is protected from washout from the base flood, *then the facility complies with this part of the Criterion*.

4.0 References

1. Title 33, Navigation and Navigable Waters, Chapter II, U.S. Army Corps of Engineers, July 1977.

2. "Guidelines for Determining Flood Flow Frequency," Bulletin No. 174, United States Water Resources Council, 2120 L Street, N.W., Washington, D.C. 20037, Revised, June 1977.

3. "HEC-2", The Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California, November 1976.

4. "Design of Stable Channels with Flexible Linings," Hydraulic Engineering Circular No. 15, October 1975, U.S. Department of Transportation, Federal Highway Administration, (USGPO #050-002-00101-9).

5. "Shore Protection Manual," U.S. Army Coastal Engineering Research Center, Department of the Army, Corps of Engineers, 1975. USGPO, Stock #008-022-0007-1, 3 Volumes.

Chapter 8

FLOODPLAINS

Criterion Compliance Decision

☐ Complies

☐ Does Not Comply

1. Is the solid waste applied to the land surface and incorporated into the soil for the purpose of beneficial utilization as a soil conditioner or fertilizer?

☐ YES (Complies)

- ☐ Waste incorporated into the soil in accordance with requirements of Section 257.3-5
- ☐ Waste used as a soil conditioner or fertilizer
- ☐ Disposal area being used (or will be used next season) for vegetation

☐ NO (Continue to 2)

2. Is the facility located in the 100-year floodplain?

☐ YES (Continue to 3)

- ☐ Stated in permit or operation applications
- ☐ State floodplain designation
- ☐ Federal floodplain designation: agency _____
- ☐ Interpolation between two known points in the 100-year floodplain
- ☐ Computations of flood flow and flood level

☐ NO (Complies)

3. Does the facility restrict the flow of the base flood or reduce the temporary water storage capacity so as to pose a hazard to human life, wildlife, or land or water resources?

Special cases:

- ☐ Facility located in a state where equivalent review or permit procedures have considered flood alteration impacts
- ☐ Facility has a 404 permit with an equivalent flood hazard assessment section and is in compliance with the permit
- ☐ Facility has filled floodplain or is diked up to or above base flood level
- ☐ Facility is below floodplain grade

- ☐ Facility located in a floodplain where the channel is diked to contain the base flood
- ☐ Facility increases base flood level more than 1.0 foot

Priority of facility:

- ☐ Regulatory floodway area - priority 1
- ☐ High flood hazard potential area (Table 1-1) - priority 2
- ☐ Low flood hazard potential area (Table 1-1) - priority 3

Factors considered in flood hazard potential assessment:

Base Flood characteristics: _____
Floodplain topography: _____
Floodplain hydrogeology: _____
Facility characteristics: _____
Natural resources in and adjacent to the floodplain: _____
_____
Land use in and adjacent to the floodplain: _____
_____

☐ YES (Does not comply - Continue to 4)

☐ NO (Continue to 4)

4. Is the facility protected from washout by the base flood so as not to pose a hazard to human life, wildlife, or land or water resources?

Factors considered for washout protection:

Types and Efficiency Protection:

- ☐ Dike or levee _____
- ☐ Berm _____
- ☐ Flexible linings _____
- ☐ Vegetative cover _____
- ☐ Riprap _____
- ☐ Diversion of surface flow _____
- ☐ Change in soil matrix _____
- ☐ Other _____
- ☐ None _____
- ☐ Flood flow velocity _____

☐ YES (Complies)

- ☐ State washout assessment or 404 permit
- ☐ Site analysis of washout protection

☐ NO (Does not comply)

- ☐ Washout by flood of lesser magnitude than the 100-year flood
- ☐ Site analysis of washout protection

CENSUS FORM

APPENDIX A

OPEN DUMP INVENTORY REPORTING FORM

FORM EPA-2
(9-26-79)

Subject to OMB Approval

OPEN DUMP INVENTORY REPORTING FORM

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
ACTING AS COLLECTING AGENT FOR
ENVIRONMENTAL PROTECTION AGENCY

Section I – GENERAL INFORMATION

1. **Date of determination** *Enter month, day, and year* — Month | Day | Year

2a. **Is this an update of a previous form?** *Mark (X) one* — 1 ☐ Yes 2 ☐ No

2b. **Is this form being submitted to remove the facility from the open dump inventory?** — 1 ☐ Yes 2 ☐ No

3. **Facility Identification** — State | County | Place | Assigned Site No. | Assigned Facility No.

4. **EPA Surface Impoundment Assessment No.** *If applicable* — State | Cnty/City | Place | Category | Site | Impoundment

5. **State Facility Identification Number** *If applicable*

6. **Name of facility**

7. **Facility location**
   - Street, road, or other location description
   - City, town, or place | State | ZIP code
   - County name

8. **Coordinates of facility location**
   - Latitude — Degrees | Minutes | Seconds
   - Longitude — Degrees | Minutes | Seconds

9. **Other legal description** *If applicable* — Range | Township | Section

10. **Land owner**
    - Name
    - Mailing address
    - City, town, or place | State | ZIP code

11. **Operator**
    - Name
    - Mailing address
    - City, town, or place | State | ZIP code

Section I – GENERAL INFORMATION – Continued

12. Type of facility *Mark (X) one*

- 1 ☐ Landfill
- 2 ☐ Surface impoundment
- 3 ☐ Land spreading
- 4 ☐ Other – *Explain* _____

13. Primary types of waste received

- 1 ☐ Municipal solid waste
- 2 ☐ Domestic sewage sludge
- 3 ☐ Industrial solid waste
- 4 ☐ Agricultural solid waste
- 5 ☐ Mining solid waste
- 6 ☐ Other – *Explain* _____

Section II – NONCOMPLIANCE WITH FEDERAL CRITERIA

Indicate noncompliance with one or more of the following categories *Mark (X) each category for which a determination of noncompliance was made.*

- 01 ☐ Floodplains
- 02 ☐ Endangered species
- 03 ☐ Surface water
- 04 ☐ Ground water
- 05 ☐ Application to food-chain cropland
- 06 ☐ Disease
- 07 ☐ Air
- 08 ☐ Safety
  - 09 ☐ Gases
  - 10 ☐ Fires
  - 11 ☐ Bird/aircraft hazard
  - 12 ☐ Access

Section III – RESPONSIBLE STATE OFFICIAL

Name			Telephone: Area code	Telephone: Number
Agency				
Mailing address *(Number and street)*	City	State	ZIP code	

Comments

FORM EPA-2 (9-26-79)

GENERAL INSTRUCTIONS

A. INTRODUCTION – This form is to be used by States in reporting to the Environmental Protection Agency (EPA) solid waste disposal facilities not in compliance with the "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (the Criteria) published as 40 CFR 257 on September 13, 1979. A form is to be submitted to EPA for each facility evaluated and found not to be in compliance with any provision of the Criteria. The names of those facilities submitted will be published by EPA as the open dump inventory required by Section 4005 of the Resource Conservation and Recovery Act of 1976 (P.L. 94–580). This form covers solid waste disposal facilities as defined and described in the Criteria with exceptions as delineated in the Criteria.

B. COMPOSITION OF FORM – Form EPA-2 is composed of three sections. Section I is to provide general information about the date of determination, the location of the facility, the owner and operator of the facility, and the type of facility in terms of the method of disposal and primary types of waste received.

Section II is for reporting the category of the Criteria for which the facility does not comply.

Section III is for the name and address of the State official responsible for the determination that the facility does not comply with the Criteria.

SPECIFIC INSTRUCTIONS

These specific instructions and guidelines are to assist you in completing the three sections of this form. Each instruction is related to a specific section and item of the form. For definitions see part D.

NOTE – Work on completing this form should not begin until all procedural and instructional materials have been thoroughly reviewed.

Section I – GENERAL INFORMATION

Item 1, Date of determination – Enter numerics indicating the day on which the facility is evaluated against the "Criteria for Classification of Solid Waste Disposal Facilities and Practices."

Example – February 1, 1980 should be coded as –

Month	Day	Year
0 2	0 1	8 0

Item 2a, Is this an update of a previous form?

Mark (X) in the "No" box if the facility has not been evaluated previously.

Mark (X) in the "Yes" box if the facility has been evaluated previously AND an EPA Disposal Facility Inventory form has been submitted previously for the facility. The EPA Facility Identification number entered in item 3 of the update form must be the same as the number entered on the initial form.

Update forms may be submitted to update or correct any item(s) in Sections I and II. If this is an update of a previous form, complete items 1, 2, 3, and 6 in Section I; Section III; and the items which are being corrected or updated. Use the comments section if necessary.

Item 2b, Is this form being submitted to remove the facility from the open dump inventory? – If "Yes," complete items 3 through 11 and Section III on the reverse side. If "No," follow the instructions given for item 2a above.

Item 3, Facility Identification Number – A master listing of facility identification numbers should be established before beginning inventory activities and maintained for the duration. The State, county, and place codes can be found in your reference manual. If a facility crosses county lines, use your best judgement in assigning it to one of the counties. Use the comments section to explain which counties are involved and the reason for coding the facility to the chosen county. If a facility is not located wholly or partially within the boundaries of a place listed in your reference manual, enter five zeroes (00000) in the place codes boxes. If the place code in your reference manual is a 4-digit code, enter it in the first four of the five boxes allowed for the place code.

EXAMPLE of encoding of EPA facility identification number for a facility located in Autaugaville, Alabama. Note the 4-digit code entered in the first four boxes of the place code.

Example A –

State (Alabama)	County (Autauga)	Place	Assigned Site No.	Assigned Facility No.
0 2	0 0 1	1 1 1 5		

EXAMPLE of facility identification number for a facility not located in a place

Example B –

State (Alabama)	County (Autauga)	Place	Assigned Site No.	Assigned Facility No.
0 1	0 0 1	0 0 0 0 0		

To ensure that each facility evaluated within the State has a unique number, the responsible State official should assign site and facility numbers sequentially for the duration of the inventory. The site number and facility numbers should be assigned in sequential order beginning with 0001 and 001 respectively.

Example C – For three facilities operating at one site in Autaugaville, Alabama, the EPA facility identification numbers should be assigned as follows.

State	County	Place	Assigned Site No.	Assigned Facility No.
0 2	0 0 1	1 1 1 5	0 0 0 1	0 0 2
0 2	0 0 1	1 1 1 5	0 0 0 1	0 0 1
0 2	0 0 1	1 1 1 5	0 0 0 1	0 0 3

switc

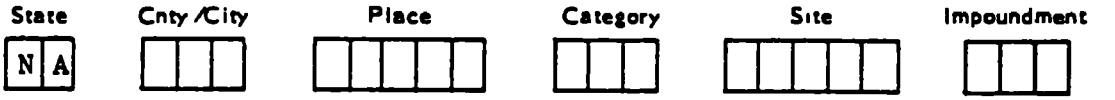
Item 4, EPA Surface Impoundment Assessment Number (SIA number) – A list of SIA impoundment numbers will be supplied to the States when they are available. If this facility is a surface impoundment which has been selected from the list of surface impoundments assessed for the U.S. EPA's Office of Water Supply, enter its SIA number here.

Example of an SIA impoundment number for an impoundment located in Autaugaville, Alabama.

Example –

If not applicable, enter "NA" as shown

Example –



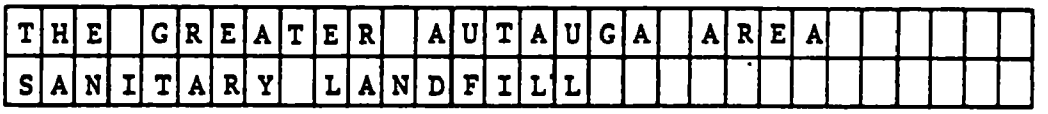
Item 5, State Facility Identification Number – This number is the number, if any, used by the State to identify the facility. Inclusion of this item is intended to provide those States which have established a system of identification codes with a cross reference to the EPA identification system. Entries should begin in the first box, regardless of length. If the State does not have an identification number, enter NA in the first two boxes.

Item 6, Name of facility – This item refers to the legal name of the facility. If there is no legal name, enter the name assigned for State record keeping purposes.

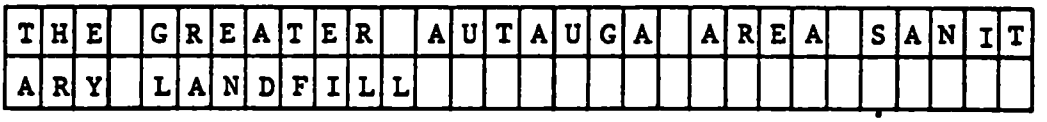
Sixty (60) entry spaces on two lines have been allowed for facility name. Reasonable abbreviations are acceptable. Leave one space between each word in the site name. The first line should end in a complete word.

Example – The Greater Autauga Area Sanitary Landfill (42 total spaces)

Acceptable

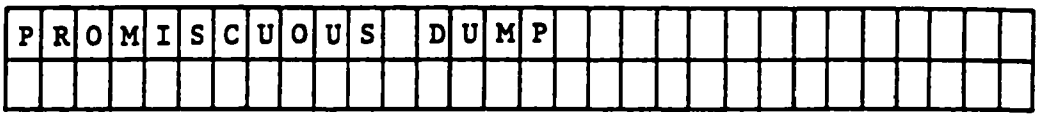


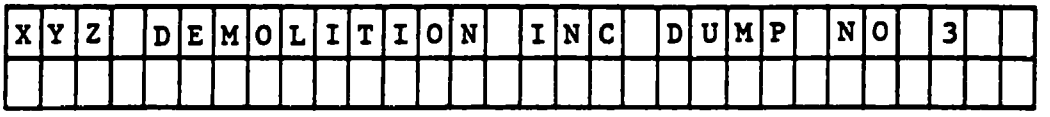
Not acceptable



In cases where a facility has no legal name or name of record (e.g., an unauthorized/promiscuous dump or a facility used by private concern), enter a description sufficient to identify the circumstances.

Example





Item 7, Facility location

Street or road – If the facility is not describable in conventional mailing address terms, provide a description sufficient to locate the facility on a county or city map. For example "2.5 miles North on Hampton Road after the intersection of Route 255." Only 60 spaces are allowed for the street/location description so descriptions may require the use of reasonable abbreviations.

City, town, or place – If the facility is not located in a city or town (see list of places), enter the name by which the area is commonly known locally or in State records.

State – See list of State abbreviations in reference material.

ZIP code – See list of ZIP codes for your State in reference material. If the facility is not described in terms of a mailing address enter "No ZIP" in the first five (5) boxes.

County name – Be certain the county name you enter here is the same county for which you entered the three-digit code in the EPA identification number (item 3).

Example A – Street address format

Street, road, or other location description

1	4	3	2		L	I	C	K	S	K	I	L	L	E	T		R	D											

Example B – Other location description when street address is unavilable

Street, road, or other location description

2	.	5		M	I		N	O	R	T	H		O	N		H	A	M	P	T	O	N		R	D				
P	A	S	T		R	T	E		2	2	5																		

NOTE – This location description lists the name of the road which gives access to the facility as well as distance and direction from a reference point.

If the facility is located in a place included in the list of places in your reference materials, enter the name as it appears on that list. Also enter the 2-character State name abbreviation and ZIP code as they appear in the reference materials.

Example C –

City, town, or place

F	U	L	T	O	N		C	I	T	Y								

State

A	L

ZIP code

3	6	0	9	8				

If a facility is located in an unincorporated town or in an area that has a commonly used name such as a post office name, that name should be entered.

Example D –

City, town, or place

T	A	L	L		P	I	N	E	S									

State

A	L

ZIP code

3	6	0	4	7				

Item 8, Coordinates of facility location — Facility coordinates may be determined using U.S. Geological Survey quad maps, county highway maps available from the State department of transportation or State department of highways, or State or local survey maps.

Example — A site in Alabama might have coordinates such as —

	Degrees	Minutes	Seconds		Degrees	Minutes	Seconds
Latitude	32	30	22	Longitude	087	20	10

Item 9, Other legal description — In some States, facility locations are described in terms of range, township, and section. If this is the case in your State, supply the appropriate codes for range, township, and section. Because these codes are not of uniform length in every State, the boxes have not been subdivided to indicate character positions.

EXAMPLE

Range	Township	Section
02E	08N	30

Item 10, Land owner

Name — If the owner is a unit of government, the administering agency, bureau, office, etc., should be entered as well as the name of the government.

Three examples of Land Owner Names are —

Name
DEPT OF SANITATN AUTAUGA CITY

Name
US ARMY, DEPT OF DENFESE

Name
DEPT OF NATURAL RESOURCES AL

Mailing address — Enter the mailing address most commonly used, including 2-character State name abbreviation and ZIP code as they appear in the reference materials.

Two examples of mailing addresses are —

Mailing address
PO BOX 1145

City, town, or place | State | ZIP code
AUTAUGAVILLE | AL | 36047

Mailing address
1123 STATE OFFICE BUILDING

City, town, or place | State | ZIP code
AUTAUGAVILLE | AL | 36047

Item 11, Operator's name and address — Use the instructions for item 10. If the operator is the same as owner, enter "SAME" in the first 4 blocks of the name line.

Item 12, Type of facility — Every facility should be classified as a landfill, surface impoundment, or land spreading/facility. If you are uncertain of the type of facility classify it as "Other" and write a brief explanation. A separate form is to be submitted for each facility, even where more than one facility is located on the same site.

Item 13, Primary types of waste received — Mark (X) the predominant "type or types of waste" received at the facility.

Section II — NONCOMPLIANCE WITH FEDERAL CRITERIA

Indicate which categories of the Criteria for which this facility does not comply.

Section III — RESPONSIBLE STATE OFFICIAL

The State official responsible for determining noncompliance with the Criteria is indicated in this section. In general the form should be signed by the director of the State solid waste program or a higher level official.

C. 6. DEFINITIONS

Facility — Any land and appurtenances thereto used for the disposal of solid wastes.

Site — Land on which one or more solid waste disposal facilities are located.

Landfill — A facility for the disposal of solid wastes involving the placement of solid wastes on or into the land surface, and usually involving compaction and covering of the disposed solid wastes.

Surface Impoundment — A natural topographic depression, artificial excavation, or like arrangement used for disposal of solid wastes, especially liquids and semi-solids. Also referred to as ponds, pits, lagoons, and basins.

Land Spreading — Application of solid waste onto land and/or incorporation into the surface soil, including the use of such waste as a fertilizer or soil conditioner.

Municipal Solid Waste — Discarded materials resulting from usual (residential and commercial) community activities.

Domestic Sewage Sludge — Any solid, semisolid, or liquid waste generated from a municipal or community wastewater treatment plant.

Industrial Solid Waste — Discarded material resulting from manufacturing activities.

Agricultural Solid Waste — Discarded material resulting from agricultural activities.

Mining Solid Waste — Discarded material resulting from mining and milling activities.

County or County Equivalent — Following are the primary political and administrative divisions:

1. In 48 States — counties
2. In Louisiana — parishes
3. In Alaska — boroughs and census areas (Note: This is a change from the "census divisions" recognized in the 1970 census.)
4. In the District of Columbia — District of Columbia
5. In Montana — Yellowstone National Park (in addition to counties)
6. In Georgia, Maryland, Missouri, Nevada, and Virginia — independent cities (in addition to counties); one in each State except Virginia, which has 41.
7. In Guam — Guam
8. In Puerto Rico — municipios
9. In the Virgin Islands — islands
10. Codes for the outlying areas are those established by the Bureau of the Census. These are:

    a — American Samoa — districts
    b — Canal Zone — court districts
    c — Trust Territory of the Pacific Islands — administrative districts
    d — Northern Mariana Islands (if separate from the Trust Territory) — municipalities

Three-digit numeric codes, unique within State or outlying area, have been assigned to each county or county equivalent. Counties are listed alphabetically followed by independent cities listed alphabetically.

Place — A place listed in the reference materials includes the following:

Incorporated Place — A place incorporated as a municipality under the laws of its State, and recognized as an incorporated place by the U.S. Bureau of the Census.

Notes: (1) This class specifically includes places incorporated as cities and villages, places incorporated asboroughs (except in Alaska), and places incorporated as towns except in eight States: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Wisconsin. Townships are not included in this class; they, and "towns" in the eight States specified possess some or all of the corporate powers common to incorporated municipalities elsewhere, but are areally extensive units which are not regarded as "places" for census purposes.

(2) An inactive incorporated place (an incorporated place with no active governmental organs) is considered to be an incorporated place as long as it is so regarded by the Bureau of the Census.

Unincorporated Populated Place (1980 Census Designated Places Only) — A concentration of population which:

a. is a closely settled population center without corporate limits delineated by the Bureau of the Census,
b. has a name that is in common use locally to refer to it, and
c. is not part of any incorporated place, or of another unincorporated place.

Note: A place is not considered "populated" if it has only daytime (working) population but no permanent residents, or if it has only seasonal population but no year-round residents, or if its population consists wholly or largely of prison or institution inmates. To qualify as a populated place, a community must generally have a population concentration of at least eight permanent nonfarm households or twenty-five permanent nonfarm residents. However, some named communities with fewer residents may qualify if they have a post office, a railroad station, or one or more stores. An unincorporated populated place has boundaries and an areal extent. These boundaries are delimited by the maintenance agent, on the basis of the verifiable extent of a concentration of residences, and local opinion as to the extent of the area known by the community name.

Township — A geographical-political entity recognized as a township, "town" (in one of eight States), or plantation (in Maine), which:

a. has a well-recognized name and boundaries; and either
b-1. qualifies as a local government under the laws of its State; or
b-2. formerly qualified as a township, "town," borough, or plantation government at some date since 1900, and is not now part of an incorporated place or another township, "town," borough, or plantation.

Notes: (1) This category comprises chiefly townships but also includes plantations in Maine and "towns" in eight States (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Wisconsin) in which the term "town" is used for areally extensive units similar to the townships of other States.

(2) Townships and "towns" are never wholly or partly included in other townships or "towns." However, they often overlap areally with one or more incorporated places, unincorporated places, or both.

(3) Townships that may exist as administrative subdivisions of counties in certain States, but that have never exercised local government powers, are not included. Examples are the townships of North Carolina and California.

Defense Installation — A named base or similar facility of the Department of Defense or one of its branches, that is included in a current listing of major bases and installations issued for general circulation by the Department of Defense or one of its branches.

Indian Reservation — An area officially so designated by the Bureau of Indian Affairs or by the State.