NUREG/CR-6147
Vol. 3

Characterization of Class A Low-Level Radioactive Waste 1986–1990

Main Report—Part B

Prepared by
J-C Dehmel, D. Loomis, J. Mauro/SC&A
M. Kaplan/ERG

S. Cohen & Associates, Inc.

Eastern Research Group, Inc.

Prepared for
U.S. Nuclear Regulatory Commission

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FOREWORD

This report characterizes Class A Low Level waste shipped for disposal from 1986 through 1990. It was developed as part of a Nuclear Regulatory Commission (NRC) sponsored study to develop a technical information base useful to persons and organizations involved in the management and disposal of Low-Level radioactive waste and in the regulation of these activities.

This NUREG report is not a substitute for NRC regulations, and compliance is not required. The approaches and/or methods described in this NUREG are provided for information only. Publication of this report does not necessarily constitute NRC approval or agreement with the information contained herein.

Donald A. Cool

Donald A. Cool, Chief
Radiation Protection and Health
Effects Branch
Division of Regulatory Applications
Office of Nuclear Regulatory Research

ABSTRACT

Under contract to the U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, the firms of S. Cohen & Associates, Inc. (SC&A) and Eastern Research Group (ERG) have compiled a report that describes the physical, chemical, and radiological properties of Class-A low-level radioactive waste. The report also presents information characterizing various methods and facilities used to treat and dispose non-radioactive waste

The characterization of Class-A low-level waste is based primarily on information contained in the Manifest Information Management System (MIMS), an electronic database compiled by the National Low-Level Waste Management Program. The Program is managed by EG&G Idaho, Inc. for the Department of Energy. Supplementary sources of information include reports and studies conducted under the auspices of the Nuclear Regulatory Commission, Department of Energy, regional low-level waste Compacts and unaffiliated States, and trade organizations. The database characterizes low-level waste shipped for disposal from 1986 to 1990.

A database management program was developed for use in accessing, sorting, analyzing, and displaying the electronic data provided by EG&G. The program was used to present and aggregate data characterizing the radiological, physical, and chemical properties of the waste from descriptions contained in shipping manifests. The data thus retrieved are summarized in tables, histograms, and cumulative distribution curves presenting radionuclide concentration distributions in Class-A waste as a function of waste streams, by category of waste generators, and regions of the United States.

The report also provides information characterizing methods and facilities used to treat and dispose non-radioactive waste, including industrial, municipal, and hazardous waste regulated under Subparts C and D of the Resource Conservation and Recovery Act (RCRA). The information includes a list of disposal options, the geographical locations of the processing and disposal facilities, and a description of the characteristics of such processing and disposal facilities.

Volume 1 contains the Executive Summary, Volume 2 presents the Class-A waste database, Volume 3 presents the information characterizing non-radioactive waste management practices and facilities, and Volumes 4 to 7 contain Appendices A to P with supporting information.

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Appendices A through P present additional information for the executive Summary (Vol. 1) and Main Report (Vol. 2 and 3). The appendices are contained in the following volumes:

Volume 4:

A Sample Shipping Manifest Forms
B Low-Level Waste Data Manager Program Description
C Waste Forms and Radionuclide Concentrations Compacts Unaffiliated States - Analyses at the container level Non-Brokered Waste: Aggregate Practices 1988-1990
D Waste Forms and Radionuclide Concentrations - Analyses at the container level for Selected Waste Forms; Beatty and Richland 1988-1990
E Radionuclide Concentrations by Compact Regions and States - Shipment-level Analyses: All Disposal Sites Aggregate Practices 1986-1990

Volume 5:

F Waste Radionuclide Concentrations by Compact Regions and States - Shipment-level Analyses: All Disposal Sites and Non-Brokered Wastes Aggregate Practices 1986-1990

Volume 6:

G Location of Major Waste Generators and Compact Regions and States Population Distributions
H Fuel Fabrication Facilities - Shipment-level Analyses for Selected Radionuclides and States: Aggregate Practices from 1986 to 1990
I Utility Waste Forms and Radionuclide Concentrations - Container-level Analyses for Selected Waste Forms: Beatty and Richland 1988 to 1990
J Utility Waste Radionuclide Concentrations - Shipment Level Analyses: 1989 Barnwell and Richland

Volume 7:

K Processed and Brokered Wastes - Selected Waste Forms and Radionuclides: Container-level Analyses Aggregate Practices from 1988 to 1990
L Population Information Pertaining to RCRA Subparts C and D Facilities
M Municipal Solid Waste Landfills in 1986 Survey
N State Comments on Landfill Capacity
O Municipal Solid Waste Landfills - 1992 Listing
P Cross-Reference List of Geographical Locations for Treatment and Disposal Facilities

PREFACE

Section 10 of the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA) of 1985 directed the Commission to develop criteria and procedures to act upon petitions "to exempt specific radioactive waste streams from regulations ... due to the presence of radionuclides ... in sufficiently low concentrations or quantities as to be below regulatory concern." The Commission responded to this statutory provision by issuing a policy statement on August 29, 1986 (51 FR 30839) that contained criteria for evaluating such petitions. On December 2, 1986 (51 FR 43367), the Commission published an advance notice of proposed rulemaking (ANPR) entitled "Radioactive Waste Below Regulatory Concern: Generic Rulemaking " (RIN 3150-AC35). In July 1990, the Commission issued a second policy statement addressing the below regulatory concern issue, "General Statement of Policy on Below Regulatory Concern," July 3, 1990 (55 FR 27522).

In July 1988, the NRC's Office of Nuclear Regulatory Research contracted S. Cohen & Associates (SC&A) to develop technical information concerning Class A low-level radioactive waste which could be used to support NRC technical evaluations of petitions for exempt waste streams. In May 1990, the contract was modified to include the development of information which could be used in establishing a basis for a generic NRC rule governing the disposal of radioactive waste determined to be Below Regulatory Concern (BRC).

In October 1992, the Congress enacted the Energy Policy Act of 1992. Section 2901 of the Act revoked the Commission's 1986 and 1990 BRC Policy Statements, and in August 1993, the Commission formally withdrew the two BRC Policy Statements. The Commission also terminated the rulemaking action that was initiated to implement the 1986 BRC Policy and withdrew the December 2, 1986 ANPR.

Although it effectively revoked the 1986 BRC Policy Statement, Section 2901 of the Energy Policy Act did not either (1) explicitly remove the Commission's obligation under Section 10 of the Low-Level Radioactive Waste Policy Amendments Act of 1985 to develop criteria and procedures for evaluating exemption requests for specific radioactive waste streams on an expedited basis, or (2) revoke the Commission's authority under the Atomic Energy Act to exempt classes of materials from licensing.

By early 1993, SC&A had already accumulated a substantial amount of information concerning Class A low-level waste. Since the information contained in this report should be useful to the NRC staff and others involved in the regulation or disposal of low-level radioactive waste, the NRC, in July 1993, authorized SC&A to compile and present this information in a NUREG/CR report.

ACKNOWLEDGEMENTS

S. Cohen & Associates, Inc. would like to take this opportunity to acknowledge the efforts and participation of the Nuclear Regulatory Commission staff, namely Messrs. Robert Meck, James Malaro, Paul Kovach, and Steve Klementowicz.

In addition, we would like to thank Mr. Ronald Fuchs and Ms. Miriam Muneta of EG&G Idaho, Inc. for their assistance in generating the low-level waste database for this project.

9.0 IDENTIFICATION AND OVERVIEW OF MANAGEMENT, TREATMENT, AND DISPOSAL TECHNOLOGIES FOR WASTES REGULATED UNDER SUBPARTS C AND D OF RCRA

9.1 Introduction

This chapter provides an overview of the treatment and disposal methodologies and technologies used for wastes regulated under Subparts C and D of RCRA. Section 9.2 discusses management and treatment methods, and Section 9.3 briefly describes disposal technologies.

9.2 Management/Treatment Methods and Technologies

Treatment technologies are methods of managing and processing wastes prior to or in lieu of final disposal. Treatment methods can be combined with different disposal methods to provide a wide array of disposal options.

9.2.1 Recycling

The Environmental Protection Agency is placing heavy emphasis on recycling of as many materials as possible. The impetus for this effort comes from the Resource Conservation and Recovery Act (RCRA) and from the rapid nationwide depletion of landfill capacity. The following discussion of recycling efforts is taken from EPA90d.

Most recycling programs operate today at the local level as part of either city or county programs. As landfill space has dwindled and dumping costs have risen, many states have moved to encourage or mandate municipal solid waste recycling through legislation. State recycling initiatives include laws that require communities, counties, or regions to develop recycling programs, bottle bill container laws, and measures that encourage but do not mandate recycling. The discussion below and Table 9-1 summarize a number of state recycling programs.

Currently, 11 states have some type of mandatory municipal solid waste recycling legislation. Although these laws vary widely in scope and content, defining state waste reduction or recycling goals is the initial step in developing a state waste management strategy. Most of these states have set statewide waste reduction goals which usually require or encourage some type of community curbside or drop-off recycling. Some states

TABLE 9-1

Highlights of State Recycling Legislation and Programs

State	Year	Program
Alaska	1983	Alaskans for Litter Prevention and Recycling, statewide litter prevention program and recycling; 10 recycling centers and 2 mobile units.
California	1972	California Waste Management Board, solid waste management agency, and other public and private recycling organizations; 3,672 multi-material recycling centers; special events: "Recycle Week".
	1986	California Beverage Container Recycling and Litter Reduction Act (Recycling Act) targeting 65% redemption of all container types in 1989; requires "convenience zone" redemption centers.
	1986	The AB 2020 legislation requires the Department of Conservation to determine (by region) which materials can be recovered economically. Manufacturers must pay a "processing fee" to ensure a reasonable return to recyclers.
Colorado	1983	Recycle Now!, multi-material recycling program; over 400 recycling centers; collected tonnage to date: beverage containers 100,000, newsprint 242,000; special events: "Recycle Month" and "Clean-Up Week".

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Connecticut	1980	Bottle bill legislation.
	1987	Legislation set a state-wide goal of 25 percent reduction of solid waste by 1991 (yard waste is included in the goal). The effort is coordinated through a number of established regions. Municipalities are required to recycle twelve materials, including PET and HDPE plastic containers. None of the materials are to be knowingly accepted at any landfill or waste-to-energy facility.
Florida	1984	Florida Business and Industry Recycling Program, multi-material recycling; 190 recycling centers; collected tonnage 1984 to 1986: 73,900 tons of aluminum, 71,250 tons of glass.
	1988	Senate Bill 1192 provides waste minimization incentives, measures to reduce non-biodegradable material production and increase recycling, an alternative bottle-bill program.
	1988	State Law established the goal to reduce solid waste by 30 percent by 1994. All counties and cities with populations greater than 50,000 must develop recycling programs by July 1, 1989 and to separate a majority of specified materials, including plastic bottles from the waste stream.
	1988	Requires the Department of Environmental Regulation to include any conditions in solid waste facility permits that are necessary to reach the state's goal of 30 percent recycling.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Illinois	1981	Illinois Association of Recycling Centers, multi-material recycling, works with the Department of Energy and Natural resources as well as the Illinois Environmental Protection Agency; 200 recycling centers (including mobile units).
	1986	Office of Illinois Solid Waste and Renewal Resources, technical and financial assistance provided on recycling efforts; 138 recycling centers.
	1988	Requires communities of over 100,000 and the City of Chicago to develop waste management plans that emphasize recycling and alternatives to landfills. Also set a 25 percent statewide recycling goal.
Iowa	1979	Bottle bill legislation passed, retailer redemption centers.
Kansas	1983	Kansas Beverage Industry Recycling Program, multi-material recycling; 16 recycling centers; collected tonnage in 1986: 1,770; special events: "Recycle Month".
Kentucky	1980	Kentucky Beverage Industry Recycling Program, multi-material recycling; 35 recycling centers; collected tonnage in 1986: 31,846.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Louisiana	1982	Keep Louisiana Beautiful, litter control/ recycling/ beautification; 155 recycling centers.
Maine	1975	Bottle bill legislation passed, redemption centers, diverts roughly 5.5% of the total waste stream.
	1987	An amendment to the Solid Waste Law established waste recovery system before issuing permits for incineration or landfill facilities.
	1988	The State of Maine Waste Reduction and Recycling Plan sets a municipal recycling goal of 25 percent recycling by January 1, 1994. There are 30 existing public recycling programs in the state of Maine. Most recycling programs collect separated materials at a drop-off center. The City of Brunswick offers residents curbside collection and services centers.
Maryland	1984	Maryland Beverage Industry Recycling Program, multi-material recycling and litter control; 130 recycling centers; special events: "Recycle Week".
	1988	Legislation established a statewide mandatory recycling program aiming to recycle 15-20 percent of the county solid waste stream, depending upon the population of the county, in five years.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Massachusetts	1983	Bottle bill legislation passed, retailer redemption centers.
	1987	The Massachusetts Solid Waste Act established five regional recycling programs to coordinate construction of facilities, material collection and sales, and the distribution of financial incentives. Municipalities must agree to pass mandatory recycling ordinances to receive assistance for recycling costs (public education, and technical or equipment costs).
Michigan	1978	Bottle bill legislation passed, retailer redemption centers.
	1986	The Clean Michigan Fund established to lessen the state's dependence on landfills by supporting resource recovery programs and organizations through direct assistance (in the form of grants).
Minnesota	1980	Recycle Minnesota Resources, beverage container and multi-material recycling; 125 recycling centers; collected tonnage in 1986: 6,500.
	1980	The Minnesota Waste Management Act. A 1984 amendment forbids any waste disposal facility supported, directly or indirectly, by public funds to accept "recyclable material" except for transfer to recycler.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Montana	1971	Associated Recyclers of Montana, household and industrial multi-material recycling: 50 recycling centers; special events: "Recycle Month".
Nebraska	1979	Nebraska Litter Reduction and Recycling Programs, grants and technical assistance; 260 recycling centers; collected tonnage in 1986: 665,866.
	1980	Nebraska State Recycling Association, Statewide recycling coalition for promotion and assistance; more than 100 recycling centers including community drop-off centers.
New Hampshire	1983	New Hampshire Beautiful, litter control/ litter pickup/ public education/ recycling grants to municipalities; 11 private and 77 municipal recycling centers; collected tonnage in 1986: 890.
New Jersey	1987	New Jersey Mandatory Source Separation and Recycling Act (statewide voluntary began in June, 1982) requires counties to recycle 15 percent of the previous year's total municipal solid waste in the first full year and 25 percent by the end of two years. Counties have six months to determine three recyclable materials, besides leaves, which are economically recoverable. The Act calls for the establishment of collection (curbside and collection center) and

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
New Jersey (cont.)		marketing systems and separation ordinances for residents, businesses, and industry; 500 recycling centers; collected tonnage in 1985: 890,000.
	1987	The Recycling Act also requires that the establishment of county waste management planning goals be part of the waste-to-energy facility permit process. No "designated recyclables" are permitted on the tipping floor of such a facility.
New York	1983	Bottle bill legislation passed, retail redemption centers.
	1988	State Solid Waste Management Act, requires each municipality to implement a source separation plan by Sept 1, 1992, "where economically feasible." The goal is to reduce/reuse/recycle fifty percent by weight of the state's solid waste. The law establishes a number of measures and standards affecting waste producers and processors.
North Carolina	1983	Keep North Carolina Clean and Beautiful, Department of Transportation Branch, focuses on litter prevention/reduction, recycling and beautification; 24 local programs throughout the state; special programs: "Clean-Up Week".
	1988	Applicants for landfill permits must submit analyses of recycling potential and a plan for implementing a recycling program.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Ohio	1980	Ohio Litter Prevention and Recycling, litter prevention/recycling of household items; 28 recycling centers; collected tonnage in 1986: 13,546, special events include "Ohio Recycling Month".
Oklahoma	1982	Oklahoma Beverage Industry Recycling Program, multi-material recycling; 46 recycling centers; collected tonnage in 1986: 29,276, special events: "Recycling Month".
Oregon	1971	Bottle bill legislation passed, retail redemption centers.
	1983	The State Recycling Opportunity Act requires local governments to provide citizens with the opportunity to recycle through curbside collection or drop-off centers. Cities of more than 4,000 must provide at least monthly collection. 106 towns and cities practice curbside separation and five of these collect plastics. Roughly ten depot collection programs are in place in major cities. The Act defines recyclable materials as "any material or group of materials which can be collected and sold for recycling at a net cost equal to or less than the cost of collection and disposal of the same materials."
Pennsylvania	1974	Recycling and Energy Recovery Section, Bureau of Solid Waste Management, multi-material recycling/energy recovery; 500 non-profit community collection centers, 125-150 scrap dealers; 120 curbside recycling programs; special events: "Recycle Month".

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Pennsylvania	1983	Pennsylvania Recycling Network, multi-material recycling; 440 recycling centers; 105 curbside collection programs (both municipal and private); collected tonnage in 1986: 110,000.
	1988	Passed legislation requiring communities larger than 10,000 to start recycling programs by September, 1990. Smaller communities have until 1991. The responsibility for solid waste management is shifted from municipalities to counties. A statewide landfill surcharge is used to finance the local recycling collection programs.
Rhode Island	1984	Ocean State Cleanup and Recycling Program, litter control/multi-material recycling; 35 recycling centers.
	1986	A comprehensive recycling law requires each city or town to separate solid waste into recyclable and non-recyclable material prior to disposal in a state-owned facility. Municipalities must divert 15 percent of their waste stream in within three years. Much of this effort will be focussed on curbside separation programs for which residents will be supplied with a plastic recycling bin. The law also requires all commercial generators and managers of multi-unit housing to submit a plan for recycling and waste reduction.
South Carolina	1987	South Carolina Governor's Task Force on Litter, litter reduction and public recycling awareness, funded by the private sector.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Texas	1967	Keep Texas Beautiful, Inc., nonprofit educational/coordination organization serving a growing base of community-litter prevention programs; 350 recycling centers; collected tonnage in 1986: 13,827; special events: "Recycle Week".
	1983	Texas Recycles Association, multi-material recycling, education, community relations; at least 300 recycling centers and 4 theme parks.
Vermont	1973	Bottle bill legislation passed, redemption centers, has diverted approximately 6 percent of the state's solid waste stream.
	1987	State Solid Waste Act encourages local recycling collection programs and regional waste management plans by providing technical and financial assistance. The plan stresses reduction, reuse, and recycling. Currently, there are more than 55 collection programs or collection drives operating in the state.
Washington	1962	Committee for Litter Control and Recycling, industry coalition; more than 1,000 recycling centers.
	1970	Washington State Recycling Association, multi-material recycling; approximately 100 recycling members.
	1971	Anti-litter Law established funding, through a special tax, for public education, waste recepticals, and litter policing. A 66

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Washington (cont.)		percent litter reduction has resulted. Currently recycles 1,177,400 tons of material equalling 22.4 of the states total waste stream. This is accomplished through curbside and drop off center methods. The State Department of Ecology lists HDPE bottles as the only plastic material being recycled in significant quantities. It is estimated that 1,700 tons (12.7 percent of HDPE bottles) were recycled in 1987.
	1971	Solid Waste Management Act established the following solid waste priorities: 1) waste reduction, 2) recycling, 3) energy recovery and incineration, and 4) landfilling. Analysis of the state's waste disposal practices and decisions on how to achieve this agenda have been renewed annually.
	1989	Renewed Solid Waste Management Act establishes a statewide goal of 50 percent recycling of municipal waste by the year 1995. The legislation does not require the use of specific recycling methods in obtaining this goal.
West Virginia	1982	West Virginia Beverage Industry Recycling Program, multi-material recycling, litter control and education; 23 recycling centers; collected tonnage in 1986: 7,335.
Wisconsin	1984	Wisconsin Recycles, recycling awareness program; collected tonnage in 1986: 25,000.

(Cont.)

TABLE 9-1 (cont.)

Highlights of State Recycling Legislation and Programs

State	Year	Program Description
Wisconsin	1984	Bureau of Solid Waste Management, waste reduction and recovery; approximately 600 community recycling programs and 650 companies; special events: "Recycle Week".
	1984	Recycling Act requires municipalities to provide citizens with recycling drop-off centers. Owners and operators of solid waste disposal sites and transfer stations must provide recycling collection centers if none exists. A number of specified materials must be accepted at these centers.

Source: EPA90.

(Connecticut, Pennsylvania, Rhode Island, New Jersey, New York, Maryland, and Florida) require communities, counties, or regions to develop curbside collection programs. Many of these laws contain some unique initiatives. Connecticut law prohibits the landfilling or incineration of 12 specified materials after 1991. In Oregon and Wisconsin curbside recycling is not specified, but residents must be provided with some opportunity to recycle. Illinois has set a goal of 25 percent waste reduction (as have a number of other states) and requires communities to meet this figure locally. Other states, like Washington and Minnesota, where many successful local recycling programs exist, have passed more general legislation which sets source reduction and recycling as the state waste management priorities.

In addition to the legislation mentioned above, industry or non-profit recycling collection networks exist in most states. These operations vary in sponsor, size, and materials collected. In many states, programs include established drop-off centers and promotion campaigns which could act as foundations for statewide collection programs.

An estimated 3,000 to 3,600 curbside collection programs are currently operating in communities across the country (GER92). Pilot programs to discover the most effective means of collecting the most recyclable material are now common. Table 9-2 provides information on the participation rates, collection quantities, and the program specifics listed above from 22 municipal curbside collection programs. Participation rates of 85 to 98 percent are typical for mandatory programs. Newspapers, glass, aluminum, and plastics are the materials most commonly collected.

In addition to curbside collection for recycling, separation and recycling of materials can take place at the municipal combustor or landfill. Data indicate that 40 percent of the existing combustion facilities have on-site recovery facilities (KIS90). This percentage drops to 30 percent if you include incinerators that do not recover energy. 85 percent of these facilities recover ferrous metals, 27 percent recover non-ferrous metals, while a few of them recover glass and plastic.

TABLE 9-2

A Summary of Curbside Recycling Program Characteristics and Participation Rates

Community	Population	Households Served	Tons/ Year	Pounds/ House/Year	Partici- pation(b)	Participation: Overall %	Participation: Collection Day %	Collection Frequency	Materials Collected(a)	Same Day As Trash	Provide Home Storage Containers	Household Set-Out Requirement
Austin, TX	450,000	90,000	7,200	160.00	V	20-25	10-12	Weekly	N,G,T,A	Mosty	20,000	Separate
Cheltenham, PA	35,500	9,500	N.Avail.	N.Avail.	V	40	30-35	Weekly	N,G,A	Yes	Yes	Separate
Davis, CA	47,000	11,000	3,200	581.82	V	60	50	Weekly	N,G,C,A	Yes	No	Separate
East Lyme, CT	N.Avail.	5,000	2,100	840.00	M	80	N.Avail.	Weekly	N,A,G,T	Yes	N.Avail.	Separate
Evesham Twp., NJ	36,000	8,500	2,995	704.71	M	85-90	50	Weekly	G,T,A,MP	No	Yes	Commingled
Groton, CT	10,000	1,900	626	658.95	M	75-85	50	Weekly	N,C,G,T,A	No	No	Commingled
Haddonfield, NJ	12,500	4,400	1,703	774.09	M	95	66	Weekly	N,G,T,A	Yes	Yes	Commingled
Hamburg, NY	10,500	3,350	N.Avail.	N.Avail.	M	98	N.Avail.	Weekly	N,C,G,T,MO	Yes	No	Commingled
Marin Co., CA	N. Avail.	44,000	12,500	568.18	V	60	35-40	Weekly	N,G,T,A,P	Yes	Yes	Separate
Mississauga, ONT.	400,000	90,000	14,000	311.11	V	80	40	Weekly	N,G,T,A	Yes	Yes	Commingled
Mecklenburg Co., NC	460,000	9,100	2,336	513.41	V	71	37	Weekly	N,G,A,P	Yes	Yes	Commingled
Niagara Falls, ONT.	70,000	19,500	2,307	236.62	V	75-80	45	Weekly	N,G,T,A,P	Yes	Yes	Commingled
Plymouth, MN	43,000	12,500	2,800	448.00	V	N.Avail.	53-56	Weekly	N,C,G,T,A	No	Yes	Separate
San Jose, CA	720,000	180,000	6,500	72.22	V	58	25	Weekly	N,G,T,A,P	Yes	Yes	Separate

(cont.)

TABLE 9-2 (Continued)

A Summary of Curbside Recycling Program Characteristics and Participation Rates

Community	Population	Households Served	Tons/ Year	Tons/ House/Year	Partici- pation(b)	Participation Overall %	Participation Collection Day %	Collection Frequency	Materials Collected(a)	Same Day As Trash	Provide Home Storage Containers	Household Set-Out Requirement
Seattle, WA	500,000	94,000	23,985	510.32	V	48	29	Weekly	G,T,A,MP	Yes	No	Commingled
Springfield Twp., PA	22,000	6,800	1,972	580.00	V	70	60	Weekly	N,G,A	Yes	Yes	Commingled
Sunnyvale, CA	116,000	28,000	4,078	291.29	V	50-60	21	Weekly	N,G,T,A,P,MO	Yes	Yes	Separate
Upper Moreland Twp., PA	28,000	6,200	N.Avail.	N.Avail.	M	62	50	Weekly	N,G	Yes	Yes	Separate
Ann Arbor, MI	108,000	20,000	1,700	170.00	V	50	25	2/month	N,C,G,T,A,MO	Yes	No	Separate
Minneapolis, MN	360,000	120,000	7,600	126.67	V	25-30	15	2/month	G,T,A,MP	No	No	Separate
Montclair, NJ	38,500	14,500	4,980	686.90	M	85	50	2/month	N,G,A	No	No	Commingled
St. Cloud, MN	44,000	9,770	403	82.50	M	N.Avail.	30	Monthly	N,G,A	No	No	Separate

(a) Materials: A = aluminum, G = glass, P = plastic, N = newspaper, C = corrugated cardboard, MO = motor oil, MP = mixed paper
(b) V = voluntary, M = mandatory

Sources: EPA90.

9.2.2 Incineration

Incineration with or without energy recovery is becoming a more common method of municipal waste reduction. The method is suitable for solid or liquid wastes with a high heat content. EPA guidelines for the thermal processing of solid wastes are given in 40 CFR 240 (CFR89j).

There are four major variations on incineration:

- On-site incineration
- Off-site incineration
- Incineration as a non-hazardous waste
- Incineration as a hazardous waste

In each case, suitable waste streams include those with a high energy content, such as paper, plastics, and animal carcasses (e.g., from biomedical research).

Off-site incineration allows a generator to take advantage of the economies of scale associated with a larger, centralized facility. Emissions from any incinerator cannot exceed the standards set by the Clean Air Act or local requirements (whichever are more stringent). Residues from incineration must be disposed of in an environmentally acceptable manner.

Modeling considerations for potential exposures during transport differ for the off-site and on-site incineration options. For on-site incineration, there is minimal transport time to the incinerator and a longer time in transit to the ultimate disposal site. Potential exposures in the latter transit period depend on what remains in the ash compared to what goes up the stack. For off-site incineration, potential exposure during transit would be based on the content of the original waste stream.

9.2.3 Waste Piles

A waste pile is a noncontainerized mass of solid, nonflowing waste material that may or may not be enclosed by a fence, a cover, or some other structure. A number of industries use waste piles as a means of temporary storage, treatment (if the hazard of the waste will degrade with time and weathering), and in some instances, permanent disposal. Often, waste piles are used only temporarily to stockpile wastes until they can be recycled. They may be used for hazardous Subtitle C wastes or nonhazardous Subtitle D wastes and may be located at an on-site or off-site location. Under current regulations, nonhazardous waste piles may constitute a disposal method; however, hazardous waste may not be permanently disposed of in piles.

Nonhazardous Subtitle D Waste Piles

Nonhazardous waste piles are subject to 40 CFR Part 257, which has general provisions for protecting flood plains, surface water, and ground water (CFR891). Table 9-3 displays the state requirements for waste piles where an actual permit, license, or application is required to operate a waste pile. Of the 29 states with regulations on nonhazardous waste piles, 22 have design criteria for waste piles, 27 have operation standards, 15 have location restrictions, and 16 impose monitoring requirements. No states require leachate collection design standards, seven require some type of liner design, three require some type of cover, and four require surface water monitoring (EPA88c).

There were an estimated 5,335 active industrial waste piles in 1986.[1] These waste piles are distributed among approximately 4,205 different establishments or locations. Of these establishments, half were operated by the stone, clay, glass, and concrete industry (2,082 establishments); however, they accounted for only 12 percent of the weight disposed of in waste piles. At the same time, more than 50 percent of the industrial waste which was disposed of in subtitle D waste piles originated from the inorganic chemicals industry, yet this waste was disposed of in only 60 establishments (1 percent). Other major contributors to waste piles, by weight, were the primary nonferrous metals industry (11.4 percent) and the primary iron and steel industry (8 percent).

The use of waste piles for Subtitle D industrial waste appears to be primarily for temporary storage or for some type of treatment. Even though waste piles represented 19 percent of the facilities, they accounted for only 1 percent of the disposal weight. In fact, according to the survey, approximately 55 percent of the establishments with waste piles use off-site facilities for ultimate disposal. Of the 4,205 establishments with waste piles, various final management techniques for the wastes were used, including:

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[1] There are no figures on municipal, construction, or other types of waste piles, but the number of these units is thought to be very small (EPA88a).

Table 9-3

Permittings and Operational Requirements for Waste Piles

Specific Permit Requirements for Waste Piles

State	Soil Conditions	Groundwater Information	Surface Water Information	Total Acreage	Life of Facility	Future Use	P.E. Cert.
Alabama	X	X			X		X
Arkansas	X	X	X		X	X	X
California	X	X	X	X	X	X	X
Delaware							
Florida							
Georgia							
Idaho							
Illinois							X
Iowa							X
Maine							X
Maryland							X
Minnesota	X		X				X
Mississippi							
Missouri							X
Nebraska	X	X	X				
Nevada							
New Jersey					X		X
New York							X
Ohio	X	X	X			X	
Oklahoma				X	X		X
Oregon					X	X	X
Pennsylvania					X	X	X
South Dakota							
Tennessee			X				
Texas					X		X
Washington							
West Virginia							
Wisconsin	X	X	X				X
Wyoming	X	X	X		X	X	
TOTAL	9	8	9	3	8	6	16

Source: EPA88b.

Table 9-3

Permittings and Operational Requirements for Waste Piles (Continued)

Design Criteria for Waste Piles

State	Liner Design	Leachate Collection	Gas Controls	Run-on/ Run-off Controls	Security Require-ments
Alabama	X		X	X	X
Arkansas					
California	X			X	X
Delaware					
Florida				X	
Georgia					
Idaho					
Illinois					
Iowa					X
Maine					X
Maryland			X		X
Minnesota					
Mississippi				X	
Missouri			X		X
Nebraska	X		X	X	X
Nevada					
New Jersey					
New York					X
Ohio	X		X	X	X
Oklahoma	X			X	X
Oregon				X	X
Penn-sylvania				X	X
South Dakota					
Tennessee					X
Texas	X		X	X	X
Washington				X	X
West Virginia					X
Wisconsin	X			X	X
Wyoming	X				X
TOTAL	7	0	6	12	19

Source: EPA88b.

Table 9-3

Permittings and Operational Requirements for Waste Piles (Continued)

Operation and Maintenance Standards for Waste Piles

State	Waste Management	Leachate Controls	Gas Controls	Covers	Safety	Other O&M Requirements
Alabama		X	X		X	X
Arkansas						
California	X	X		X	X	X
Delaware						
Florida		X			X	X
Georgia					X	X
Idaho					X	X
Illinois						
Iowa	X				X	X
Maine	X				X	X
Maryland	X				X	X
Minnesota					X	X
Mississippi					X	
Missouri	X				X	X
Nebraska		X	X	X	X	X
Nevada					X	
New Jersey	X				X	X
New York		X			X	X
Ohio	X				X	X
Oklahoma		X			X	X
Oregon		X			X	X
Pennsylvania		X			X	X
South Dakota						X
Tennessee					X	X
Texas	X		X		X	X
Washington					X	X
West Virginia	X				X	X
Wisconsin		X	X	X	X	X
Wyoming	X				X	X
TOTAL	10	9	4	3	25	24

Source: EPA88b.

Table 9-3

Permittings and Operational Requirements for Waste Piles (Continued)

Location Standards and Restrictions for Waste Piles

State	Floodplain Protection	Minimum Distances	Critical Habitat	Geo-logically Sensitive Areas	Soil Conditions
Alabama	X	X			
Arkansas					
California	X	X			X
Delaware					
Florida		X			
Georgia					
Idaho					
Illinois					
Iowa					
Maine	X	X			
Maryland					
Minnesota			X		
Mississippi					
Missouri					
Nebraska	X	X	X		
Nevada		X			
New Jersey					
New York	X				
Ohio					
Oklahoma	X	X			
Oregon			X	X	
Penn-sylvania	X	X			
South Dakota	X			X	
Tennessee					
Texas	X	X			
Washington					
West Virginia	X				
Wisconsin	X				
Wyoming	X				
TOTAL	10	9	3	2	1

Source: EPA88b.

Table 9-3

Permittings and Operational Requirements for Waste Piles (Continued)

Monitoring Requirements for Waste Piles

State	Ground Water	Surface Water	Leachate	Air
Alabama	X		X	X
Arkansas	X			
California	X		X	
Delaware				
Florida	X		X	
Georgia				
Idaho				
Illinois				
Iowa				
Maine				
Maryland				
Minnesota				
Mississippi				
Missouri	X			
Nebraska	X		X	
Nevada				
New Jersey				
New York	X		X	
Ohio	X		X	
Oklahoma	X	X	X	
Oregon			X	
Pennsylvania	X		X	X
South Dakota	X	X		
Tennessee				
Texas	X			
Washington				
West Virginia	X	X		
Wisconsin	X	X	X	
Wyoming				
TOTAL	13	4	10	2

Source: EPA88b.

Table 9-3

Permittings and Operational Requirements for Waste Piles (Continued)

Closure, Post-Closure, and Financial Responsibility Requirements for Waste Piles

State	Closure	Post-Closure	Financial Responsibility Requirements
Alabama	X	X	
Arkansas			
California	X	X	X
Delaware			
Florida			
Georgia	X		
Idaho			
Illinois	X	X	
Iowa			
Maine	X		
Maryland			
Minnesota	X		
Mississippi			
Missouri			
Nebraska	X		
Nevada			
New Jersey			
New York	X	X	X
Ohio	X	X	
Oklahoma	X		X
Oregon	X	X	X
Penn-sylvania			
South Dakota	X	X	
Tennessee			
Texas	X	X	X
Washington			
West Virginia			
Wisconsin	X	X	X
Wyoming			
TOTAL	14	9	6

Source: EPA88b.

- 2,533 - sent off-site
- 648 - permanently stored in waste pile
- 558 - recycled on-site
- 158 - transferred to on-site land application unit
- 129 - transferred to on-site landfill
- 50 - incinerated on-site
- 851 - other

Of 17 major industries surveyed, 11 were found to use waste piles for their nonhazardous waste. These include the following:

- fertilizer and other agricultural chemicals
- electric power generation
- industrial inorganic chemicals
- industrial organic chemicals
- lumber and wood products
- pulp and paper
- plastic and resin manufacturing
- primary iron and steel manufacturing and ferrous foundries
- primary nonferrous metals manufacturing and nonferrous foundries
- stone, clay, glass, and concrete products, and
- textile manufacturing.

According to the EPA study, the specific types of waste that actually get disposed of in waste piles vary by industry but were frequently the residue of combustion processes (e.g., ashes, kiln dusts, and slags). Wastes from the electric power generation industry consist of primarily coal piles, fly ash, and bottom slag/ash, an indication that the coal-fired plants are the major users of waste piles within this industry. Wastes from the inorganic chemicals industry, the largest user of waste piles by weight, typically consist of precipitates, sludges, heavy ends, off-specification products, spent adsorbents, and spent catalysts.

Most of the Subtitle D waste piles in the EPA industrial survey are on-site facilities. Of the 4,205 active waste piles, only 228 or 5.4 percent accept off-site waste. Similarly, only 103 or 2.5 percent accept off-site household waste.

Of the 1,285 waste piles that are owned by small-quantity-generators (SQGs), 135 dispose of their hazardous waste in on-site Subtitle D waste piles. In other words, 3.2 percent of the industrial Subtitle D waste piles are used for on-site disposal of SQG waste.

Data regarding non-industrial use of waste piles or hazardous waste piles are largely unavailable at this time. In addition, the EPA has not gathered data concerning the environmental and health impacts of waste piles.

<u>Hazardous Waste Piles</u>

Currently, hazardous waste piles at facilities with Part A and Part B permits in states that do not have an authorized RCRA hazardous waste program must meet 40 CFR Part 264 requirements for liners and leachate collection systems. Other regulations include inspection schedules, closure and post-closure plans, as well as exclusion of certain waste types. These regulations apply to owners and operators of facilities that store or treat hazardous waste in piles. Under 40 CFR 264 waste piles for hazardous materials are considered a method of treatment or storage only. Hazardous waste piles that have closed, but still have waste in them, are subject to regulations governing landfills (CFR89i). Facilities with interim status are subject to the regulations found in 40 CFR 265 (CFR89j).

Data characterizing hazardous waste piles are not available at this time. The EPA, however, is in the process of analyzing 1986 data collected in a national survey of hazardous waste facilities (EPA88f).

9.3 Disposal Methodologies and Technologies

This section is subdivided into (1) land-based methods for (a) solid and semi-solid wastes and (b) liquid wastes, and (2) ocean disposal.

9.3.1 Solid and Semi-Solid Waste Disposal

9.3.1.1 Landfills

Landfills are a practical method for the disposal of solid and semi-solid wastes. Most types of landfills have a requirement that a sludge must be at least 20 percent solids to be acceptable for disposal. There are several types of landfills with differing requirements:

- Hazardous waste landfills (Subtitle C facilities)
- Municipal landfills
- Industrial landfills

<u>Hazardous Waste Landfills (Subtitle C facilities)</u>

Since they dispose of hazardous wastes, these facilities fall under Subtitle C of the Resource Conservation and Recovery Act. Requirements for these facilities are given in 40 CFR Parts 264 through 267 (CFR89j). Wastes may be determined as hazardous by two methods: (1) it is listed as a hazardous waste, or (2) it exhibits any of the following four characteristics - ignitability, corrosivity, reactivity, or toxicity.

Several requirements are relevant to modeling these facilities. All wastes must be tested and handled to ensure that the integrity of the facility is not compromised by incompatibility among the wastes (40 CFR 265.313). Double liners and leachate collection systems are required. Facilities must not be located within 200 feet of a fault that has had displacement in Holocene time (40 CFR 264.18). If the facility is located in a 100-year floodplain, it must be designed to prevent washout of hazardous material by a 100-year flood (40 CFR 264.30). The site must have a run-on control system capable of preventing flow onto the active portion of the landfill during peak discharge from a 25-year storm. It also must have a run-off control system capable of collecting and controlling the water volumes from a 24-hour, 25-year storm (40 CFR 265.302). As of 1985, a facility owner may not dispose of bulk or non-containerized liquid hazardous waste or hazardous waste containing free liquids (whether or not absorbents have been added) in the landfill (40 CFR 265.314(b)). Non-hazardous liquid wastes are also prohibited unless the owner/operator can demonstrate that such disposal will not present a risk of contamination of any underground source of drinking water (40 CFR 265.314(f)).

The Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act requires EPA to establish treatment standards for all listed and characteristic hazardous wastes destined for land disposal. The treatment standards set concentration levels or methods of treatment which substantially diminish the toxicity of wastes or reduce the likelihood of migration from the site. Wastes failing to meet the treatment requirements are prohibited from land disposal. Table 9-4 lists the land disposal regulations, the date of publication, and the contents of the regulation (EPA91e). The land disposal restrictions affect the wastes a hazardous landfill may accept rather than the design of the facility.

Municipal Solid Waste Landfills (MSWLFs)

Municipal facilities are allowed to accept household waste and may accept other types of Subtitle D wastes, such as commercial waste, nonhazardous sewerage sludge from publicly owned treatment works, industrial solid waste, and construction/demolition waste. Nearly 50 percent of all municipal solid waste landfills (MSWLFs) accept some amount of industrial waste. Note that about 20 percent receive some portion of small-quantity generator hazardous waste. These facilities may be publicly or privately owned (15 percent are privately owned).

The Environmental Protection Agency promulgated final rules for MSWLFs on 9 October 1991 (40 CFR Part 257 and 258; EPA91d). Part 258 does not apply to MSWLFs that stopped receiving waste prior to that date. MSWLFs that stop receiving waste by October 1993 must meet only the final cover requirements. MSWLFs receiving waste beyond that date must comply with all of Part 258. An exemption exists for small landfills that dispose of less than 20 tons per day on the average in areas receiving less than 25 inches of rainfall per year or remote areas which do not have any reasonable alternative for regionalization (if there is no evidence of existing groundwater contamination.) Qualifying small MSWLFs are exempted from the design, ground-water monitoring, and corrective action requirements.

Location restrictions: New units and lateral expansions may be located in floodplains as long as they do not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in a washout of solid waste so as to pose a hazard to human health or the environment. New units and expansions are barred from wetlands unless the operator can demonstrate safety for four separate criteria. New units and expansions are barred within 200 feet of faults that experienced displacement during the Holocene period and in seismic impact zones unless demonstrations of safety can be made to an approved State.

TABLE 9-4

LAND DISPOSAL RESTRICTIONS REGULATIONS AS OF 1991

Date	Federal Register[1]	Contents
May 28, 1986	51FR19305	Provides Implementation Schedule
November 7, 1986	51FR40636	Solvents and Dioxins rule
June 4, 1987	52FR21014	Corrections to November 7, 1986 rule
July 8, 1987	52FR25787	"California List Wastes" (halogenated wastes, certain metal-bearing wastes, polychlorinated biphenyls (PCBs), and cyanide and corrosive wastes)
July 26, 1988	53FR28118	Underground Injection Control (UIC): Solvents and Dioxins
August 16, 1988	53FR30908	UIC: California List and some "First Third" Wastes (specific F, K, P, and U hazardous waste codes)[2]
August 17, 1988	53FR31211	"First Third" Wastes (§268.10)[3]
February 27, 1989	54FR18266	Amendment to schedule for Multi-Source Leachate
May 2, 1989	54FR18837	Amendments to "First Third" rule
June 14, 1989	54FR25422	UIC: "Second and Third Third" Wastes (§148.15 and §148.16)
June 23, 1989	54FR26647	"Second Third" Wastes (§148.11)
September 6, 1989	54FR36970	Corrections to August 17, 1988 and May 2, 1989 "First Third" rules
June 1, 1990	55FR22683	"Third Third" Wastes and Characteristic Wastes (D001-D017) (§268.12)
June 13, 1990	55FR23935	Corrections to September 6, 1989 rule
January 31, 1991	56FR3876	"Third Third" and Characteristic Wastes Technical Correction Notice

[1] Federal Register (FR) citations (e.g., 51FR19305) are read Volume 51 Federal Register page number 19305.
[2] Hazardous waste code will be used throughout this document to reference hazardous waste numbers identified in 40 CFR §261.20-§261.24 and §261.30-§261.33.
[3] Notations, such as §268.10, refer to the section of Title 40 of the Code of Federal Regulations (CFR).

Source: EPA91b.

Operating criteria: All owners/operators must exclude the receipt of hazardous waste, provide daily cover, control on-site disease vectors, provide routine methane monitoring, eliminate most open burning, control public access, construct run-on and run-off control, control discharges to surface water, cease disposal of most liquid wastes, and demonstrate compliance. Household hazardous waste and hazardous waste generated by conditionally exempt small quantity generator are not included in the Part 258.20 criteria. The exceptions to the restrictions on the disposal of liquids are household waste and leachate from the MSWLF unit.

Design criteria: New units and lateral extensions must have one of the following designs:

- composite liner and leachate collection system design (An illustration shows a unit with a 2-foot bottom layer of compacted soil (permeability <= 1×10^{-7} cm/sec) covered by a flexible membrane liner, overlain by a leachate collection system.)

- a design that meets performance standard and approved by approved State.

Groundwater monitoring: New units, lateral expansions, and existing units need to install a groundwater monitoring system.

Final cover requirements: The final cover design has two layers. The infiltration layer must be a minimum of 18 inches of earthen material that has a permeability <= 1×10^{-5} cm/sec or equal to the permeability of the bottom liner system (whichever is less). The erosion layer must be a minimum of 6 inches of earthen material that can sustain native plant growth.

The Agency believes that regionalization of solid waste management will play a major role in mitigating the long-term impacts of the regulation. It recognized, however, that regionalization is not feasible for some small communities and provided an exemption.

Industrial Waste Landfills

Approximately 28,000 industrial solid waste disposal facilities (i.e., facilities that accept no household wastes) are known to exist (EPA88c). These facilities, of which about 12 percent are landfills, are regulated under existing and proposed 40 CFR Part 257 (CFR891). Industrial landfills can be located either onsite or offsite. About 35 percent of the 390 million dry metric tons of nonhazardous industrial wastes generated annually is managed onsite (although not necessarily in landfills). Very little data are available on industrial landfills and other industrial solid waste disposal facilities. The proposed 40 CFR Part 257 includes a request for notification and information from industrial solid waste disposal facilities.

9.3.1.2 Land Application

Land application, or land treatment, is a disposal method where industrial sludge or sewage sludge is mixed with the soil, and the soil microorganisms are used to break down the organics in the waste into their harmless component parts. Depending upon the liquid content of the waste, the sludge may be applied and tilled into the soil, sprayed on the soil, or injected into the soil. In many cases, the use of the waste is considered beneficial to the soil and is used to reclaim areas used for mining. Industries that use land application for waste disposal include the pulp and paper industry (water effluent treatment sludges), oil and gas (drilling wastes), and municipal waste water treatment plants (publicly-owned treatment works [POTW] for sewage sludges).

Federal requirements for all land application units are found in 40 CFR 257 which contains provisions for protecting flood plains, surface water, and ground water. There are also limits placed on the application rates for cadmium and PCBs (polychlorinated biphenyls) on soil. Annual application rates of cadmium cannot exceed 0.5 kilograms per hectare per year and cumulative application rates are limited depending upon the pH and cation exchange capacity of the soil (CFR89l).

9.3.2 Liquid Waste Disposal

The possible methods for disposing of liquid wastes include:

- Bulk or non-containerized liquid hazardous wastes are prohibited from hazardous waste landfills (CFR89j; 40 CFR 265.314(b))

- Hazardous wastes containing free liquids (whether or not absorbents have been added) are prohibited from hazardous waste landfills (CFR89j; 40 CFR 265.314(b))

- Non-hazardous liquids may not be placed in a hazardous waste landfill unless the owner/operator can demonstrate that it will not present a risk of contamination to any underground source of drinking water (CFR89j; 40 CFR 265.315(f))

- Lab packs (small containers of hazardous waste in overpacked drums) must be packaged in non-leaking inside containers with sufficient absorbent material to contain all the liquid (CFR89k; 40 CFR 265.316)

- Regulations for municipal solid waste landfills prohibit the disposal of bulk or non-containerized liquids (unless it is household waste or, with special site requirements, landfill leachate). Containers holding liquid waste must be small (household size) or designed to hold a liquid for use other than storage (e.g., a battery) (EPA91d; 40 CFR 258.28).

In other words, disposing of the wastes in liquid form in a hazardous waste or municipal waste landfill is not possible.

9.3.2.1 Discharge with Process Waste Water

There are two subcategories of industry to consider under this option: "direct dischargers" or "indirect dischargers." A direct discharger releases the effluent directly to a surface water body. To allow the discharge, each site needs the modification of an existing, or the issuance of a new, National Pollution Discharge Elimination System (NPDES) permit. An indirect discharger releases an effluent to a sanitary sewer, and that water is treated by a publicly owned treatment works (POTW). The POTW produces sludge as the residue from the wastewater treatment process, but also discharges the "cleaned" water to surface or other water bodies. Each POTW has an NPDES permit.

9.3.2.2 Injection Wells

Liquid wastes may be injected for disposal. Two types of injection wells require discussion, Class I and Class V wells. Class I wells are used to inject hazardous wastes beneath the lowermost formation containing, within one-quarter mile of the well bore, an underground source of drinking water. Class I wells also include other industrial and municipal disposal wells that inject fluids beneath the lowest formation containing an underground source of water within one-quarter mile of the well bore. In Class I wells, injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited. Except during stimulation, the injection pressure is prohibited from creating new fractures or propagating existing fractures on the injection zone, or to initiate fractures in the confining zone.

Class V injection wells are used for the disposal of nonhazardous wastes that are not associated with oil and gas productic or certain mining activities. Class V wells have been usec or a variety of nonhazardous wastes including septage and municipal wastewater and are not necessarily deep wells, since they do not currently have any requirements, as do Class I wells, to underlie all known actual or potential sources of drinking water.

The regulations concerning Class I and Class V wells are found in 40 CFR Parts 144 through 147 (CFR891). In addition, many states have their own Underground Injection Control programs, and some have primacy for regulating Class I wells (analogous to being an Agreement State with NRC).

9.3.2.3 Surface Impoundments

Surface impoundments are facilities or part of a facility that is a natural topographic depression, human-made excavation, or diked area formed primarily of earthen materials. Examples include holding, storage, settling, and aeration pits, ponds, and lagoons. They are associated with wastes with low solids content (i.e., pumpable wastes). It is a very common onsite disposal method for industrial wastes (nearly 60 percent of all industrial waste facilities are surface impoundments [EPA88c]). If the waste is from a publicly-owned treatment work (POTW), i.e., treated sewage sludge, it falls under the regulations in proposed 40 CFR 503 where pollutant limits are set (EPA93).

9.3.2.4 Land Application

Liquid wastes may also be land-applied by spraying the wastes over the soil. For a more complete description, see Section 9.3.1 where the regulations concerning land application are discussed in greater detail.

9.3.3 Ocean Disposal

In 1988, Congress enacted Public Law 100-688, known as the Ocean Dumping Ban Act, which prohibits the dumping of sewage sludge and any solids, semisolids, or liquids associated with industrial manufacturing or processes (with very few exceptions) by December 31, 1991. The EPA intends to apply the broadest interpretation of this law and will work to prohibit the disposal of any industrial waste in the ocean. Additionally, at this time, the EPA believes that only municipal sludge is being disposed of in the ocean. All industrial waste disposers appear to have already ceased ocean dumping.

10.0 CHARACTERIZATION OF TREATMENT AND DISPOSAL TECHNOLOGIES

This chapter describes in more detail the treatment and disposal techniques identified in Chapter 9. Incineration (or combustion) is the only treatment method considered, while disposal methods focus on various types of landfills.

10.1 Treatment (Combustion)

Combustion, with or without energy recovery, is becoming a more common method of municipal waste reduction. A method that typically reduces municipal solid waste up to 90 percent by volume and 70 to 75 percent by weight will certainly be attractive to any community with landfill capacity limitations (EPA88a; KIS90). The U.S. Environmental Protection Agency has set a goal of increasing the proportion of municipal solid waste incinerated from 9 percent in 1989 to 20 percent in 1992 (EPA89a).

Three variations for the combustion of wastes are examined:

- On-site incineration as a nonhazardous waste in a small combustor (such as a hospital or biomedical research facility would have for the disposal of infectious wastes)

- Off-site incineration as a nonhazardous waste in a municipal waste combustor

- Off-site incineration as a hazardous waste at a permitted Subtitle C facility

10.1.1 On-site Incineration

10.1.1.1 Summary Description

In on-site incineration, wastes are collected, stored, and incinerated on site. The resulting ash is collected and, if necessary, tested to determine whether the ash is hazardous. If not, it is hauled to a municipal waste landfill for disposal. If hazardous, it is sent to a Subtitle C facility. A waste is considered hazardous if it is listed as a hazardous waste or it exhibits one or more of the following characteristics:

- ignitability
- corrosivity
- reactivity
- toxicity

The last parameter is measured by the toxicity characteristic leaching procedure (TCLP) (EPA90a). EPA has already determined that some specific wastes are hazardous, and these are referred to as "listed" wastes (CFR89a). Toluene, for example, is a component of some scintillation fluids. The presence of toluene in a waste may cause it to exhibit the hazardous characteristic of toxicity. Only if toluene is discarded as part of a spent solvent or off-specification product would it be a listed hazardous waste.

The report assumes that the generator of the waste will test it to determine whether it is hazardous. If it is, the generator will need to determine how much hazardous waste is generated in a calendar month. Requirements differ depending upon the amount generated. For example, facilities that generate less than 100 kg/calendar month and no more than 1 kg/calendar month of acutely hazardous waste are conditionally exempt (CFR89a and CFR89b).

On-site incineration is particularly relevant to the biomedical sector. Information for this technology is drawn from the data gathered on hospital incinerators.

10.1.1.2 Current Practices

Facilities that handle biomedical wastes, such as hospitals, research facilities, and manufacturers, are also likely to handle infectious wastes. Many states require incineration for the disposal of infectious wastes (EPA88a, Appendix L). In March 1990, there were approximately 5,500 hospitals in the United States[2], and the EPA estimates that over 90 percent of these facilities operate incinerator equipment of some kind (EPA88a). There is no more accurate estimate of the number of hospital incinerators or other on-site incinerators at this time.[2,3]

Many of the units are small and are not considered in several regulations. For example, units combusting solely medical waste are not covered by the new standards of performance for

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[2] Personal communication between Milton Bezub, American Hospital Association, Washington, D.C., and Maureen F. Kaplan, Eastern Research Group, Inc., Arlington, MA, 27 November, 1990, regarding hospitals and incinerators.

[3] Personal communication between Mary Greene, U.S. Environmental Protection Agency, Office of Solid Waste, and Maureen F. Kaplan, Eastern Research Group, Inc., Arlington, MA, 22 October 1990, about current practices and uses of incinerators.

combustors (EPA91a; 40 CFR 60.50a(g)) or emission guidelines for existing facilities (EPA91b; 40 CFR 60.30.a(f)). If, however, the units have a heat input capacity above 100 million Btu/hr and recover heat to generate steam or heat water, the units would be subject to NSPS for industrial, commercial, and institutional boilers (EPA88a; 40 CFR 60.40b, Subpart Db). The EPA calculates, however, that a hospital incinerator would have to be sized over 11,700 lb/hr to be subject to this regulation and notes that the largest onsite hospital incinerator offered for sale is approximately 6,000 lb/hr (EPA88a).

Standards for incinerator performance are set in 40 CFR Subpart E, but only for units having a design capacity of 50 tons/day or greater and that burn over 50 percent municipal waste (CFR89c, 40 CFR 60.50-51). EPA88a calculates this as a feed rate of 4,167 lb/hr; Subpart E would apply only to the largest of hospital waste incinerators. The same 50 ton/day criterion is used in 40 CFR Part 240, guidelines for the thermal processing of solid wastes (CFR89d). The guidelines require that emissions shall not exceed the emission standards established by the Agency under the authority of the Clean Air Act (40 CFR Parts 52, 60, and 61) or state or local standards, whichever are more stringent.

Hospital waste incinerators are not named among the 28 prevention of significant deterioration source categories (EPA88a) and are generally small enough to fall outside the area of most regulations.

10.1.1.3 Facility Features and Characteristics

Three major types of incinerators are currently used in hospitals: excess air, controlled air, and rotary kiln. Excess air, or retort, incinerators appear as a compact cube from the outside with a series of chambers of baffles inside. Burning is accomplished with total excess air levels of 100 to 300 percent. Generally, only the older incinerators are retort incinerators. Most new systems are two-stage controlled-air units capable of 99.9 percent combustion efficiency. Rotary kilns consist of a primary chamber in which waste is heated and volatized and a secondary chamber in which combustion of the volatile fraction is completed (EPA88a).

Feed systems and ash removal for the incinerators range from manually operated to fully automatic systems. For units with feed rates less than 200 lb/hr, manual loading and ash removal with rake and shovel are typical. Mechanical loaders are standard features for units with capacities above 500 lb/hr (EPA88a).

Size: The EPA obtained data on 433 hospital incinerators in New York State (EPA88a). Figure 10-1 reproduces the information on the waste feed rate distribution. About 60 percent of the units have design feed rates of less than 200 lb/hr. The units with feed rates less than 200 lb/hr showed a bimodal distribution, with peaks in the 50 to 74 lb/hr and 100 to 124 lb/hr categories (see Figure 10-2). Units that burn more than 600 lb/hr make up 52 percent of the incineration capacity, while those that burn 1,000 lb/hr or greater make up 34 percent of total incinerator capacity. The report does not specifically identify the smallest and largest units in the study, but it presents the stack heights for incinerators with feed rates ranging from 1 to 2,700 lb/hr. Elsewhere, the report mentions that 6,000 lb/hr is the design capacity of the largest unit offered for sale.

Stack Height: The lowest stack height in the New York study is given as 6 to 8 feet while the highest appears to be 365 feet (see Figure 10-3). The average stack height for the seven feed rate categories ranges from 66 to 87 feet. EPA88a uses 78 feet as an average stack height for all of its model facilities.

Operating Characteristics: EPA88a does not give any information on staffing requirements, per se. A typical operating cycle is given as:

- ash clean-out 15-30 minutes
- preheat 15-60 minutes
- waste loading 5-6 hours
- burn-down 2-4 hours
- cool-down 5-8 hours

A waste loading period of 12 to 14 hours is a maximum for units with manual ash removal (EPA88a). Rotary kilns operate in a continuous mode, so loading and ash removal must be accomplished in a continuous or semi-continuous mode (EPA88a). A model incinerator with a feed rate of less than 200 lb/hr can be characterized as operating 5 days a week for about 4 hours a day (EPA88a).

Mass Reduction Factor: EPA88a gives a volume reduction of 90 percent. EPA89b provides mass reduction factors of about 3 for mass burn and modular systems.

Transportation Distances: There is no transportation distance to the incinerator for an on-site facility. Distances for transportation of the ash to a landfill for disposal are discussed in the next section.

Distance to Nearest Member of the Population: Given that most hospitals have incinerators, we must assume that the nearest exposed member of the general population is standing on the sidewalk next to the building. This is probably in the neighborhood of 10 meters from the stack.

Population Density: On-site incineration is a waste management option often chosen for biomedical wastes. Biomedical waste generators provide a wide range of functions, such as health care services at local clinics, private hospitals, and government hospitals. As mentioned, there are an estimated 5,500 hospitals nationwide. Incineration of these wastes, therefore, could potentially occur anywhere in the country. Appendix L, Table L-3, summarizes the population for every county in the country by state. The range varies from 131 people in Newtok County, Alaska, to 7.5 million people in Los Angeles County, California. Some facilities will be located in large cities. The population density of the surrounding area may be as high as that of Manhattan (68,015 people per square mile in 1988; CEN90, Table 40). Total county figures for New York City are: 1.2 million (Bronx), 2.2 million (Kings = Brooklyn), 1.4 million (New York = Manhattan), 350 thousand (Richmond = Staten Island), and 1.9 million (Queens).

Table 10-1 summarizes of the on-site incineration parameters. For comparison, the facility at Rockefeller University for the incineration of infectious wastes is a controlled air incinerator permitted to burn 400 lb/hr (RU88). This facility would represent approximately the 80th percentile for size in the data set for hospital incinerators.

10.1.2 Off-site Incineration at a Municipal Facility

10.1.2.1 Summary Description

In off-site incineration at a municipal facility, the combustible waste is separated at the point of generation for incineration and disposal. The material is collected at the generating site along with other trash and transported by truck to the incineration site. Municipal waste incineration facilities incorporate economies of scale over the hospital-sized units and are much larger. The resultant ash is either transported to a landfill or is disposed of at an on-site landfill. If the ash fails any test for hazardous characteristics, it must be sent to a Subtitle C (hazardous) facility for disposal.

There are three main types of combustors in operation: mass burn, modular, and refuse-derived fuel. At mass burn facilities, refuse is placed on a grate system that moves the waste through the combustor. The waste is not preprocessed, except to remove large, noncombustible items (e.g., a refrigerator). Modular combustors also burn waste without pre-processing, are typically shop fabricated, and are installed at the site. For refuse-derived fuel facilities, the waste is shredded or finely divided to allow co-firing with pulverized coal (EPA89c).

10.1.2.2 Current Practices

Regulations and emission guidelines for new and existing combustors appeared on 11 February 1991 (EPA91a and EPA91b). The standards limit the emission of organics, metals, acid gas, and nitrogen oxides, and require good combustion practices. The proposed standards initially required a 25 percent reduction in the weight of the waste through separation of recoverable materials prior to combustion. This requirement, however, has been eliminated in the final standards.

10.1.2.3 Facility Features and Characteristics

A 1990 survey found 168 municipal waste combustion (MWC) facilities in operation in the United States (KIS90). Only 40 of these are incinerators, while the remaining 128 are waste-to-energy (WTE) plants. Not included in the count are 12 refuse-derived fuel (RDF) processing facilities that generate a prepared fuel for off-site combustion. An additional 19 WTE plants are under construction, and 79 MWC plants are in the planning stage (active and inactive). From 1986 to 1989, the WTE capacity in the United States nearly doubled, and the figure could double again by 1992 if all projects under construction and in final planning stages come on line (LEG89).

Size: Table 10-2 summarizes the municipal waste combustors in operation as of September 28, 1990. They are located in 38 states. New York has the largest capacity -- 13,011 tpd -- and this does not include the 3,000 tpd facility that is in the early planning stages for the Arthur Kill landfill on Staten Island. The five states with the next largest capacities are Florida (11,270 tpd), Massachusetts (10,600 tpd), Virginia (6,831 tpd), Connecticut (5,913 tpd), and Minnesota (5,878 tpd). Together, these six states account for nearly 60 percent of the U.S. capacity.

The size ranges from a 5 tpd facility in New Hampshire to a 3,300 tpd facility in Michigan. The size or capacity of a facility is the total capacity of all its units; many facilities have more than one unit. Figure 10-4 is a histogram of combustion capacity, showing the distribution to be highly skewed to the left. The median size is 200 tpd, the mean is 550 tpd, and the standard deviation is 721 tpd. The mode is 100 tpd with a secondary mode at 200 tpd. Taking the $\log_{10}$ of combustor capacity results in a more symmetrically shaped distribution (Figure 10-5). The mean of the transformed distribution is 2.3 (about 200 tpd) with a standard deviation of 0.68 tpd. A summary of facility size by compact region is given in Table 10-3.

Stack Height: KIS90 does not present information on stack height. To fill this gap, ERG used an earlier study of municipal waste combustors. In 1988, EPA gathered information on existing municipal waste combustors to support a rulemaking effort for proposed guidelines for existing facilities (EPA89b and EPA89c). This information was compiled into a database from which EPA developed 12 model facilities with stack heights ranging from 60 to 230 feet. About half of the models have stack heights of 200 feet or greater (EPA89c).

The SC&A team obtained a copy of the database from EPA (MYE90); Table 10-4 lists selected parameters. The listing shows that a facility may have multiple combustion units and that these units may or may not share stacks. The average stack height is 138 ft with a standard deviation of 82.6 ft and a median of 120 ft. The mode for the distribution is 40 ft with secondary modes at 80 to 90 ft and 200 ft.

Operating Characteristics: About 85 percent of the facilities operate 24 hours a day. About 67 percent operate 7 days a week, with an additional 23 percent operating 5 days a week. EPA89b estimates that a 900 tpd refuse-derived fuel facility requires:

- 10 person-years/year operating labor
- 3 person-years/year supervisory labor
- 3 person-years/year maintenance labor.

Labor requirements for smaller facilities are scaled by capacity.

Mass Reduction Factors: The mass reduction factors used in the EPA model incinerators are summarized in Table 10-5 (EPA89b). Case studies for model facilities show volume reductions from 75 to 90 percent and mass reductions from 50 to 70 percent for mass burn and modular units, and reductions of 95 percent (volume) and 90 percent (weight) for refuse-derived fuel facilities (EPA89c). The combined information in Tables 10-3 and 10-5 indicates that the Midwest Compact is the only region with a substantial portion of refuse-derived fuel facilities. The mass reduction for a combustor in this compact may be a factor of 6 to 7, rather than the typical value of 3.

Transportation Distances: Table 10-6 estimates typical average transportation distances to a municipal waste combustor by state. The area of the state is divided by the number of combustor facilities to calculate the area served by each facility. The average straight-line transportation distance is one-half the radius of a circle with this area. The distance is doubled to account for the fact that hauling routes are rarely straight-line patterns.

Table 10-7 presents the information by compact. Note that the Rocky Mountain Compact has no incinerators. Distances in excess of 200 miles are estimated for the Northwest and Southwestern Compacts. The Central and Central Midwest Compacts have estimated transport distances of 160-180 miles. The Midwest, Southeast, and Appalachian Compacts have estimated transport distances between 80-90 miles. The Northeast Compact has the shortest distance - slightly under 30 miles.

Distance to the Nearest Member of the Population: Very few site-specific data are available for this parameter. The permit requirements for licensing an incinerator rely upon a trial burn and performance tests to indicate compliance with emission standards. No site-specific accident risk analysis is required.

Population Densities: MYE90 includes information on surrounding land use for existing incinerators. About two-thirds of the facilities indicated that surrounding land use was industrial. About 40 percent cited commercial land use, 38 percent cited residential land use, 20 percent cited rural land use, and 20 percent cited other land use. A facility could mark multiple categories of land use. The information in Appendix L can provide a range of the county populations. The upper end is marked by two incinerators in Brooklyn which has a county population of 2.2 million people.

10.1.3 Off-site Incineration at a Hazardous Waste Facility

10.1.3.1 Summary Description

In this scenario, the combustible waste is separated at the point of generation and transported to the incineration site. The distinction between Section 10.1.2 and 10.1.3 is that the combustible material has been determined to be a hazardous waste. If the waste is a listed hazardous waste, the ash is sent to a Subtitle C facility. If the waste is a characteristic hazardous waste, the ash is tested. The results indicate whether the ash will be sent to a Subtitle C or Subtitle D facility for disposal (CFR89a; 40 CFR 261.3(c)).

10.1.3.2 Current Practices

The process for disposing of hazardous waste is very similar to that for the disposal of low-level radioactive waste. The generator must prepare a manifest which tracks the waste until its ultimate disposal and a licensed transporter is required to follow the Department of Transportation (DOT) and EPA regulations regarding the pick-up, transport, and delivery of hazardous waste to a licensed treatment or disposal facility.

The DOT regulations may be found in 49 CFR 171-179. Treatment and disposal must occur in licensed facilities.

Performance standards for owners of hazardous waste incinerators are found in CFR89e. Requirements include:

- 99.9999 percent destruction and removal efficiency (DRE) for dioxins, dioxin-listed wastes, and PCBs

- 99.99 percent DRE for each principal organic hazardous constituent (POHC)

- Emission rate for hydrogen chloride not to exceed 1.8 kg/hr or 1 percent of HCl in stack gas prior to entering pollution control equipment

- Particulate matter emission rate not to exceed 180 mg per dry standard cubic meter (0.08 grains per dry standard cubic foot)

Performance standards for hazardous waste burned in boilers and industrial furnaces were promulgated on 21 February 1991 (EPA91c). In addition to the limitations given above on dioxins, PCBs, POHCs, and particulate matter, limits on emissions are placed on carbon monoxide, hydrocarbons, and 10 metals with a bubble approach for facilities with multiple stacks. There is an exemption for small quantity on-site burners under certain conditions but not if the waste contains dioxins or PCBs (40 CFR 266.108).

Compliance for permits is evaluated by a trial burn (EPA91c, EPA88b). No safety or risk assessment, such as risk to public health in case of filter failure, is required[4].

10.1.3.3 Facility Features and Characteristics

The information about facility features and characteristics is drawn from two EPA surveys:

- National Survey of Hazardous Waste Treatment, Storage, Disposal and Recycling Facilities, OMB No. 2050-0070, expires June 1988

- National Survey of Hazardous Waste Generators, OMB No. 2050-0075, expires November 1989

[4] Personal communication between Michael Johnston, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, and Maureen F. Kaplan, Eastern Research Group, Inc., Arlington, MA, 20 December 1990, regarding evaluation of compliance and permits.

The data from 1986 are requested in both surveys. The data were prepared by RTI and are in SAS (RTI91a).

There were 238 facilities that responded to the survey. The location of each facility is listed in Table 10-8. Summaries by state and by compact are given in Tables 10-9 and 10-10, respectively. Four non-affiliated regions (Maine, New Hampshire, Vermont, and the District of Columbia) do not have hazardous waste incinerators within their boundaries.

Tables 10-11 through 10-13 summarize the facilities that (1) accept wastes from the general public, or from a limited number of facilities not under the same ownership, or (2) plan to become commercial before January 1992. The number of facilities now drops to 31. All compact regions have at least one facility, but, of the unaffiliated states, only Massachusetts, New York, and Texas have a facility within their borders.

We compared the "commercial" facilities with "private" facilities that handled waste that was either generated on site or by a facility under the same ownership (Tables 10-14 through 10-16). A commercial facility incinerated about 4 times as much solid waste as a private facility even though it is about 8 times smaller in area. All facilities that handle mixed radioactive/hazardous waste are private. Because of the differences between "commercial" and "private" facilities, we restricted the data set for the rest of the analyses to the 31 commercial facilities listed in Table 10-17.

Size: Table 10-18 summarizes facility size by compact. The range is from 1 to 2,700 acres. The average is nearly 400 acres, but it varies from 2 to 1,080 acres by compact.

Distance to Nearest Property Line: The closest property line to an area that handles hazardous waste ranges from 0 to 1,600 feet (see Table 10-19). The average is 250 feet but varies from 25 to 765 feet by compact.

Population Within One Mile: Table 10-20 summarizes the estimated population within one mile. (Table 10-17 provides a site-by-site list.) In four cases, there is no one within one mile. Where there is information, the population ranges from 4 to 20,000 people. The average is 1,845 people.

Closest Residence: Tables 10-17 and 10-21 summarize the distance to the closest residence. This information is missing for seven facilities, but where it is given, the distance ranges from 120 to 10,000 feet. The average is 2,685 feet.

Types of Incinerators: The types of incinerators used at each facility are listed in Table 10-22. The most common types are liquid injection (11 facilities) and rotary kiln with injection (13 facilities). None of the facilities have infra-red or fume/vapor incinerators.

Operating Characteristics: There are 41 units located at the 31 facilities. Table 10-23 summarizes the types of materials that can be fed directly into the incinerator unit. About half can handle fiber drums (intact, empty, or shredded/crushed). Only a quarter can handle metal drums in any form; only nine facilities can feed intact metal drums into the incinerator. About 40 percent can handle sludge, while about 25 percent can handle uncontainerized bulk solids. Table 10-24 lists the pollution control devices associated with a particular incinerator. The most common devices are packed bed scrubbers, quenches, and venturi scrubbers, often in combination. About half the incinerator units have these pollution control devices. Table 10-25 lists operating time and downtime during 1986. Several units are under-utilized and had downtime due to no waste. Over half (25 units) operated in excess of 2,000 hours in 1986 with hazardous waste influent, and most of these operated in excess of 12 hr/day for the year.

Feed rates are listed in Table 10-26. Most of the units can handle liquids, and feed rates range from 20 to 20,000 lb/hr and up to 2,000 gal/hr. Only 13 units handle sludges; feed rates range from 5 to 8,000 lb/hr. Only two units handle gases. Table 10-27 summarizes feed rates for solids by compact. The average feed rates vary from 100 to 7,500 lb/hr by compact.

The survey gathered no information on stack height.

Operating Personnel: Table 10-28 lists the number of employees by facility. In several cases, a substantial portion of the employees neither engage in nor support hazardous waste operations (see Pittsfield, Massachusetts, Cottage Grove, Michigan, Columbia, Missouri, Rochester, New York, and Kingsport, Tennessee). The Midland, Michigan facility is unique in the large number of contractors used compared to the overall number of employees. Table 10-29 summarizes this information by compact. The average number of employees engaged in hazardous waste operations varies from 3 to 1,005 people, while the average number in supporting operations ranges from 3 to 104 people. The use of contractors is sporadic and occurs in only six of the regions and states.

County Population: Appendix L, Table L-1, lists the population for each of the 31 counties in which there is a commercial hazardous waste incinerator. The population ranges from 9,270 (Carroll, Kentucky) to 5.2 million people (Cook, Illinois).

Transportation Distances: Table 10-30 summarizes transportation distances **to the incinerator site** by compact. The calculations are based on the number of facilities that accept waste from off-site non-owner generators. From the time of the 1986 survey to October 1990, an additional 52 facilities received permits to burn hazardous waste (EPA90b). It is not clear, however, how many of these newer facilities accept wastes generated off-site by non-owner facilities. Table 10-30 also presents the areas of unaffiliated states combined with the areas of contiguous states through which the waste would have to travel in order to reach an incinerator. (For example, the distances for Maine are based on the area of Maine, New Hampshire, and Massachusetts.)

We also need to consider transportation **from the incinerator site to the landfill site**. A review of Table 10-17 indicates that only 2 of the 31 facilities have associated landfills. Several facilities were contacted by telephone to verify the shipment of the wastes. They do ship the wastes, generally to hazardous waste landfills located elsewhere. Typical travel times, when given, ranged from 2 to 5 hours (SIG91a).

10.2 Disposal Technologies

This section discusses the final disposal of the waste. Waste forms that are (1) solid or have been solidified, and (2) non-recyclable are candidates for landfilling in an appropriate facility. This means that metals, glass, and liquids are excluded.

Landfills fall into two general categories -- Subtitle D facilities that accept non-hazardous waste and Subtitle C facilities that accept hazardous waste. (The terms derive from the part of the Resource Conservation and Recovery Act [RCRA] in which they are discussed.) Subtitle D facilities include both industrial and municipal solid waste landfills (MSWLF). Industrial landfills are generally located at the generating facility.

10.2.1 Subtitle D Facilities - Municipal Solid Waste Landfills

10.2.1.1 Summary Description

In this scenario, wastes are collected and hauled to a transfer station or directly to an MSWLF. Commercial haulers offer containers to their clients that range from 1 to 50 cubic yards (cy). Typical sizes for municipal waste are the 15 and 30 cy containers; the larger 50 cy containers are generally used for demolition and construction debris. Compactors are available for the 15 and 30 cy containers, and these can reduce the waste volume at a 4:1 ratio (SIG91b).

Transportation vehicles range from typical garbage trucks to semi-trailers (GUT91). Transfer stations are used to consolidate loads on larger vehicles should the distance to the landfill be substantial. At the landfill, the truck is weighed and tipping fees are assessed. The waste is offloaded, spread by construction equipment in the disposal cell and covered at the end of the day. A final cover is placed over the landfill unit when all cells are filled.

10.2.1.2 Current Practices

General criteria for all solid waste disposal facilities are found in 40 CFR 257 (CFR89f). These criteria contain provisions regarding:

- Flood plains - units located in flood plains shall not restrict the flow of flood waters; reduce the temporary overflow water storage capacity of the flood plain in case of a flood; or result in a washout of solid waste that would present a hazard to humans, wildlife, land resources, or water resources.

- Surface waters - units cannot discharge pollutants or dredged or fill material into state waters in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES; Section 402 of the Clean Water Act). Non-point source pollution of surface waters in violation of a water quality management plan is also prohibited (Section 208 of the Clean Water Act).

- Ground water - a unit cannot contaminate an underground drinking water source beyond the solid waste boundary. States have the authority to change the boundaries only if such an alteration would not contaminate drinking water sources.

Guidelines specifically for the land disposal of solid wastes are found in 40 CFR 241 (CFR89g). Recommended procedures include: compacting the spread wastes to the smallest practicable volume, placing and compacting a 6-inch cover over the working area at the end of each day, and placing a final cover of no less than 2 ft of compacted material.

States have placed additional requirements for municipal landfills. These are summarized in Tables 10-31 through 10-37 (taken from EPA88c). The requirements vary widely from state to state. The final cover for the site, however, is the parameter most frequently included. On the other hand, at the time the tables were compiled, no state required air monitoring.

The Environmental Protection Agency promulgated final rules for municipal solid waste landfills (MSWLFs) on 9 October 1991 (EPA91d). New units and lateral expansions must have liners, leachate collection systems, and final covers as specified (see Section 9.3 for more details) or achieve a performance-based design goal. The final rule "sets a risk range of 1×10^{-4} to 1×10^{-6}," but states are not precluded from setting a more stringent standard (EPA91d, 51086).

In 1985, EPA conducted a census of landfills which resulted in an estimate of 7,645 municipal landfills (EPA86). The geographical distribution of those landfills is illustrated in Figure 10-6.

10.2.1.3 Facility Features and Characteristics

The 1985 census formed the basis of a survey conducted by the EPA in 1986 (EPA87). The survey was not a census, but a stratified sample with the stratification based on sample size. There were 1,076 respondents representing an estimated 6,034 facilities.

The SC&A team obtained a copy of the available data from the survey (RTI90). Of the 1,076 respondents, 61 masked the state in which the facility was located for reasons of confidentiality, and another 4 were for landfills in Puerto Rico. These were not considered further in our analyses. The resultant data set contained 1,011 observations. A listing of the names and addresses of these facilities is included as Appendix M. Table 10-38 summarizes the observations by state; Colorado is the only state without observations. Table 10-39 summarizes the observations by compact and unaffiliated states. Because this was a stratified sample, the sampling weights have been used in the calculation of all subsequent tables. A trial run was made comparing the ownership of the facilities calculated from our data set against the results published in EPA88d. The results agreed within a percent (see Table 10-40) so the removal of the masked observations should not significantly affect the results.

<u>Age and Lifetime</u>: Tables 10-41 and 10-42 summarize the age of the facilities in the survey, while Tables 10-43 and 10-44 describe their estimated lifetime. The average facility is 19 years old with an estimated average lifetime of 40 years. Table 10-45 is the frequency table for closure dates. Over

half the facilities are expected to close by 1999. This survey finding has been borne out by the capacity crisis reached in some states and will be discussed further in the section on regulatory climate and future developments.

Size: Tables 10-46 through 10-48 summarize the facility area (acres), capacity (million cubic yards), and depth (yards) on a state basis. Tables 10-49 through 10-51 repeat the information on a compact basis. Landfills in the survey may be as small as 1 acre or as large as 5,250 acres. Capacities range from 308 thousand cubic yards to 364 million cubic yards. The distributions for these parameters are skewed, and the median values for these parameters are 40 acres, 375,650 cubic yards, and 2.5 yards in depth.

Waste: Quantity: The average annual quantity of waste received by the facility is given in Tables 10-52 and 10-53. The range is anywhere from 5 metric tons a year to 6.3 million metric tons a year. The average varies greatly by compact region.

Waste: Received From: In 1986, very few facilities received waste from incinerators (3 percent) or from resource recovery facilities (3 percent). These percentages are likely to increase in the future given the current emphasis on incineration and recycling as means to reduce the landfill capacity crisis (EPA89a).

Waste: Form in Which Received: Tables 10-54 and 10-55 summarize the percentage of wastes received as bulk liquids, containerized liquids, or other containerized waste. In general, over 95 percent of the facilities did not receive these waste forms. The exceptions, however, received up to 50 percent bulk liquids or containerized liquids (e.g., Oklahoma), while other facilities received up to 20 percent containerized wastes.

Waste: How Processed: In general, few facilities said they used baling (2 percent) or shredding (2 percent). More facilities (39 percent) said they used other methods of processing the wastes, but there is no information on what these methods might be.

Landfill Method: Table 10-56 tabulates the proportion of facilities using certain landfill methods. In general, 47 percent use the area method, 68 percent use the trench method, and 41 percent of the facilities use both these methods. Other (unspecified) landfill methods are used by 5 percent of the facilities.

Waste: Cover Ratio: Table 10-57 summarizes the proportion of the facilities using certain waste to cover ratios. There is a wide range used, but there are modes at 3:1 and 4:1.

Landfill Units: Individual unit information from the survey was not available (HUD90). The following information on specific units is taken from EPA88d. Active units averaged 32.5 acres in surface area, with an average 1.5 million cubic yards in capacity. Planned units were smaller -- 18.8 acres with 1 million cubic yard capacity. Most sites averaged less than two units per facility.

About 35 percent to 40 percent of the active and planned units have no known liner (Table 10-58), while synthetic membrane liners quintuple in use between active and planned units. Table 10-59 summarizes the average thickness of the liner where one is in use or planned. The thicknesses vary widely with the material.

Tables 10-60 and 10-61 list the percentage of facilities using final covers and the thickness of those covers. Less than 5 percent of planned units have no known cover.

Leachate collection systems are summarized in Table 10-62. At the time of the survey, only 11.5 percent of the active units and 21.2 percent of the planned units had leachate collection systems. Leachates are frequently trucked or discharged to a sewer/publicly-owned treatment works (POTW) (38 percent to 56 percent) or re-circulated (21 percent to 30 percent).

Geohydrology: Tables 10-63 through 10-65 summarize the percentage of facilities occurring in 100-year flood plains, designated wetlands, and karst terrain. In general, about 12 percent of the facilities are located in flood plains, and 5 percent are located in wetlands. The percentages, however, vary widely by compact.

Tables 10-66 through 10-71 show the percentages of facilities that have (1) wells (public or private), (2) rivers, streams, lakes, or reservoirs used for drinking, and (3) rivers, streams, lakes, or reservoirs not used for drinking within a mile of the facility. In general, about 55 percent of the facilities have no wells within 1 mile of the site. About 56 percent of the facilities have rivers, streams, lakes or reservoirs within 1 mile but these are not used as drinking water sources. Only 5 percent of the facilities have water bodies that are used as drinking water sources within a mile. Again, there is wide variation by compact. Rhode Island, for example, has wells but no rivers, streams, lakes, or reservoirs within a mile of its facilities.

The average hydrogeological characteristics of the upper aquifer at each facility are summarized in Tables 10-72 and 10-73. The range seen in the average horizontal flow rate varies from less than 1 foot/yr to more than 10,000 feet/year, depending on the compact.

Distances: Eleven sets of distances were requested in the survey. These are (1) from the property line to the nearest residence, (2) from the edge of a unit to the nearest residence, (3) from the bottom of the wastes to the high water table, (4) from the bottom of the wastes to bedrock, (5) from the edge of a unit to the nearest downgradient private well within 1 mile, (6) from the edge of a unit to the nearest downgradient public well within 1 mile, (7) from the edge of a unit to the nearest downgradient river or stream within 1 mile that is used for drinking water, (8) from the edge of a unit to the nearest downgradient lake or reservoir within 1 mile that is used for drinking water, and (9, 10, and 11) from the edge of a unit to the nearest downgradient water body reservoir within 1 mile that is NOT used for drinking water (9 = river or stream, 10 = lake or reservoir, and 11 = wetland). All distances are listed on one table for easy reference. Separate tables provide the mean, number of observations in the sample, minimum value, maximum value, and standard deviation. Distances by state are given in Tables 10-74 through 10-78, while the information for compacts is given in Tables 10-79 through 10-83. For example, where there is a well within a mile of the site, the average distance is 1,850 feet and 2,357 feet to a private and public well, respectively.

Private Wells within 1 Mile: Where there are wells within a mile, there is information on the number of private wells and the population served by them (Tables 10-84 and 10-85). Anywhere from one to several hundred wells serving from 1 to 1,500 people may be found within a mile. In general, when there are wells within a mile of the site, an average of 17 private wells serve 45 people.

Public Wells within 1 Mile: Where there are wells within a mile, there is information on the number of public wells and the population served by them (Tables 10-86 and 10-87). There can be anywhere from 1 to 17 wells within a mile serving from 6 to 55,000 people. In general, when there are wells within a mile of the site, an average of 2 public wells serve 3,639 people.

Rivers and Streams within 1 Mile: Tables 10-88 and 10-89 summarize the number and population information for rivers or streams that are used for drinking water within a mile. There are, at most, two such water bodies serving up to 250,000 people. Only 5 percent of the facilities have such characteristics.

Lakes or Reservoirs within 1 Mile: Table 10-90 and 10-91 summarize the number and population information for lakes or reservoirs that are used for drinking water within a mile. These are rare, as may be seen from the sparse entries in the tables. There are, at most, two such water bodies serving up to 150,000 people. Only 5 percent of the facilities have such characteristics.

Population Served by Nearest Water Sources: Where there are drinking water sources within a mile of the site, the survey requested the distance to that source and the number of people served by that source. The distance information is given in Tables 10-74 through 10-83. The associated population information is given in Tables 10-92 and 10-93. The sparsity of the data indicates the relative infrequency of major water sources being located within a mile of the site.

Monitoring Systems: Table 10-94 summarizes the proportion of facilities that monitor various media. In general, ground water is the most frequently monitored, but this happens at only one of every three sites. Tables 10-95 through 10-100 summarize the information by state, while Tables 10-101 through 10-106 summarize the data on a compact basis.

Contaminants Monitored: Table 10-107 ranks the contaminants monitored in ground water. Only conductivity, pH, iron, and chlorides are monitored more than half the time.

Monitoring Wells: Given that monitoring wells occur at the facility, Tables 10-108 and 10-109 summarize the number of wells, their average depth, the sampling frequency, and the number of samples taken in each episode for upgradient monitoring wells. The same information is given in Tables 10-110 and 10-111 for downgradient wells.

Operating Requirements: The survey did not include any information on operating requirements. EPA88c mentions that a single full-time operator may be sufficient to operate a small (50 to 70 tons per day) landfill, and, as a general rule, one employee is needed per 70 tons per day received.

Transportation: The distance traveled to the landfill is related to the number of sites available for the waste, their location, and their remaining capacity. The number of sites has declined dramatically in recent years. In 1985, there were approximately 7,645 sites (EPA86). A study of 1986 survey data reduced that number to 6,034 (EPA88d). The survey data indicated that over half the landfills were scheduled to close by 1990. Appendix N is a compilation of state comments on landfill capacity taken from EPA88c. In addition, other landfills (particularly smaller and older ones) had been closing rather than trying to upgrade the facility to meet anticipated requirements on final cover systems, monitoring systems, and other requirements. EPA noted that substantial economies of scale could be obtained by participation in larger regional landfills with other local governments (EPA91d, 50988); a phenomenon which appears to be happening.

In 1991, the SC&A team contacted 46 states to gain a more accurate picture of the number of operating MSWLFs (see Table 10-112). This information is therefore an update of the EPA 1985 census data. The 46 states had 7,251 landfills in 1985. This number dropped to 4,850 by the late 1980s, a 33 percent decline. The decline by state varies widely. Georgia has only an 8 percent loss while Maryland and Wisconsin closed 74 percent and 73 percent of their landfills, respectively. This decline is expected to continue. A 1990 study projects that there will be fewer than 1,800 landfills operating by the year 2010 (DIE90). A list of landfills published by EPA in 1992 has a count of 5,345 municipal solid waste landfills in 50 states and five protectorates (EPA92). The 1992 list is included in this report as Appendix O.

The decline in the number of sites has led to a capacity crisis in some states. Figure 10-7 illustrates those states that have less than 5 years of capacity left, those with 5-10 years of capacity, and those with more than 10 years (NSW89). The capacity problem is most critical in the northeastern part of the United States.

This affects the transportation of waste across state lines. The National Solid Waste Management Association published a study on the interstate movement of municipal solid waste in October 1990 (NSW90). The web of interstate relations (excluding New York and New Jersey) is shown in Figure 10-8. Thirty-eight states are both importers and exporters of waste; 76 percent of the interactions occur between contiguous states. So we may assume that much of this transport is to the closest, most cost-effective site, even if it happens to be across a state boundary. Four states (Nevada, South Dakota, Utah, and Wyoming) only import waste.

Five states only export waste. These are: the District of Columbia, Idaho, New Jersey, New York, and Rhode Island. As expected, these states cluster in the northeastern part of the country. New York and New Jersey are anomalous in that they ship wastes to states several hundred miles away (see Figure 10-9). Some states, such as Utah, actively solicit out-of-state wastes (WSJ90), while others react angrily against it (GUT91).

Table 10-113 calculates the typical transport distance by state. Where available, the newer count of landfills was used. For the remaining states, the 1985 census count was reduced by 33 percent, the overall decline since 1985. Excluding Alaska and South Dakota, typical transport distances are 36 miles or less. The transportation distances for New York and New Jersey are given twice - the first based only on the area of the state and the second based on the areas of all states to which waste is shipped. Taking these factors into account, the typical distance for New Jersey jumps to 93 miles. The upper bound for New York is the distance from that state to New Mexico, over a thousand miles.

Table 10-114 summarizes the transport distances by compact region. It incorporates the larger estimates for New York and New Jersey based on the areas of all states to which the waste may be shipped. On a compact basis, typical transport distances range from 10 to 63 miles, assuming that the facilities within the compact can accept all the waste generated within the compact.

10.2.2 Subtitle C Facilities - Hazardous Waste Landfills

10.2.2.1 Summary Description

In this scenario, the hazardous waste is separated at the point of generation for separate transport and disposal. The distinction between Section 10.2.1 and 10.2.2 is that the material discussed in Section 10.2.2 has been determined to be a hazardous waste (see Section 10.1.1.1 for details).

10.2.2.2 Current Practices

The process for disposing of hazardous waste is very similar to that for the disposal of low-level radioactive waste. The generator must prepare a manifest which tracks the waste until its ultimate disposal, and a licensed transporter is required to follow the Department of Transportation (DOT) and EPA regulations regarding the pick-up, transport, and delivery of hazardous waste to a licensed treatment or disposal facility. The DOT regulations may be found in 49 CFR 171-179. Treatment and disposal must occur in licensed facilities.

Performance standards for owners of hazardous waste landfills are found in CFR89h. Requirements include:

- Two or more liners and a leachate collection system between each liner.

- Design and operating requirements that the leachate depth over the liner does not exceed 30 cm (1 foot). The leachate collection and removal system must be operated after closure until leachate is no longer detected.

- A lower liner of no less than 3-foot thick layer of re-compacted clay or other natural material with a permeability of no more than 1×10^{-7} cm/sec is deemed to satisfy the requirement that the liner be designed to prevent the migration of any constituent through the liner during the operating and 30-year post-closure periods.

- Run-on controls based on a 25-year storm.

- Run-off controls based on a 25-year storm.

- Final cover designed to minimize migration of liquids through the landfill. The permeability of the final cover must be less than or equal to the permeability of the bottom liner system or natural subsoils present.

The EPA regional administrator may waive certain requirements on a case-by case basis.

The regulations concerning the form and concentration levels in the wastes sent to a hazardous waste landfill have continued to evolve (see Table 9-4 and 40 CFR Part 268.10-268.12; EPA91e). For many wastes, these land disposal restrictions require treatment (such as incineration or neutralization) prior to disposal in a hazardous waste landfill.

10.2.2.3 Facility Features and Characteristics

The information for facility features and characteristics is drawn from two EPA surveys:

- National Survey of Hazardous Waste Treatment, Storage, Disposal and Recycling Facilities, OMB No. 2050-0070, expires June 1988

- National Survey of Hazardous Waste Generators, OMB No. 2050-0075, expires November 1989

Both surveys request data from 1986. The data were prepared by RTI and are in SAS (RTI91b).

Responding to the survey were 130 facilities. The location of each facility is listed in Table 10-115. Summaries by state and by compact are given in Tables 10-116 and 10-117, respectively. Six unaffiliated regions (Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, and the District of Columbia) do not have hazardous waste landfills within their boundaries.

Tables 10-118 through 10-120 summarize the facilities that (1) accept wastes from the general public or from a limited number of facilities not under the same ownership, or (2) have plans to become commercial before January 1992. These are defined as "commercial" facilities. The number of facilities now drops to 31. All compact regions have at least one facility, but only New York and Texas of the unaffiliated states have a facility within their borders.

We compared the "commercial" facilities with "private" facilities that handled waste that was either generated on site or by a facility under the same ownership (see Tables 10-121 and 10-122). A commercial facility landfilled about 4 times as much solid waste as a private facility even though they are about 8 times smaller in area. All facilities that handle mixed radioactive/hazardous waste are private (Table 10-123). Because of the differences between "commercial" and "private" facilities, we restricted the data set for the rest of the analyses to the 31 commercial facilities listed in Table 10-124. The two locations that have both Subtitle C incinerators and Subtitle C landfills are Baton Rouge, Louisiana and Deer Park, Texas (compare Tables 10-17 and 10-124). Two other sites (Emelle, Alabama and Texas City, Texas) have Subtitle D incinerators on site.

<u>Size</u>: Table 10-125 summarizes the facility area by compact. The overall average size for a hazardous waste landfill facility is nearly 450 acres. (Other operations, such as incineration, may also occur on the site.) The average ranges from 1 acre to 1,340 acres by compact.

<u>Landfill Units</u>: The survey contains information on 51 individual units at the 31 facilities. The dimensions of these units are given in Table 10-126. The average size of a landfill unit is 18 acres, although this can range from 1 to 200 acres (Table 10-127). The capacities are summarized in Tables 10-128 and 10-129. The smallest unit has a capacity of 3,000 cy, while the largest is 8.4 million cy. The average depth is about 9.4 yd (Table 10-130).

Table 10-131 lists the liner for each unit. The instructions to the survey defined a composite liner as a combination of synthetic material and a compacted, low-permeability liner of clay or soil. A composite liner was considered as a single liner even though it is made from two materials. About 25 percent did not specify the type of liner installed at that unit. Another 28 percent said they used a liner but not one of the specified types. About 28 percent said they had a top and bottom liner. The remaining 19 percent had single liners.

Table 10-132 lists the final cover types. Several locations use more than one type of cover in the final cover for the unit. About 84 percent of the units have synthetic covers, 59 percent have earthen covers and another unspecified 31 percent have another type of cover.

Table 10-133 lists the air pollution controls for each unit. About half the units monitor air emissions, while 60 percent use daily earth covers. Only 4 percent collect vented gas, 2 percent use wind screens, and 16 percent use synthetic covers. About 28 percent of the units do not use any of the air pollution control measures mentioned above.

Geohydrology: Table 10-134 lists whether a facility is in a 100-year floodplain, wetland, karst terrain, or whether the waste is above the seasonal high water table. None of the facilities is located in karst terrain or in a wetland. Two are located in flood plains. Only 14 of the 31 facilities stated that the waste was above the seasonal high water table, and another 9 facilities did not respond to the question.

Where the waste is above the seasonal high water table, there is generally silty clay or clay between the waste and the aquifer and silt within the aquifer (Table 10-135). The median depth to the aquifer is 25 feet, and the average depth is 49 feet (Tables 10-135 and 10-136).

The general characteristics of the aquifer underlying the site are summarized in Tables 10-137 through 10-139. Permeability ranges from 6×10^{-8} to 1×10^{-2} cm/sec. Fourteen of thirty responding sites had permeabilities less than 1×10^{-3} cm/sec. Porosity ranges from 10 percent to 15 percent and the thickness ranges from 2 to 175 feet. The horizontal flow rate is given in only 29 cases, and it ranges from .001 to 58 ft/yr.

About three-fourths of the facilities stated whether there were water bodies within a mile of the site that were used as drinking water sources. Table 10-140 lists the percentages of those facilities which positively reported the presence of such water bodies. Only 4 percent report public wells, 21 percent report both private wells and lakes/reservoirs, and 65 percent report rivers and streams within a mile of the site.

Distances: The survey requested six sets of distances. These are from the unit to the nearest (1) property boundary, (2) residence, (3) private well within a mile, (4) public well within a mile, (5) river or stream within a mile, and (6) lake or reservoir within a mile. This information is listed in Table 10-141 and summarized in Tables 10-142 through 10-144. Only one public well is reported among the 31 sites.

Populations within 1 Mile: Five sets of populations within 1 mile of the site are requested in the survey. These are: (1) within 1 mile of the site, (2) same as #1 but using a private well as a drinking water source, (3) same as #1 but using a public well as a drinking water source, (4) same as #1 but using a river or stream for drinking water, and (5) same as #1 but using a lake or reservoir for drinking water. The information is listed by site in Table 10-145. There is very little information available except for category #1 - the number of people within a mile. This parameter is summarized by state and compact in Table 10-146. There are, at most, 4,000 people within a mile of the site.

Groundwater Monitoring: All the facilities that responded to the question said they monitored ground water. There may be anywhere from 1 to 37 upgradient wells, and these are generally sampled on a quarterly basis. The average depth for the upgradient well ranges from 20 to 700 feet (Tables 10-147 through 10-149). There are generally three times as many downgradient wells as there are upgradient wells. The sampling frequency and average depth for the downgradient wells are the same as for the upgradient wells (Tables 10-150 through 10-152). No information is available on what is monitored at these sites.

Surface Water Monitoring: Surface water monitoring data are given in Table 10-153. Seven facilities have a direct discharge to surface water. (This could be from other operations at the site not associated with the landfill or it could refer to leachate disposal. No further information is available from the survey.) Seventeen facilities monitor surface water, generally at each NPDES outfall.

Operating Personnel: Tables 10-154 and 10-155 summarize the information available on the number of employees at the facility. The number of employees directly involved with hazardous waste operations ranges from 2 to 200, with anywhere from 3 to 25 additional contractors. The median number of employees engaged in hazardous waste operations is 19 with no contractors.

County Population: Table 10-156 lists the county populations for those counties with "commercial" hazardous waste landfills.

The range is from 2,057 people (Gilliam, Oregon) to 5.2 million people (Cook, Illinois).

<u>Transportation</u>: From the 130 facilities in the 1986 survey, the number of 266 hazardous landfills increased to 410 by October 1990 (EPA90c). It is unclear, however, just how many additional facilities accept waste on a commercial basis. As a conservative approach, the transportation distances are calculated based on the number of facilities that accept waste from off-site non-owner generators.

Transportation distances are calculated on a compact basis. Unlike municipal waste, most hazardous wastes end up being disposed of within the border of the state where they are generated. An estimated 96 percent of hazardous waste receives treatment or disposal at the generating plant. Of the remaining 4 percent of the hazardous waste, 37 percent is exported out of state, generally to adjacent or neighboring states (KIR90; HMC91). Table 10-157 lists the distances by compact. These range from 64 miles for the Northeastern Compact (due to the two sites in Connecticut) to 526 mile for the Rocky Mountain Compact. Except for the Northeastern Compact, all other transport distances exceed 125 miles, and most are between 200 and 300 miles.

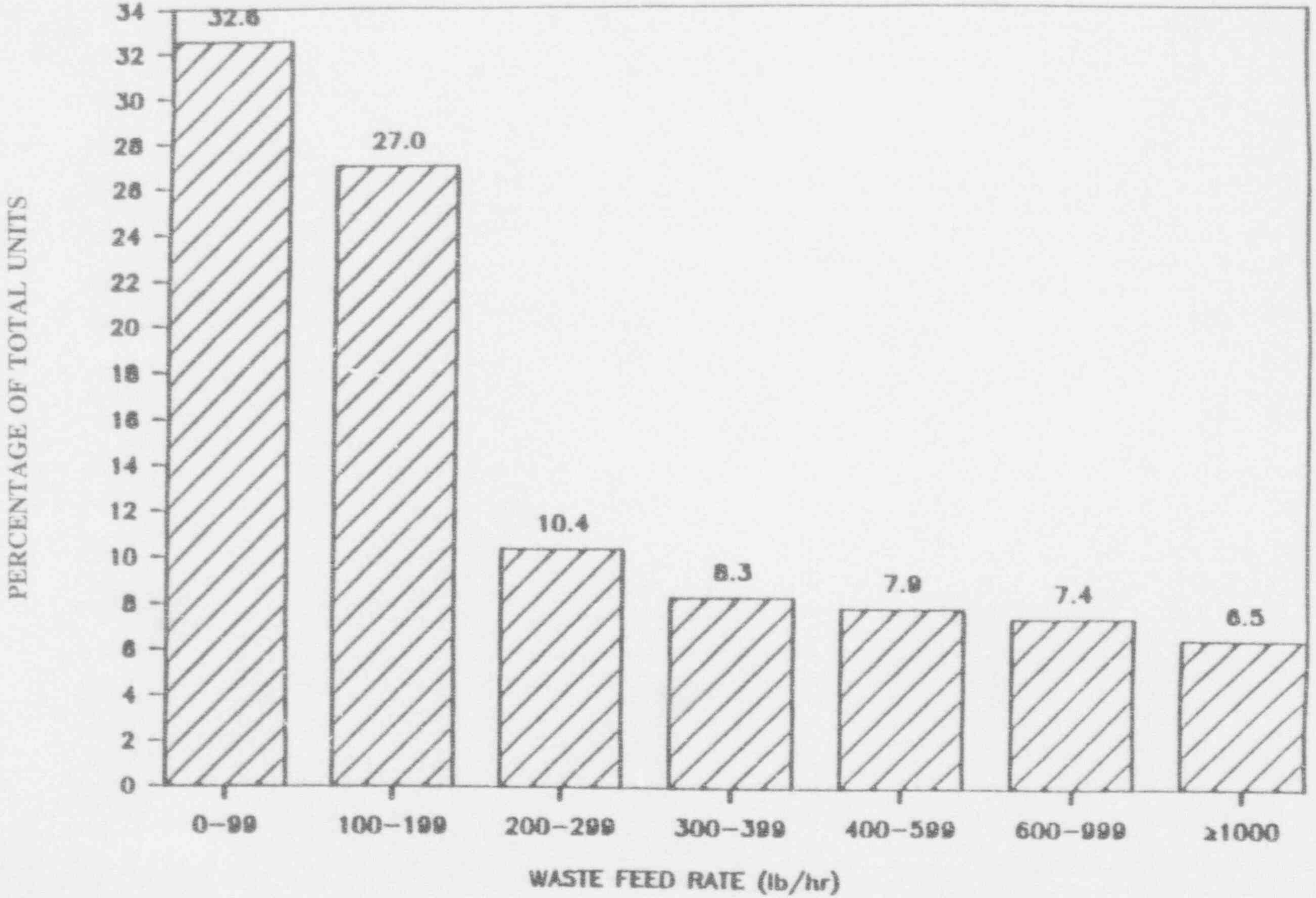

FIGURE 10-1

Waste Feed Rate Distribution of Incinerators in New York Database by Number

Source: EPA88a.

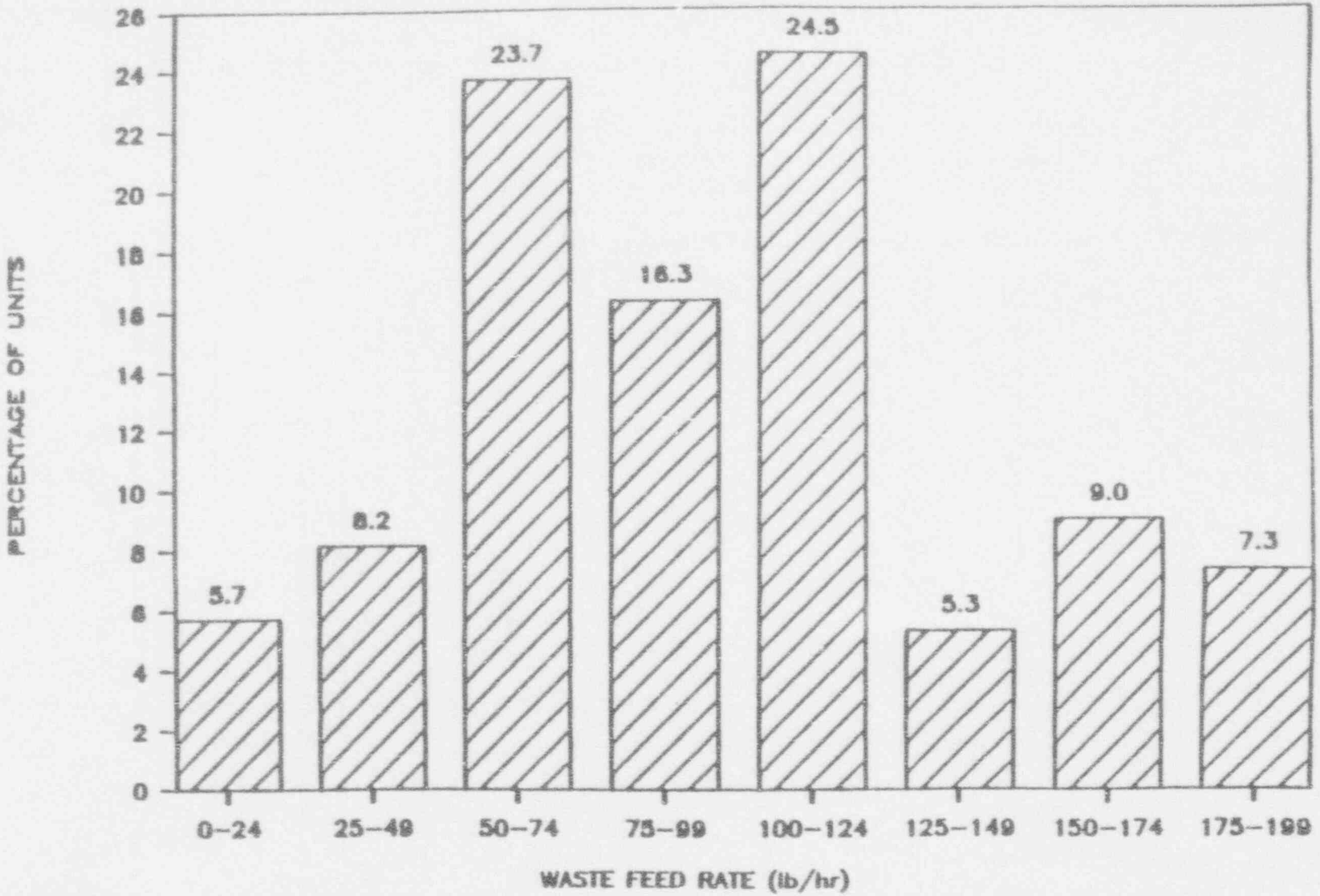

FIGURE 10-2

Waste Feed Rate Distribution of Small (Less than 200 lb/hr) Incinerator in New York Database by Number

Source: EPA88a.

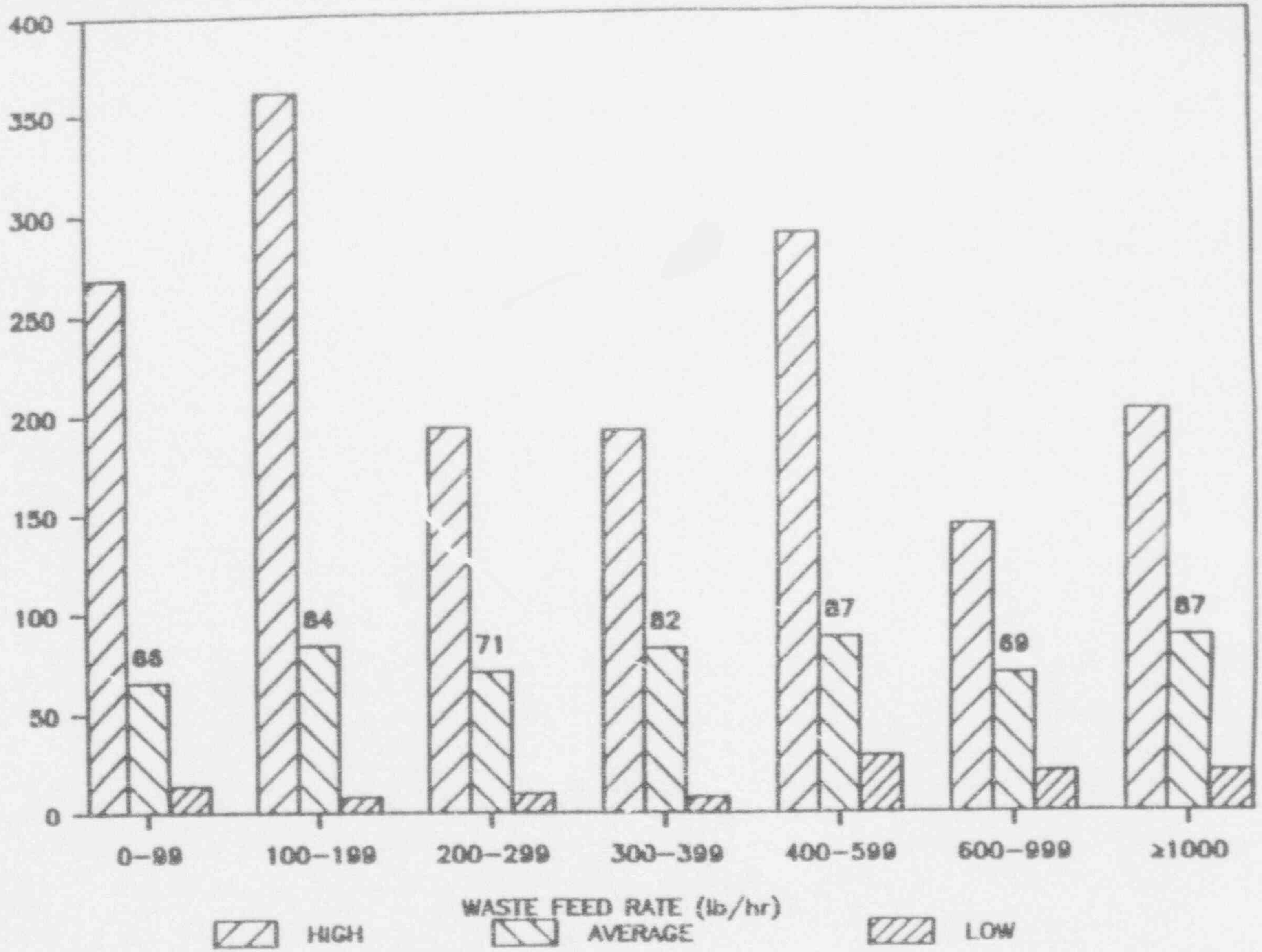

FIGURE 10-3

Average, High, and Low Stack Heights According to Selected Feed Rate Ranges

Source: EPA88a.

Table 10-1
Summary of On-Site Incineration Parameters

Parameter	Values: Typical	Minimum	Maximum
Feed Rate (lb/hr)	150	1	2,700
Stack Height (ft)	78	6	365
(m)	24	2	111
Mass Reduction Factor	3		
Nearest Exposed Member of Population (m)	10		
Operating Parameters	5 days/week 4 hours/day		

Sources: EPA88a; EPA89c.

TABLE 10-2

Operating Municipal Waste Combustors in the United States
as of September 1990

State	Project	Startup Year	Design Capacity (tpd)	RDF Facility	State Totals Number	State Totals Capacity
Alabama	Huntsville	1990	690			
Alabama	Tuscaloosa	1984	300		2	990
Alaska	Juneau	1986	70			
Alaska	Kyparuk (ARCO)	1982	12			
Alaska	Parsons (SOHIO)	1985	12			
Alaska	Prudhoe Bay	1981	100			
Alaska	Shemya	1970s	20			
Alaska	Sitka	1985	25		6	239
Arkansas	Batesville	1986	100			
Arkansas	Blytheville	1975	70			
Arkansas	N. Little Rock	1977	100			
Arkansas	Osceola	1980	50			
Arkansas	Stuttgart	1971	60		5	380
California	Commerce	1986	380			
California	Long Beach (SERRF)	1990	1,380			
California	Stanislau	1989	800		3	2,560
Connecticut	Bridgeport	1988	2,250			
Connecticut	Bristol	1988	650			
Connecticut	Mid-Connecticut	1988	2,000	*		
Connecticut	New Canaan	1971	125			
Connecticut	Stamford	1974	360			
Connecticut	Wallingford	1989	420			
Connecticut	Windham	1981	108		7	5,913
DC	Washington DC	1972	1,000		1	1,000
Delaware	Pigeon Point	1987	600		1	600
Florida	Bay County	1987	510			
Florida	Dade County	1993	3,000	*		
Florida	Hillsborough Co.	1987	1,200			
Florida	Key West	1986	150			
Florida	Lakeland		300	*		
Florida	Mayport Naval St.	1979	50			
Florida	McKay Bay	1985	1,000			
Florida	Miami Int'l Airport	1984	60			
Florida	Palm Beach Co.	1989	2,000	*		
Florida	Pinellas Co.	1983	3,000		10	11,270
Georgia	Savannah	1987	500		1	500
Hawaii	H-Power	1990	2,160		1	2,160
Idaho	Cassia Co.	1981	50		1	50
Illinois	Chicago NW	1970	1,600		1	1,600
Indiana	Indianapolis	1988	2,362		1	2,362
Iowa	Ames Municipal Electric		200	*	1	200
Kentucky	Louisville	1957	500		1	500

TABLE 10-2 (continued)

Operating Municipal Waste Combustors in the United States as of September 1990

State	Project	Startup Year	Design Capacity (tpd)	RDF Facility	State Totals Number	State Totals Capacity
Maine	Frenchville	1984	50			
Maine	Harpswell	1975	14			
Maine	MERC	1987	600	*		
Maine	PERC	1988	1,000			
Maine	Portland	1988	500			
Maine	Windham	1973	50		6	2,214
Maryland	Baltimore (RESCO)	1985	2,250			
Maryland	Harford	1988	360			
Maryland	Pulaski	1982	1,200		3	3,810
Massachusetts	Fall River	1972	600			
Massachusetts	Framingham	1970	500			
Massachusetts	Haverhill (MB)	1989	1,650			
Massachusetts	Haverhill (RDF)	1984	950	*		
Massachusetts	Millbury	1987	1,500			
Massachusetts	N. Andover	1985	1,500			
Massachusetts	Pittsfield	1981	240			
Massachusetts	Saugus	1975	1,500			
Massachusetts	SEMASS	1988	1,800	*		
Massachusetts	Springfield	1988	360		10	10,600
Michigan	Detroit	1990	3,300	*		
Michigan	Fisher Guide Div.	1986	100			
Michigan	Jackson Co.	1987	200			
Michigan	Kent Co.	1990	625		4	4,225
Minnesota	Duluth	1985	400	*		
Minnesota	Elk River	1989	1,500	*		
Minnesota	Fergus Falls	1988	94			
Minnesota	Hennepin Co.	1989	1,200			
Minnesota	N. States Power		560	*		
Minnesota	Olmstead Co.	1987	200			
Minnesota	Perham	1986	100			
Minnesota	Polk Co.	1988	80			
Minnesota	Pope and Douglas Co.	1987	72			
Minnesota	Ramsey & Washington Co.	1987	720	*		
Minnesota	Ramsey & Washington Co.	1987	720	*		
Minnesota	Red Wing	1982	72			
Minnesota	Savage	1982	60			
Minnesota	Thief River Falls		100	*	14	5,878
Mississippi	Pascagoula	1985	150		1	150
Missouri	Ft. Leonard Wood	1982	75		1	75
Montana	Livingston	1982	72		1	72
New Hampshire	Auburn	1979	5			
New Hampshire	Candia		15			
New Hampshire	Canterbury		10			
New Hampshire	Claremont	1987	200			
New Hampshire	Concord	1989	500			
New Hampshire	Durham	1980	108			
New Hampshire	Groveton	1975	24			
New Hampshire	Lincoln	1980	24			
New Hampshire	Litchfield		22			
New Hampshire	Meredith		31			
New Hampshire	Nottingham	1972	8			
New Hampshire	Pelham	1978	24			
New Hampshire	Pittsfield		48			

TABLE 10-2 (continued)

Operating Municipal Waste Combustors in the United States as of September 1990

State	Project	Startup Year	Design Capacity (tpd)	RDF Facility	State Totals Number	State Totals Capacity
New Hampshire	Plymouth	1976	16			
New Hampshire	Wilton	1979	30			
New Hampshire	Wolfeboro	1975	16		16	1,081
New Jersey	Atlantic Co. Jail	1990	14			
New Jersey	Fort Dix	1986	80			
New Jersey	Warren Co.	1998	400		3	494
New York	Albany	1981	600	*		
New York	Babylon	1989	750			
New York	Bay 41st St. Brooklyn	1949	1,050			
New York	Betts Avenue, Queens	1964	1,000			
New York	Cattaraugus Co.	1983	112			
New York	Dutchess Co.	1989	400			
New York	Glen Cove	1983	250			
New York	Hempsted	1989	2,319			
New York	Henry St., Brooklyn	1959	1,000			
New York	Islip	1990	518			
New York	Kodak	1970	150	*		
New York	Long Beach	1988	200			
New York	Niagra Falls	1981	2,000			
New York	Oneida Co.	1985	200			
New York	Oswego Co.	1986	200			
New York	Saltaire	1990	12			
New York	Westchester Co.	1984	2,250		17	13,011
N. Carolina	Mecklenburg Co.	1989	235			
N. Carolina	Wrichtsville	1981	50		2	285
Ohio	Akron	1979	1,000	*		
Ohio	Columbus	1982	2,000	*		
Ohio	Montgomery Co. N.	1988	900			
Ohio	Montgomery Co. S.	1970	600		4	4,500
Oklahoma	Miami	1982	108			
Oklahoma	New Cordell	1992	200			
Oklahoma	Tulsa	1986	1,125		3	1,433
Oregon	Brookings	1979	50			
Oregon	Coos Bay	1978	100			
Oregon	Marion Co.	1987	550		3	700
Pennsylvania	Harrisburg	1972	720			
Pennsylvania	Westmoreland Co.	1987	50			
Pennsylvania	York Co.	1990	1,344		3	2,114
S. Carolina	Charleston	1989	600			
S. Carolina	Hampton	1985	270		2	870
Tennessee	Dyersburg	1980	100			
Tennessee	Lewisburg	1980	60			
Tennessee	Nashville	1986	1,120			
Tenn. ssee	Sumner Co.	1981	200		4	1,480
Texas	Carthage city	1986	40			
Texas	Center	1986	40			
Texas	Cleburne	1986	115			
Texas	Gatesville	1981	20			
Texas	Huntsville	1984	25			
Texas	Palestine	1980	25			
Texas	Waxahachie	1982	50		7	315
Utah	Davis	1988	400		1	400

TABLE 10-2 (continued)

Operating Municipal Waste Combustors in the United States as of September 1990

State	Project	Startup Year	Design Capacity (tpd)	RDF Facility	State Totals Number	State Totals Capacity
Vermont	Readsboro		13			
Vermont	Stamford	1973	10		2	23
Virginia	Alexandria/Arlington	1988	975			
Virginia	Fairfax Co.	1990	3,000			
Virginia	Fort Eustis	1981	40			
Virginia	Galax	1986	56			
Virginia	Hampton	1980	200			
Virginia	Harrisonburg	1982	100			
Virginia	Norfolk	1967	360			
Virginia	Portsmouth	1988	2,000	*		
Virginia	Salem	1978	100		9	6,831
Washington	Bellingham	1985	100			
Washington	Skagit Co.	1988	178		2	278
Wisconsin	Barron Co.	1986	80			
Wisconsin	Elkhart Lake	1969	48			
Wisconsin	La Crosse Co.	1988	400	*		
Wisconsin	Madison	1979	75	*		
Wisconsin	Muscoda	1989	120			
Wisconsin	Sheboygan	1965	240			
Wisconsin	St. Croix Co.	1988	115			
Wisconsin	Waukesha	1979	175		8	1,253
Total			92,416	22	168	92,416

Note: Asterisks indicate facilities which operates with Refuse-Derived Fuel.

Source: KIS90.

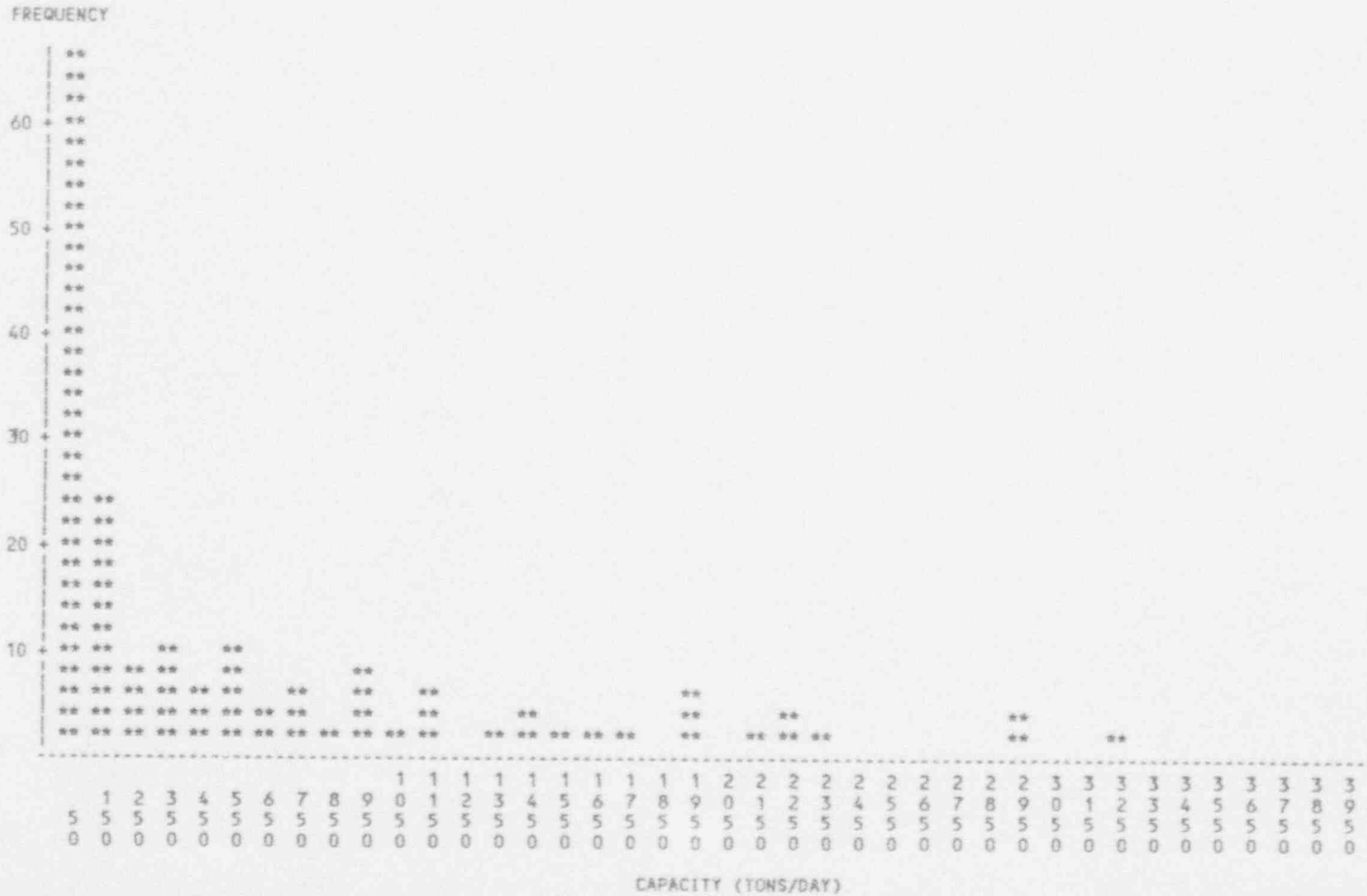

Figure 10-4

Histogram of Municipal Waste Combustors - Capacity (tons/day)

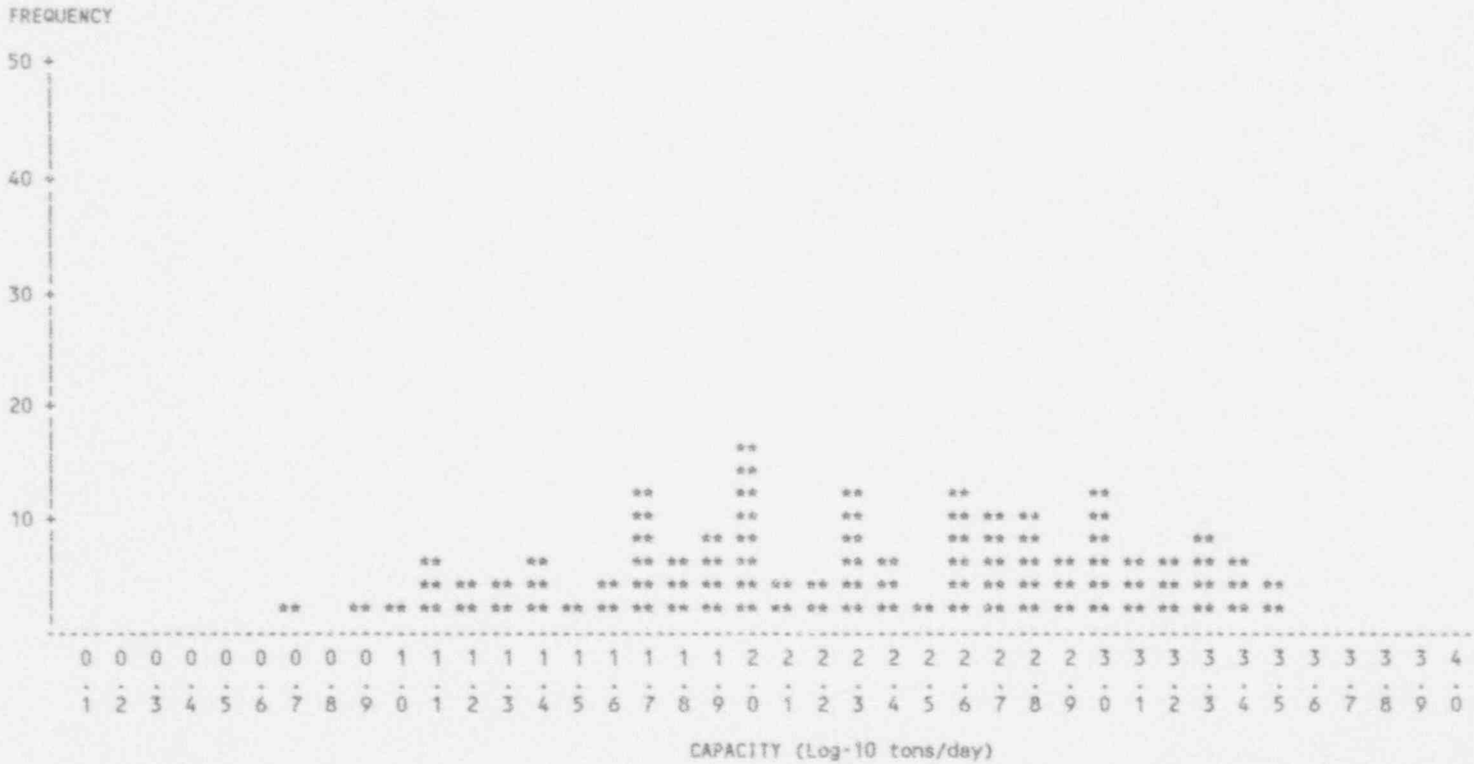

FIGURE 10-5

Histogram of Log-10 Transformed Municipal Waste Combustor Capacity

TABLE 10-3

COMPACT SUMMARY OF MUNICIPAL WASTE COMBUSTORS IN THE U.S.
FACILITY SIZE

Compact Region	Number of Units	Size Range (tons per day) Minimum	Median	Maximum	Number of RDF Facilities
Appalachian	7	50	720	2,250	0
Central	8	50	100	1,125	0
Central Midwest	2	500	1,050	1,600	0
Midwest	33	48	200	3,300	12
Northeast	10	14	380	2,250	1
Northwest	15	12	72	2,160	0
Southeast	29	40	270	3,000	4
Southwest	5	300	690	1,300	0
Unaffiliated States:					
Dist. of Columbia	1	1,000	1,000	1,000	0
Maine	6	14	275	1,000	1
Massachusetts	10	240	1,225	1,800	2
New Hampshire	16	5	24	500	0
New York	17	12	518	2,319	2
Texas	7	20	40	115	0
Vermont	2	10	12	13	0

Source: KIS90.

Table 10-4
Municipal Waste Combustors - November 1990

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind	Comm	Res	Rur	Other	% Combusted Ind	Comm	Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
1a	AK	Sitka	570315	1351920	2	No	Yes	No	Yes	No	0	50	50	1	24	5	2616	25	No		2	80
														2	24	5	2616	25	No		2	80
2	AK	Prudhoe Bay	701245	1482406	1	No	Yes	Yes	Yes	No	100	0	0	1	24	7	7507	60	No		3.2	61
4	AR	Batesville	0	0	2	No	Yes	Yes	No	Yes	35	36	29	1	24	5	5224	50	Yes	2	3.5	40
														2	24	5	1911	50	Yes	1	3.5	40
8	AR	Osceola	360000	900000	2	No	Yes	Yes	Yes	Yes	19	30	50	1	24	5	5185	50	No		4	25
														2	24	5	5185	50	No		4	25
9	AR	Stuttgart	0	0	3	Yes	Yes	Yes	No	Yes	0	0	0	1	12	5	3120	12.5	No		4.8	36
														2	12	5	3120	12.5	No		4.8	36
														3	12	5	3120	12.5	No		4.8	36
10	CA	Commerce	0	0	1	Yes	No	No	Yes	Yes	0	95	5	1	24	7	6000	350	No		5	150
11	CT	Town of New Canaan	410830	732850	1	Yes	Yes	No	Yes	Yes	0	5	95	1	11	5	2500	125	No		5	60
12	CT	Bridgeport	0		3	No	No	Yes	Yes	Yes		33	67	1	24	7	0	750	No		7.5	295
														2	24	7	0	750	No		7.5	295
														3	24	7	0	750	No		7.5	295
15	DC	Washington	0	0	4	No	Yes	Yes	Yes	No	0	44	55	1	24	7	6720	250	Yes	2 4	18	180
														2	24	7	6720	250	Yes	1 4	18	180
														3	24	7	6720	250	No		18	180
														4	24	7	6720	250	Yes	1 2	18	180
16	DE		0	0	5	No	Yes	Yes	Yes	No	0	5	95	1	24	7	0	0	Yes	2345	4	200
														2	24	7	0	0	Yes	1345	4	200
														3	24	7	0	0	Yes	1245	4	200
														4	24	7	0	0	Yes	1235	4	200
														5	24	7	0	0	Yes	1234	4	200
17	FL	Miami	0	0	4	No	No	No	No	Yes	0	25	75	1	24	7	4443	960	Yes	2	9	151
														2	24	7	4443	960	Yes	1	9	151
														3	24	7	4443	960	Yes	4	9	151
														4	24	7	4443	960	Yes	3	9	151
18	FL	Tampa	295716	822030	3	No	No	Yes	Yes	No	0	62	38	1	24	7	5270	400	No		5.5	220
														2	24	7	5270	400	No		5.5	220
														3	24	7	5270	400	No		5.5	220
19	FL	Key West	243445	814441	2	Yes	No	No	Yes	Yes	0	0	0	1	24	7	0	75	No	2	6	140
														2	24	7	0	75	No	1	6	140
22	FL	St. Petersburg	275200	824000	3	Yes	Yes	Yes	Yes	No	15	25	60	1	24	7	7900	1050	Yes	2	11	161
														2	24	7	7900	1050	Yes	1	11	161
														3	24	7	7900	1050	No		8	161

Table 10-4
Municipal Waste Combustors - November 1990 (continued)

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind Comm Res Rur Other	% Combusted Ind Comm Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
23	FL	Tampa	275651	822514	4	No Yes Yes Yes Yes	32 32 36	1	24	7	7900	250	Yes	2	5.8	160
								2	24	7	7900	250	Yes	1	5.8	160
								3	24	7	7900	250	Yes	4	5.8	160
								4	24	7	7900	250	Yes	3	5.8	160
127	FL	Panama City	301554	853008	2	Yes Yes Yes No Yes	10 22 68	1	24	7	5705	255	Yes	2	4.5	125
								2	24	7	570	255	Yes	1	4.5	125
20	FL	Lakeland	280000	814500	1	No Yes Yes Yes Yes	0 35 64	3	24	7	7028	320	No			
25	HI	Waipahu	212245	1580000	2	No Yes Yes Yes Yes	0 5 95	1	24	6	4700	300	No		8	90
								2	24	6	4700	300	No		8	90
26	IA	Ames	420129	933623	2	Yes No No Yes Yes	0 0 0	1	24	7	2384	544.8	No		8	200
								2	24	7	7041	1128	No		11	207
27	ID	Heyburn	0	0	2	No Yes Yes Yes Yes	10 30 60	1	24	5	4400	50	Yes	2	3	64
								2	24	5	4400	50	Yes	1	3	64
28	IL	Chicago	415000	873700	4	No No No Yes Yes	0 0 100	1	24	7	6483	400	Yes	2	14	250
								2	24	7	6483	400	Yes	1	14	250
								3	24	7	6483	400	Yes	4	14	250
								4	24	7	6483	400	Yes	3	14	250
31	KY	Louisville	381337	854437	4	No Yes No Yes Yes	035.1 64.5	1	24	7	4387	140	Yes	2 3 4	12	200
								2	24	7	4387	140	Yes	1 3 4	12	200
								3	24	7	4387	140	Yes	1 2 4	12	200
								4	24	7	4387	140	Yes	1 2 3	12	200
33	MA	Framingham	712530	421730	2	No No No Yes No	1 9 90	1	24	6.5	2873	250	No		7.6	100
								2	24	6.5	2873	250	No		7.6	100
35	MA	North Andover	0	0	2	No Yes Yes Yes Yes	040.3 59.7	1	24	7	7940	750	No		7	230
								2	24	7	7940	750	No		7	230
130	MA	Saugus	0	0	2	No No Yes Yes Yes	3 12 85	1	24	7	7621	750	Yes	2	9	178
								2	24	7	7621	750	Yes	1	9	178
131	MA	Millbury	0	0	2	No No No Yes Yes	0 20 80	1	24	7	0	750	Yes	2	10	365
								2	24	7	0	750	Yes	1	10	365
37	MD	Baltimore	391615	763750	3	No Yes Yes Yes No	15 30 55	1	24	7	8278	750	Yes	2 3	7	315
								2	24	7	8278	750	Yes	1 3	7	315
								3	24	7	8278	750	Yes	1 2	7	315
40	ME	Auburn	440400	701600	4	No No No No Yes	33 22 42	1	24	7	8472	50	Yes	2	4.5	40
								2	24	7	8472	50	Yes	1	4.5	40
								3	24	7	8472	50	Yes	4	4.5	40
								4	24	7	8472	50	Yes	3	4.5	40

Table 10-4
Municipal Waste Combustors - November 1990 (continued)

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind Comm Res Rur Other	% Combusted Ind Comm Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
42	ME	Frenchville	681906	471712	1	Yes Yes Yes No Yes	22 27 51	1	8	5	2090	120	No		18	60
43	ME	Windham	0	0	2	No Yes Yes No Yes	0 40 60	1	16	5	4200	22	No		4	30
								2	16	5	4200	22	No		4	30
44	MI	Madison Heights	423039	830606	2	No No No Yes Yes	0 12.5 87.5	1	24	5	6480	300	Yes	2	11	175
								2	24	5	6480	300	Yes	1	11	175
45	MI	Mount Clemens	0	0	2	No Yes Yes Yes Yes	0 3 97	1	24	7	5686	300	Yes	2	11.5	200
								2	24	7	5686	300	Yes	1	11.5	200
47	MN	Alexandria	455207	952210	2	No Yes Yes Yes Yes	0 10 90	1	24	7	3750	70	No		0	70
								2	24	7	3750	70	No		0	70
48	MN	Duluth	0	0	2	No Yes Yes Yes Yes	10 25 60	1	24	7	7000	120	No		5	50
								2	24	7	7000	120	No		5	50
49	MN	Mankato	441148	940045	2	No Yes Yes Yes Yes	0 0 0	1	24	5	400	360	No		10	158
								2	24	5	400	360	No		10	158
50	MN	Perham	0	0	2	No Yes Yes Yes Yes	0 0 0	1	24	7	0	57	Yes	2	3.5	75
								2	24	7	0	57	Yes	1	3.5	75
51	MN	Fosston	0	0	2	No No No No No	0 0 0	1	24	7	0	40	Yes	2	3	170
								2	24	7	0	40	Yes	1	3	170
52	MN	Red Wing	0	0	2	No Yes Yes Yes Yes	15 10 75	1	24	5	6000	36	No		3	60
								2	24	5	6000	36	No		3	60
54	MN	Rochester	0	0	2	Yes No Yes No No	10 10 80	1	24	7	5900	100	Yes	2	3.1	190
								2	24	7	5900	100	Yes	1	3.1	190
142	MN	Fergus Falls	461731	960500	2	Yes Yes Yes Yes No	10 20 70	1	24	7	0	37.5	Yes	2	3	80
								2	24	7	0	37.5	Yes	1	3	80
55	MO	Ft. Leonard Wood	374500	920700	3	Yes Yes No Yes No	0 0 0	1	24	7	7056	26.4	No		6	49
								2	24	7	7056	26.4	No		6	49
								3	24	7	7056	26.4	No		6	49
56	MS	Moss Point	302526	883109	2	No No Yes Yes No	0 4 94	1	24	7	6941	75	Yes	2	3.5	70
								2	24	7	6941	75	Yes	1	3.5	70
57	MT	Livingston	0	0	2	Yes No Yes Yes Yes	0 10 90	1	20	5	5101	35	No		35	44
								2	20	5	5101	35	No		35	44
58	NC	Wrightsville Beach	341325	774723	2	No Yes No Yes Yes	0 40 60	1	8	5.5	0	14	No		4.5	15
								2	8	5.5	0	14	No		4.5	15

Table 10-4
Municipal Waste Combustors - November 1990 (continued)

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind	Comm	Res	Rur	Other	% Combusted Ind	Comm	Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
129	NC	Wilmington	0	0	2	No	Yes	Yes	Yes	Yes	20	30	50	1	24	7	7200	100	Yes	2	5	90
														2	24	7	7200	100	Yes	1	5	90
60	NH	Plymouth	434647	714200	1	Yes	Yes	No	No	Yes	0	30	70	1	16	7	3662	16	No		4.8	26
63	NH	Candia	0	0	1	Yes	Yes	Yes	Yes	No	0	3	97	1	8	3	1664	5	No		2	31
66	NH	Durham	430812	705614	3	Yes	Yes	Yes	Yes	No	6	17	77	1	24	7	8760	36	Yes	2 3	6	115
														2	24	7	8760	36	Yes	1 3	6	115
														3	24	7	8760	36	Yes	1 2	6	115
67	NH	Groveton	443500	713000	1	No	Yes	Yes	Yes	Yes	70	0	30	1	16	5	7000	25	No		4.5	60
72	NH	Wilton	0	0	1	Yes	Yes	No	No	No	0	5	95	1	8	2	832	10	No		0	0
74	NJ	Fort Dix	0	0	4	Yes	Yes	Yes	Yes	No	0	0	0	1	24	7	1368	20	Yes	2	2.6	80
														2	24	7	1368	20	Yes	1	2.6	80
														3	24	7	1368	20	Yes	4	2.6	80
														4	24	7	1368	20	Yes	3	2.6	80
75	NY	Albany	0	0	2	Yes	No	No	Yes	No	0	0	0	6	24	7	7710	300	Yes	7	14	200
														7	24	7	7802	300	Yes	6	14	200
76	NY	Cuba	0		3	Yes	Yes	Yes	Yes	No	0	20	80	1	24	7	7552	40	No		2.8	44
														2	24	7	7552	40	No		2.8	44
														3	24	7	7552	40	No		2.8	44
77	NY	Poughkeepsie	413734	732724	2	No	No	No	Yes	Yes	0	35	65	1	0	0	0	253	Yes	2	4	200
														2	0	0	0	253	Yes	1	4	200
83	NY	Fulton	432054	762533	4	No	Yes	No	Yes	Yes	0	12	70	1	24	7	7567	50	No		2.5	135
														2	24	7	7567	50	No		2.5	135
														3	24	7	7567	50	No		2.5	135
														4	24	7	7567	50	No		2.5	135
86	NY	Peekskill	0	0	3	No	No	Yes	Yes	Yes	0	0	0	1	24	7	7800	750	Yes	2 3	7.5	197
														2	24	7	7536	750	Yes	1 3	7.5	197
														3	24	7	7896	750	Yes	1 2	7.5	197
132	NY	Niagara Falls	430435	790103	2	No	Yes	Yes	Yes	Yes	6.6	25	68.4	1	24	7	7280	1024	No		10	210
														2	24	7	7281	1024	No		10	210
143	NY	Long Beach	0	0	1	Yes	No	No	Yes	No	0	50	50	1	24	7	140	200	No		0	0
87	OH	Akron	410424	813152	6	Yes	No	No	Yes	No	5	65	30	1	24	7	6265	432	Yes	2	8.6	102
														2	24	7	6206	432	Yes	1	8.6	102
														3	24	7	5137	432	No		8.6	102

Table 10-4
Municipal Waste Combustors - November 1990 (continued)

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind Comm Res Rur Other	% Combusted Ind Comm Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
89	OH	Columbus	0	0	6	Yes No Yes Yes Yes	5 25 70	1	24	7	6553	333	Yes	2	23	272
								2	24	7	6553	333	Yes	1	23	272
								3	24	7	6553	333	Yes	4	23	272
								4	24	7	6553	333	Yes	3	23	272
								5	24	7	6553	333	Yes	6	23	272
								6	24	7	6553	333	Yes	5	23	272
90	OH	Euclid	0	0	2	No Yes Yes Yes Yes	0 0 100	1	24	5	6240	100	No		0	0
								2	24	5	6240	100	No		0	0
91	OH	Dayton	841023	395021	3	No No Yes No No	55 1 43	1	24	7	7925	300	Yes	2	10	120
								2	24	7	7677	300	Yes	1	10	120
91a	OH	Dayton	0	0	3	No No No No No	48 0 52	1	24	7	8083	150	Yes	2	10	40
								2	24	7	8083	150	Yes	1	10	40
93	OK	Tulsa	0	0	3	No No Yes Yes Yes	0 36 63.8	1	24	7	6296	375	Yes	2	7	235
								2	24	7	7980	375	Yes	1	7	235
								3	24	7	3140	375	No		4.9	235
134	OR	Brooks	0	0	2	No Yes No No Yes	0 0 0	1	24	7	8419	275	Yes	2	4	256
								2	24	7	8356	275	No		5	150
146	OR	Courthouse-Coquille	0	0	4	Yes Yes Yes Yes No	0 50 50	1	24	5	346	12.5	No		0	0
								2	24	5	5520	50	No		0	0
								3	24	5	5520	50	No		0	0
								4	24	5	7567	50	No		0	0
94	PA	Harrisburg	401443	765119	2	No Yes No Yes Yes	3 10 85	1	24	7	6648	360	Yes	2	15	150
								2	24	7	7183	360	Yes	1	15	150
95	PA	Greensburg	401617	793302	2	Yes No No Yes Yes	0 20 80	1	24	7	1400	25	Yes	2	2.5	115
								2	24	7	1400	25	Yes	1	2.5	115
135a	PA	Philadelphia	395230	750730	2	No Yes Yes Yes Yes	0 0 99	1	24	5	0	375	No		7	102
								2	24	5	0	375	No		7	102
135b	PA	Philadelphia	400230	751440	2	No Yes Yes Yes Yes	0 0 100	1	24	5	0	375	No		7	64
								2	24	5	0	375	No		7	64
98	TN	Dyersburg	360330	892357	2	Yes No No No Yes	39 40 21	1	24	6	6249	50	No		3.4	40
								2	24	6	6249	50	No		3.4	40
99	TN	Gallatin	362301	862510	4	No Yes Yes Yes Yes	0 0 0	1	24	7	8031	100	No		4	90
								2	24	7	7555	100	No		4	90
100	TN	Lewisburg	0	0	1	No No No Yes Yes	34.5 24.7 40.8	1	15	5	3925	60	No		5.5	50
36	TN	Nashville	0	0	3	No No No Yes Yes	3 17 80	2	24	7	6952	360	No		8.3	120
								3	24	7	6952	360	No		8.3	120
								4	24	7	6952	400	No		8.3	120

Table 10-4
Municipal Waste Combustors - November 1990 (continued)

Name	State	City	Lat.	Long.	Comb. Units	Surround Land Use Ind	Comm	Res	Rur	Other	% Combusted Ind	Comm	Res	Unit	Hrs/ Day	Days/ Week	Oper. Hrs '87	Design Feed Rate	Share Stack	Share Stack W/	Stack Diameter	Stack Height
137	TX	Waxahachie	322530	965030	2	No	Yes	Yes	Yes	Yes	0	0	0	1	24	6	6432	25	No		0	0
														2	24	6	6432	25	No		0	0
106	VA	Alexandria	0	0	3	No	No	Yes	Yes	Yes	0	0	0	1	24	7	657	375	No		5	210
														2	24	7	647	375	No		5	210
														3	24	7	638	375	No		5	210
108	VA	Hampton	370601	762331	2	No	No	Yes	No	No	0	7	80	1	24	7	7523	100	No		3	248
														2	24	7	7523	100	No		3	248
109	VA	Harrisonburg	382554	785051	2	Yes	Yes	Yes	No	No	0	31	68	1	24	7	7200	50	Yes	2	4	139
														2	24	7	7200	50	Yes	1	4	139
111	VA	Norfolk	0	0	2	No	Yes	No	Yes	Yes	0	0	0	1	24	7	3000	180	Yes	2	7.7	74
														2	24	7	4000	180	Yes	1	7.7	74
113	VA	Portsmouth	0	0	4	No	No	Yes	Yes	Yes	0	52	48	1	24	7	2875	480	No		6	275
														2	24	7	2875	480	No		6	275
														3	24	7	2875	480	No		6	275
														4	24	7	2875	480	No		6	275
117	VT	Stamford	0	0	1	Yes	No	No	Yes	Yes	0	5	95	1	4	2	416	1	No		0	0
119	WA	Tacoma	471634	1222332	2	No	Yes	Yes	Yes	Yes	0	8	52	1	0	0	0	330	Yes	2	10.8	213
														2	0	0	0	330	Yes	1	10.8	213
122	WI	La Crosse	0	0	2	No	Yes	Yes	Yes	Yes	10	20	70	1	16	5	183	135	No		9.2	125
														2	16	5	227	135	No		9.2	125
123	WI	Madison	0	0	1	Yes	No	No	Yes	Yes	0	2	98	1	24	7	0	60	Yes	2	7.5	208
125	WI	Waukesha	425938	881500	2	No	Yes	Yes	Yes	Yes	0	0	100	1	24	7	7000	87.5	No		7	105
														2	24	7	7000	87.5	No		7	105
138	WI	Sheboygan	434457	874405	2	Yes	No	No	Yes	No	10	10	80	1	24	4.5	5215	84	Yes	2	8.8	175
														2	24	4.5	5215	84	Yes	1	8.8	175

Source: EPA89c.

TABLE 10-5

Mass Reduction Factors for EPA Model Municipal Waste Combustors

Model Number	Name	Model Capacity (tpd)	Total Solid Waste (tpd)	Mass Reduction Factor	Percentage Reduction	Percentage Remaining
1	Mass Burn/Waterwall	200	64	3.13	68%	32%
2	Mass Burn/Waterwall	800	255	3.14	68%	32%
3	Mass Burn/Waterwall	2,250	718	3.13	68%	32%
4	Mass Burn/Refractory	500	154	3.25	69%	31%
5	Mass Burn/Rotary Waterwall	1,050	335	3.13	68%	32%
6	Refuse-Derived Fuɩ. (RDF)	2,000	295	6.78	85%	15%
7	RDF Cofired	2,000	284	7.04	86%	14%
8	Modular/Excess Air	240	77	3.12	68%	32%
9	Modular/Starved Air	50	15	3.33	70%	30%
10	Modular/Starved Air	100	30	3.33	70%	30%
11	Fluidized-Bed Combustor (Bubbling Bed)	900	68	13.24	92%	8%
12	Fluidized-Bed Combustor (Circulating)	900	68	13.24	92%	8%

Source: EPA89b.

TABLE 10-6

TYPICAL TRANSPORTATION DISTANCE TO
MUNICIPAL WASTE COMBUSTORS IN THE U.S.
BY STATE

STATE	COMPACT	NUMBER OF COMBUSTORS	STATE AREA (sq. mi.)	SQUARE MILES PER COMBUSTOR	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)*
Alabama	SE	2	51,705	25,853	64	128
Alaska	NW	6	591,004	98,501	125	250
Arizona	SW	0	114,000	NA	NA	NA
Arkansas	C	5	53,187	10,637	41	82
California	SW	3	158,706	52,902	92	184
Colorado	RM	0	104,091	NA	NA	NA
Connecticut	NE	7	5,018	717	11	21
Delaware	AP	1	2,045	2,045	18	36
District of Columbia	UA	1	63	63	3	6
Florida	SE	10	58,664	5,866	31	61
Georgia	SE	1	58,910	58,910	97	194
Hawaii	NW	1	6,471	6,471	32	64
Idaho	NW	1	83,564	83,564	115	231
Illinois	CM	1	56,345	56,345	95	189
Indiana	MW	1	36,185	36,185	76	152
Iowa	MW	1	56,275	56,275	95	189
Kansas	C	0	82,277	NA	NA	NA
Kentucky	CM	1	40,410	40,410	80	160
Louisiana	C	0	47,752	NA	NA	NA
Maine	UA	6	33,265	5,544	30	59
Maryland	AP	3	10,460	3,487	24	47
Massachusetts	UA	10	8,284	828	11	23
Michigan	MW	4	58,527	14,632	48	97
Minnesota	MW	14	84,402	6,029	31	62
Mississippi	SE	1	47,689	47,689	87	174
Missouri	MW	1	69,697	69,697	105	211
Montana	NW	1	147,046	147,046	153	306
Nebraska	C	0	77,355	NA	NA	NA
Nevada	RM	0	110,561	NA	NA	NA
New Hampshire	UA	16	9,279	580	10	19
New Jersey	NE	3	7,787	2,596	20	41
New Mexico	RM	0	121,593	NA	NA	NA
New York	UA	17	49,108	2,889	21	43
N. Carolina	SE	2	52,669	26,335	65	129
N. Dakota	SW	0	70,702	NA	NA	NA
Ohio	MW	4	41,330	10,333	41	81
Oklahoma	C	3	69,956	23,319	61	122
Oregon	NW	3	97,073	32,358	72	144
Pennsylvania	AP	3	45,308	15,103	49	98
Rhode Island	UA	0	1,212	NA	NA	NA
S. Carolina	SE	2	31,113	15,557	50	100
S. Dakota	SW	0	77,116	NA	NA	NA
Tennesee	SE	4	42,144	10,536	41	82
Texas	UA	7	266,807	38,115	78	156
Utah	NW	1	84,899	84,899	116	232
Vermont	UA	2	9,614	4,807	28	55
Virginia	SE	9	40,767	4,530	27	54
Washington	NW	2	68,139	34,070	74	147
Wisconsin	MW	8	56,153	7,019	33	67
Wyoming	RM	0	97,809	NA	NA	NA
W. Virginia	AP	0	24,232	NA	NA	NA
TOTAL		168	3,618,768			
AVERAGE				22,407	44	88

Notes: * Assumes a factor of 2.0 to convert straight line distance to transportation distance.
Compact regions are as follows:

SW- Southwest   NE- Northeast
NW- Northwest   AP- Appalachian
C- Central   CM- Central Midwest
SE- Southeast   RM- Rocky Mountain
MW- Midwest   UA- Unaffiliated State

TABLE 10-7

TYPICAL TRANSPORTATION DISTANCE TO
MUNICIPAL WASTE COMBUSTORS IN THE U.S.
BY COMPACT

COMPACT REGIONS	NUMBER OF COMBUSTOR	AREA (sq. mi.)	SQUARE MILES PER COMBUSTOR	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)*
Northwest	15	1,078,196	71,880	107	214
Rocky Mountains	0	434,054	NA	NA	NA
Southwestern	3	446,376	148,792	154	308
Central	8	330,527	41,316	81	162
Midwest	33	402,569	12,199	44	88
Central Midwest	2	96,755	48,378	88	175
Southeast	31	383,661	12,376	44	89
Northeast	10	12,805	1,281	14	29
Appalachian	7	82,045	11,721	43	86
Unaffiliated States:					
Dist. of Columbia	1	63	63	3	6
Maine	6	33,265	5,544	30	59
Massachusetts	10	8,284	828	11	23
New Hampshire	16	9,279	580	10	19
New York	17	49,108	2,889	21	43
Rhode Island	0	1,212	NA	NA	NA
Texas	7	266,807	38,115	78	156
Vermont	2	9,614	4,807	28	55

* Assumes a factor of 2.0 to convert straight line distance to transportation distance.

TABLE 10-8

Listing of Hazardous Waste Incinerators - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
	JOHNSTON ISLAND	.	.	.	.
AL	THEODORE	30	30	88	8
AL	EMELLE	32	47	88	18
AL	MC INTOSH	31	15	87	58
AL	BIRMINGHAM	33	29	86	54
AL	DOTHAN	31	15	85	25
AL	MOBILE	30	41	88	10
AL	AXIS	30	56	88	0
AL	ANNISTON	33	39	85	58
AR	EL DORADO	33	12	92	37
AR	BATESVILLE	35	42	91	31
AR	PINE BLUFF	34	19	92	5
AR	JEFFERSON	.	.	.	.
AR	JACKSONVILLE	34	53	92	8
AZ	TUCSON	32	37	111	22
CA	MARTINEZ	38	1	122	4
CA	VENTURA CO.	34	13	118	41
CA	MARTINEZ	38	7	122	1
CA	STANFORD	.	.	.	.
CA	WHITTIER	.	.	.	.
CA	MARTINEZ	38	2	122	6
CA	RANCHO CORDOVA	38	35	121	15
CA	PITTSBURG	.	.	.	.
CA	LIVERMORE	.	.	.	.
CA	HERLONG	40	9	120	7
CA	PERRIS	33	50	117	16
CA	SAN DIEGO	.	.	.	.
CA	LOS ANGELES	33	59	118	8
CO	GOLDEN	39	53	105	11
CO	GOLDEN	.	.	.	.
CT	GROTON	41	20	72	5
DE	WILMINGTON	39	45	75	38
DE	WILMINGTON	.	.	.	.
FL	ST PETERSBURG	27	53	82	43
FL	LAKELAND	28	6	82	0
FL	SAINT MARKS	30	10	84	13
GA	ALBANY	31	29	84	7
GA	AUGUSTA	33	25	8	56
GA	ATLANTA	33	42	84	22
GA	ATLANTA	.	.	.	.
IA	MUSCATINE	41	21	91	4
IA	MIDDLETOWN	40	47	91	14
IA	AMES	.	.	.	.
ID	LEWISTON	46	23	117	2
ID	SCOVILLE	.	.	.	.
IL	CHICAGO	41	58	87	34
IL	CARPENTERSVILLE	.	.	.	.
IL	FRANKLIN PARK	41	56	87	51
IL	CHICAGO	41	49	87	45
IL	EAST ALTON	38	53	90	6
IL	MORRIS	41	24	88	19
IL	CORDOVA	41	45	90	17
IL	SAUGET	60	58	19	19
IL	SAVANNA	42	16	90	23

TABLE 10-8 (cont.)

Listing of Hazardous Waste Incinerators - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
IN	INDIANAPOLIS	86	16	39	55
IN	WHITING	41	40	87	29
IN	HAMMOND	41	36	87	28
IN	SHADELAND	40	23	86	56
IN	RICHMOND	39	80	84	95
IN	CLINTON	39	44	87	23
IN	CRANE	38	50	86	50
IN	VALPARAISO	.	.	.	.
KS	WICHITA	37	35	97	25
KS	PARSONS	88	13	53	4
KS	COFFEEVILLE	.	.	.	.
KY	LOUISVILLE	38	13	85	50
KY	CALVERT CITY	37	3	88	21
KY	CARROLLTON	38	40	85	8
KY	LEXINGTON	38	4	84	29
KY	BRANDENBURG	38	0	86	7
KY	VALLEY STATION	38	1	85	55
KY	CALVERT CITY	37	2	88	20
KY	CLAY	.	.	.	.
KY	RICHMOND	.	.	.	.
LA	LAPLACE	30	3	90	31
LA	LAKE CHARLES	30	14	93	16
LA	LAKE CHARLES	30	13	93	17
LA	PLAQUEMINE	30	19	90	14
LA	GEISMAR	30	11	91	0
LA	BATON ROUGE	30	34	91	13
LA	BELLE CHASSE	29	48	90	0
LA	TAFT	29	59	90	27
LA	NEW ORLEANS	30	1	89	55
LA	WESTLAKE	30	14	93	16
LA	NORCO	30	0	90	25
LA	DOYLINE	32	33	93	24
LA	LAKE CHARLES	.	.	.	.
MA	CAMBRIDGE	42	23	71	16
MA	PITTSFIELD	42	24	73	14
MD	ELKTON	39	37	75	52
MD	BALTIMORE	.	.	.	.
MD	ABERDEEN PROVING GROUND	39	23	76	18
MI	MIDLAND	43	36	84	12
MI	KALAMAZOO	42	12	85	33
MN	COTTAGE GROVE	44	45	92	54
MO	ST. LOUIS	38	35	90	12
MO	COLUMBIA	39	55	92	18
MO	SPRINGFIELD	37	14	96	14
MO	SOUTH RIVER	39	50	91	26
MO	KANSAS CITY	39	7	94	28
MO	NEVADA	37	50	94	19
MO	KANSAS CITY	39	5	94	29
MO	SAINT CHARLES	38	48	90	28
MO	MCDOWELL	.	.	.	.
MS	PASCAGOULA	30	21	88	30
MS	NSTL STATION	30	23	89	35
MT	PARADISE	47	23	114	48
NC	LENOIR	35	53	81	33

TABLE 10-8 (cont.)

Listing of Hazardous Waste Incinerators - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
NC	LELAND	34	19	78	2
NC	GREENVILLE	35	39	77	21
NC	RESEARCH TRIANGLE	33	54	78	52
NC	LENOIR	35	52	81	27
NC	RESEARCH TRIANGLE	35	53	78	54
ND	MANDAN	46	51	100	53
NJ	BAYONNE	74	5	40	39
NJ	NEWARK	41	15	72	45
NJ	DEEPWATER	.	.	.	.
NJ	PISCATAWAY	40	33	74	31
NJ	KEARNY	40	43	74	7
NJ	BRIDGEPORT	39	46	75	21
NJ	RARITAN	40	34	74	39
NJ	WOODBURY	39	50	75	12
NJ	JERSEY CITY	.	.	.	.
NM	LOS ALAMOS	35	52	106	20
NV	HAWTHORNE	38	32	118	38
NY	ROCHESTER	43	8	77	38
NY	CLARENCE	42	55	78	41
NY	NIAGARA FALLS	43	4	79	0
NY	HARRIMAN	41	18	74	8
NY	WATERFORD	42	49	73	35
NY	NIAGARA FALLS	43	6	79	0
NY	TONAWANDA	78	53	43	0
NY	ALBANY	42	39	73	46
NY	MODEL CITY	43	13	78	58
NY	SELKIRK	42	34	73	51
NY	ROCHESTER	43	12	77	38
NY	ROMULUS	42	43	76	51
OH	MARIETTA	39	22	81	30
OH	ASHTABULA	41	54	80	46
OH	WICKLIFFE	41	36	81	28
OH	PAINESVILLE	40	43	81	16
OH	CLEVELAND	.	.	.	.
OH	CIRCLEVILLE	39	33	82	56
OH	CLEVELAND	41	26	81	32
OH	LIMA	40	42	84	7
OH	ELYRIA	41	21	82	7
OH	CLEVELAND	41	28	81	38
OH	MIAMISBURG	39	37	84	17
OH	MARIETTA	39	22	81	30
OK	BARTLESVILLE	36	45	96	0
OK	STILLWATER	36	9	97	3
OK	MUSKOGEE	35	46	95	18
OR	BEAVERTON	.	.	.	.
OR	HERMISTON	45	50	119	26
PA	WEST POINT	40	13	75	18
PA	FRACKVILLE	40	45	76	20
PA	YORK	39	54	76	49
PA	RIVERSIDE	40	57	76	38
PA	PHILADELPHIA	75	12	39	54
PA	CONSHOHOCKEN	40	5	75	20
PA	CONSHOHOCKEN	40	5	75	19
PR	HUMACAO	18	9	65	47

TABLE 10-8 (cont.)

Listing of Hazardous Waste Incinerators - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
PR	BARCELONETA	18	25	66	32
PR	BARCELONETA	18	26	66	34
PR	CAGUAS	18	14	66	1
PR	GUAYAMA	.	.	.	.
PR	MAYAGUEZ	18	15	67	9
PR	BARCELONETA	18	25	66	33
RI	WARWICK	.	.	.	.
SC	ROCK HILL	34	53	81	4
SC	LUGOFF	34	14	80	39
SC	ANDERSON	34	26	82	39
SC	ROEBUCK	34	52	81	58
SC	CENTRAL	30	45	82	46
SC	GREER	34	55	82	10
SC	AIKEN	33	17	81	39
TN	MEMPHIS	35	9	89	57
TN	MEMPHIS	35	16	89	59
TN	OAK RIDGE	35	55	84	25
TN	KINGSPORT	.	.	.	.
TX	LA PORTE	29	42	95	4
TX	TEXAS CITY	29	22	94	57
TX	SEABROOK	29	36	95	1
TX	LA PORTE	29	38	95	2
TX	DEER PARK	29	43	95	8
TX	PORT LAVACA	28	34	96	50
TX	GALVESTON	29	18	94	46
TX	TEXAS CITY	29	20	94	55
TX	PORT ARTHUR	94	6	29	52
TX	LONGVIEW	32	26	94	41
TX	PORT NECHES	29	58	93	56
TX	CONROE	30	18	94	58
TX	BEAUMONT	29	58	94	12
TX	LA PORTE	29	42	95	2
TX	TEXAS CITY	29	22	94	53
TX	ORANGE	.	.	.	.
TX	BEAUMONT	30	1	94	1
TX	FREEPORT	29	0	95	24
TX	SUGAR LAND	29	37	95	38
TX	HOUSTON	29	45	95	10
TX	FREEPORT	28	59	95	23
TX	PASADENA	29	44	95	10
TX	PASADENA	29	44	95	10
TX	HOUSTON	29	43	95	16
TX	BISHOP	27	34	97	50
TX	SEADRIFT	28	31	96	46
TX	OLD OCEAN	29	.	95	.
TX	DEER PARK	29	43	95	5
TX	BAYTOWN	29	45	94	54
TX	DEER PARK	29	42	95	4
TX	BEAUMONT	29	58	94	3
TX	DALLAS	32	48	96	50
TX	BEAUMONT	30	3	94	3
TX	PASADENA	29	37	95	3
TX	PASADENA	29	37	95	3
TX	PASADENA	.	.	.	.

TABLE 10-8 (cont.)

Listing of Hazardous Waste Incinerators - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
TX	DEVERS	.	.	.	.
TX	TEXARKANA	33	26	94	22
TX	AMARILLO	35	19	101	35
TX	DALLAS	32	45	96	56
TX	HOUSTON	.	.	.	.
TX	CHAMBERS CTY	.	.	.	.
UT	MAGNA	40	40	112	5
UT	TOOELE	40	31	112	24
UT	TOOELE	40	31	112	24
VA	HOPEWELL	37	18	77	16
VA	RADFORD	37	12	80	32
WA	PULLMAN	46	43	117	8
WA	CHEHALIS	46	39	122	50
WI	ARLINGTON	.	.	.	.
WI	NEW LONDON	44	22	88	43
WI	EAU CLAIRE	44	45	91	27
WI	SAUKVILLE	40	23	87	56
WV	SISTERSVILLE	39	29	81	5
WV	WILLOW ISLAND	39	21	81	18
WV	WASHINGTON	39	16	81	40
WV	NEW MARTINSVILLE	39	43	80	49
WV	SOUTH CHARLESTON	38	21	81	21

TABLE 10-9

Number of Hazardous Waste Incinerator Facilities by State

STATE	Frequency	Percent
AL	8	3.4
AR	5	2.1
AZ	1	0.4
CA	13	5.5
CO	2	0.8
CT	1	0.4
DE	2	0.8
FL	3	1.3
GA	4	1.7
IA	3	1.3
ID	2	0.8
IL	9	3.8
IN	8	3.4
KS	3	1.3
KY	9	3.8
LA	13	5.5
MA	2	0.8
MD	3	1.3
MI	2	0.8
MN	1	0.4
MO	9	3.8
MS	2	0.8
MT	1	0.4
NC	6	2.5
ND	1	0.4
NJ	9	3.8
NM	1	0.4
NV	1	0.4
NY	12	5.1
OH	12	5.1
OK	3	1.3
OR	2	0.8
PA	7	3.0
PR	7	3.0
RI	1	0.4
SC	7	3.0
TN	4	1.7
TX	42	17.7
UT	3	1.3
VA	2	0.8
WA	2	0.8
WI	4	1.7
WV	5	2.1

Frequency Missing = 1

TABLE 10-10

Number of Hazardous Waste Incinerator Facilities by Compact

COMPACT	Frequency	Percent
AP	17	7.2
C	24	10.1
CM	18	7.6
MA	2	0.8
MW	39	16.5
NE	10	4.2
NW	10	4.2
NY	12	5.1
PR	7	3.0
RI	1	0.4
RM	4	1.7
SE	36	15.2
SW	15	6.3
TX	42	17.7

Frequency Missing = 1

TABLE 10-11

Listing of Hazardous Waste Incinerators - 1986 Data - By State
Facilities Accepting Off-site Wastes from Non-owner Generators

STATE	COUNTY/PARISH	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
AL	JEFFERSON	BIRMINGHAM	33	29	86	54
AR	UNION	EL DORADO	33	12	92	37
AR	JEFFERSON	JEFFERSON	.	.	.	.
CA	CONTRA COSTA	MARTINEZ	38	1	122	4
CA	RANCHO CORDOVA*	RANCHO CORDOVA	38	35	121	15
CO	JEFFERSON	GOLDEN	.	.	.	.
IL	COOK	CHICAGO	41	58	87	34
IL	ST. CLAIR	SAUGET	60	58	19	19
KS	MONTGOMERY	COFFEEVILLE	.	.	.	.
KY	CARROLL	CARROLLTON	38	40	85	8
KY	MEADE	BRANDENBURG	38	0	86	7
KY	MARSHALL	CALVERT CITY	37	2	88	20
KY	WEBSTER	CLAY	.	.	.	.
LA	E. BATON ROUGE	BATON ROUGE	30	34	91	13
MA	BERKSHIRE	PITTSFIELD	42	24	73	14
MI	MIDLAND	MIDLAND	43	36	84	12
MN	WASHINGTON	COTTAGE GROVE	44	45	92	54
MO	BOONE	COLUMBIA	39	55	92	18
MO	MARION	SOUTH RIVER	39	50	91	26
MO	BARRY	MCDOWELL	.	.	.	.
NC	CALDWELL	LENOIR	35	52	81	27
NJ	GLOUCESTER	BRIDGEPORT	39	46	75	21
NY	ERIE	CLARENCE	42	55	78	41
NY	MONROE	ROCHESTER	43	12	77	38
PA	MONTGOMERY	CONSHOHOCKEN	40	5	75	20
SC	YORK	ROCK HILL	34	53	81	4
SC	SPARTANBURG	ROEBUCK	34	52	81	58
SC	GREENVILLE & SPARTANBURG	GREER	34	55	82	10
TN	SULLIVAN	KINGSPORT	.	.	.	.
TX	HARRIS	DEER PARK	29	43	95	5
WA	LEWIS	CHEHALIS	46	39	122	50

* Rancho Cordova is an unincorporated town, thus the county and town are the same (1980 pop = 42,881)

TABLE 10-12

Number of Hazardous Waste Incinerator Facilities by State
Facilities Accepting Off-site Wastes from Non-owner Generators

STATE	Frequency	Percent
AL	1	3.2
AR	2	6.5
CA	2	6.5
CO	1	3.2
IL	2	6.5
KS	1	3.2
KY	4	12.9
LA	1	3.2
MA	1	3.2
MI	1	3.2
MN	1	3.2
MO	3	9.7
NC	1	3.2
NJ	1	3.2
NY	2	6.5
PA	1	3.2
SC	3	9.7
TN	1	3.2
TX	1	3.2
WA	1	3.2

TABLE 10-13

Number of Hazardous Waste Incinerator Facilities by Compact
Facilities Accepting Off-site Wastes from Non-owner Generators

COMPACT	Frequency	Percent
AP	1	3.2
C	4	12.9
CM	6	19.4
MA	1	3.2
MW	5	16.1
NE	1	3.2
NW	1	3.2
NY	2	6.5
RM	1	3.2
SE	6	19.4
SW	2	6.5
TX	1	3.2

TABLE 10-14

Quantity of Waste Incinerated - Private vs. Commercial

			STATUS	
			Commercial	Private
Quantity	Solid	N	23	110
		MIN	3	0
		MAX	75,644	140,457
		MEAN	15,196	3,841
		STD	19,481	14,126
	Liquid	N	5	45
		MIN	360	0
		MAX	4,155,254	23,444,000
		MEAN	1,154,066	1,589,142
		STD	1,725,480	4,387,267
	Gas	N	.	2
		MIN	.	1
		MAX	.	1
		MEAN	.	1
		STD	.	0

TABLE 10-15

Facilities That Handle Mixed Radioactive Waste

OBS	STATE	TOWN	Manage	Accept General	Accept Limited	Accept Onsite	Accept Owner	Commercial 92	Stored	Disposed	Treated
1	AZ	TUCSON	yes	no	no	yes	no	no	yes	no	no
2	CA	LIVERMORE	yes	no	no	yes	no	no	yes	no	yes
3	CA	STANFORD	yes	no	no	yes	no	no	yes	no	no
4	CO	GOLDEN	yes	no	no	yes	no	no	yes	no	yes
5	CT	GROTON	yes	no	no	yes	no	no	yes	no	no
6	DE	WILMINGTON	yes	no	no	yes	no	no	no	no	yes
7	IA	AMES	yes	no	no	no	yes	no	no	no	yes
8	ID	SCOVILLE	yes	no	no	yes	yes	no	yes	no	yes
9	MD	ABERDEEN PROVING GROUND	yes	no	no	yes	no	no	yes	yes	no
10	MI	KALAMAZOO	yes	no	no	no	yes	no	yes	yes	no
11	MI	MIDLAND	yes	no	no	no	yes	no	no	no	yes
12	MO	COLUMBIA	yes	no	no	yes	no	no	yes	yes	no
13	NC	RESEARCH TRIANGLE	yes	no	no	yes	no	no	yes	no	yes
14	NC	RESEARCH TRIANGLE	yes	no	no	yes	no	no	no	no	yes
15	NJ	RARITAN	yes	no	no	yes	no	no	yes	no	no
16	NM	LOS ALAMOS	yes	no	no	yes	no	no	yes	yes	yes
17	NY	ALBANY	yes	no	no	yes	no	no	yes	no	no
18	NY	ROCHESTER	yes	no	no	yes	yes	no	yes	no	no
19	OH	CLEVELAND	yes	no	no	yes	no	no	yes	no	no
20	OH	LIMA	yes	no	no	yes	no	no	yes	no	no
21	OH	MIAMISBURG	yes	no	no	yes	no	no	yes	no	no
22	OK	BARTLESVILLE	yes	no	no	yes	no	no	yes	no	no
23	PA	WEST POINT	yes	no	no	yes	no	no	yes	no	yes
24	SC	AIKEN	yes	no	no	yes	no	no	yes	yes	yes
25	TN	OAK RIDGE	yes	no	no	yes	yes	no	yes	no	yes
26	TX	AMARILLO	yes	no	no	yes	no	no	yes	no	no
27	TX	GALVESTON	yes	no	no	yes	no	no	yes	no	yes
28	WA	PULLMAN	yes	no	no	yes	yes	no	yes	no	no
29	WI	ARLINGTON	yes	no	no	no	yes	no	no	no	yes

TABLE 10-16

Facility Area - Private vs. Commercial

		STATUS	
		Commercial	Private
Facility Area (Acres)	N	31	201
	MIN	1	1
	MAX	2,700	62,463
	MEAN	397	2,442
	STD	741	7,167

TABLE 10-17
Commercial Facilities - Size and Neighboring Populations

OBS	STATE	TOWN	COMPACT	Onsite Landfill	Facility Area (Acres)	Closest Property Line (ft)	Population Within One Mile	Closest Residence (ft)
1	AL	BIRMINGHAM	SE	no	14	50	0	1500
2	AR	EL DORADO	C	no	315	20	1000	1000
3	AR	JEFFERSON	C	no	1	.	.	.
4	CA	MARTINEZ	SW	no	20	0	4050	1000
5	CA	RANCHO CORDOVA	SW	no	6	65	0	.
6	CO	GOLDEN	RM	no	2	.	.	.
7	IL	CHICAGO	CM	no	30	32	21	4800
8	IL	SAUGET	CM	no	35	50	0	9999
9	KS	COFFEEVILLE	C	no	36	.	.	.
10	KY	CARROLLTON	CM	no	25	120	500	1200
11	KY	BRANDENBURG	CM	no	2000	1600	10	2800
12	KY	CALVERT CITY	CM	no	28	10	1200	3000
13	KY	CLAY	CM	no	10	.	.	.
14	LA	BATON ROUGE	C	yes	345	450	350	1200
15	MA	PITTSFIELD	MA	no	299	25	5000	300
16	MI	MIDLAND	MW	no	1600	100	4400	300
17	MN	COTTAGE GROVE	MW	no	820	360	45	2600
18	MO	COLUMBIA	MW	no	1341	1600	20000	1600
19	MO	SOUTH RIVER	MW	no	5	1000	4	5200
20	MO	MCDOWELL	MW	no	3	.	.	.
21	NC	LENOIR	SE	no	2	50	250	1000
22	NJ	BRIDGEPORT	NE	no	78	200	0	4000
23	NY	CLARENCE	NY	no	6	50	23	3000
24	NY	ROCHESTER	NY	no	2154	200	7000	400
25	PA	CONSHOHOCKEN	AP	no	7	60	1100	1320
26	SC	ROCK HILL	SE	no	42	50	80	4000
27	SC	ROEBUCK	SE	no	255	15	1000	1600
28	SC	GREER	SE	no	54	50	50	2500
29	TN	KINGSPORT	SE	no	2700	.	.	.
30	TX	DEER PARK	TX	yes	86	60	0	10000
31	WA	CHEHALIS	NW	no	2	40	53	120

TABLE 10-18
Facility Size by Compact

	Facility Area (Acres)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	1	7	7	7	.
C	4	1	345	174	181
CM	6	10	2,000	355	806
MA	1	299	299	299	.
MW	5	3	1,600	754	740
NE	1	78	78	78	.
NW	1	2	2	2	.
NY	2	6	2,154	1,080	1,519
RM	1	2	2	2	.
SE	6	2	2,700	511	1,076
SW	2	6	20	13	10
TX	1	86	86	86	.
ALL	31	1	2,700	397	741

TABLE 10-19
Closest Property Line by Compact

	Closest Proper y Line (ft)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	1	60	60	60	.
C	2	20	450	235	304
CM	5	10	1,600	362	693
MA	1	25	25	25	.
MW	4	100	1,600	765	673
NE	1	200	200	200	.
NW	1	40	40	40	.
NY	2	50	200	125	106
RM	0	.	.	.	.
SE	5	15	50	43	16
SW	2	0	65	33	46
TX	1	60	60	60	.
ALL	25	0	1,600	250	457

TABLE 10-20
Population Within One Mile by Compact

	Population Within One Mile				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	1	1,100	1,100	1,100	.
C	2	350	1,000	675	460
CM	5	0	1,200	346	522
MA	1	5,000	5,000	5,000	.
MW	4	4	20,000	6,112	9,485
NE	1	0	0	0	.
NW	1	53	53	53	.
NY	2	23	7,000	3,512	4,933
RM	0	.	.	.	.
SE	5	0	1,000	276	415
SW	2	0	4,050	2,025	2,864
TX	1	0	0	0	.
ALL	25	0	20,000	1,845	4,231

TABLE 10-21
Closest Residence (ft) by Compact

	Closest Residence (ft)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	1	1,320	1,320	1,320	.
C	2	1,000	1,200	1,100	141
CM	5	1,200	9,999	4,360	3,401
MA	1	300	300	300	.
MW	4	300	5,200	2,425	2,076
NE	1	4,000	4,000	4,000	.
NW	1	120	120	120	.
NY	2	400	3,000	1,700	1,838
RM	0	.	.	.	.
SE	5	1,000	4,000	2,120	1,182
SW	1	1,000	1,000	1,000	.
TX	1	10,000	10,000	10,000	.
ALL	24	120	10,000	2,685	2,664

TABLE 10-22
Commercial Facilities - Types of Incinerators

OBS	STATE	TOWN	COMPACT	Liquid Injection	Rotary Kiln	Rotary Kiln With Liquid Injection	Two Stage	Fixed Hearth	Multiple Hearth
1	AL	BIRMINGHAM	SE	no	no	no	no	no	no
2	AR	EL DORADO	C	yes	no	yes	no	no	no
3	AR	JEFFERSON	C	yes	yes	.	.	.	.
4	CA	MARTINEZ	SW	yes	no	no	no	no	no
5	CA	RANCHO CORDOVA	SW	no	no	no	no	no	yes
6	CO	GOLDEN	RM	no	no	no	no	no	no
7	IL	CHICAGO	CM	no	no	yes	no	no	no
8	IL	SAUGET	CM	.	.	.	.	yes	.
9	KS	COFFEEVILLE	C	no	no	yes	no	no	no
10	KY	CARROLLTON	CM	no	no	yes	no	no	no
11	KY	BRANDENBURG	CM	yes	no	no	no	no	no
12	KY	CALVERT CITY	CM	no	no	yes	no	no	yes
13	KY	CLAY	CM	yes	.	.	.	.	.
14	LA	BATON ROUGE	C	no	no	yes	no	no	no
15	MA	PITTSFIELD	MA	yes	no	no	no	no	no
16	MI	MIDLAND	MW	no	no	yes	no	no	no
17	MN	COTTAGE GROVE	MW	no	no	yes	no	no	no
18	MO	COLUMBIA	MW	no	no	no	no	yes	no
19	MO	SOUTH RIVER	MW	yes	no	no	yes	no	no
20	MO	MCDOWELL	MW	.	.	yes	.	.	.
21	NC	LENOIR	SE	yes	no	no	no	no	no
22	NJ	BRIDGEPORT	NE	yes	no	yes	no	no	no

OBS	Fluidized Bed	Infra-Red	Fume/ Vapor	Pyrolitic Destructor	Other	Quantity Incinerated	Units
1	no	no	no	yes	no	417	Tons
2	no	no	no	no	no	75644	Tons
3	.	.	.	.	.	869	Gallons
4	no	no	no	no	no	800770	Gallons
5	no	no	no	no	no	791	Tons
6	yes	no	no	no	no	360	Gallons
7	no	no	no	no	no	34261	Tons
8	.	.	.	.	.	5500	Tons
9	no	no	no	no	no	2497	Tons
10	no	no	no	no	no	1470	Tons
11	no	no	no	no	no	545	Tons
12	no	no	no	no	no	.	.
13	.	.	.	.	.	.	.
14	no	no	no	no	no	14598	Tons
15	no	no	no	no	no	813078	Gallons
16	no	no	no	no	no	13175	Tons
17	no	no	no	no	no	25887	Tons
18	no	no	no	no	no	4	Tons
19	no	no	.	no	.	4155254	Gallons
20	.	.	.	.	.	191	Tons
21	no	no	no	no	no	7384	Tons
22	no	no	no	no	no	29000	Tons

TABLE 10-22 (cont.)
Commercial Facilities - Types of Incinerators

OBS	STATE	TOWN	COMPACT	Liquid Injection	Rotary Kiln	Rotary Kiln With Liquid Injection	Two Stage	Fixed Hearth	Multiple Hearth
23	NY	CLARENCE	NY	no	no	no	no	yes	no
24	NY	ROCHESTER	NY	.	.	yes	.	.	.
25	PA	CONSHOHOCKEN	AP	yes	no	no	no	no	no
26	SC	ROCK HILL	SE	.	.	.	.	.	yes
27	SC	ROEBUCK	SE	yes	no	no	no	no	no
28	SC	GREER	SE	no	no	no	no	no	no
29	TN	KINGSPORT	SE	yes	no	yes	no	no	no
30	TX	DEER PARK	TX	no	no	yes	no	no	no
31	WA	CHEHALIS	NW	no	no	no	no	yes	no

OBS	Fluidized Bed	Infra-Red	Fume/ Vapor	Pyrolitic Destructor	Other	Quantity Incinerated	Units
23	no	no	no	no	no	20	Tons
24	.	.	.	.	.	22430	Tons
25	no	no	no	no	no	0	
26	.	.	.	.	.	8200	Tons
27	no	no	no	no	no	26600	Tons
28	no	no	no	yes	.	3	Tons
29	no	no	no	no	no	29004	Tons
30	no	no	no	no	no	51509	Tons
31	no	no	no	no	.	372	Tons

TABLE 10-23
Commercial Facilities - Materials Fed Directly Into Incinerator

OBS	STATE	TOWN	COMPACT	Metal Drums	Crushed/ Shredded Metal Drums	Empty Metal Drums	Fiber Drums	Crushed/ Shredded Fiber Drums	Empty Fiber Drums	Sludge	Uncontainerized Bulk Solids
1	AL	BIRMINGHAM	SE	yes	yes	yes	yes	yes	yes	yes	yes
2	AR	EL DORADO	C	yes	yes	yes	yes	yes	yes	yes	yes
3	AR	EL DORADO	C	no	no	no	no	no	no	no	no
4	AR	JEFFERSON	C	no	no	no	no	no	no	no	no
5	AR	JEFFERSON	C	no	yes	no	yes	yes	yes	yes	no
6	CA	MARTINEZ	SW	no	no	no	no	no	no	no	no
7	CA	RANCHO CORDOVA	SW	no	no	no	no	no	no	no	no
8	CO	GOLDEN	RM	no	no	no	no	no	no	yes	yes
9	IL	CHICAGO	CM	no	yes	no	yes	yes	yes	yes	no
10	IL	SAUGET	CM	no	no	no	yes	yes	yes	yes	no
11	IL	SAUGET	CM	no	no	no	yes	yes	yes	yes	no
12	KS	COFFEEVILLE	C	no	yes	no	yes	yes	yes	no	no
13	KY	CARROLLTON	CM	no	no	no	no	no	no	yes	no
14	KY	BRANDENBURG	CM	no	no	no	no	no	no	no	no
15	KY	CALVERT CITY	CM	.	.	.	.	.	.	.	.
16	KY	CALVERT CITY	CM	.	.	.	.	.	.	.	.
17	KY	CLAY	CM	.	.	.	.	.	.	.	.
18	LA	BATON ROUGE	C	no	no	.	yes	.	.	yes	no
19	MA	PITTSFIELD	MA	no	no	no	no	no	no	no	no
20	MI	MIDLAND	MW	yes	no	.	yes	.	.	yes	yes
21	MN	COTTAGE GROVE	MW	yes	yes	yes	yes	yes	yes	yes	yes
22	MO	COLUMBIA	MW	yes	yes	yes	yes	yes	yes	yes	yes
23	MO	SOUTH RIVER	MW	no	no	no	no	no	no	no	no
24	MO	SOUTH RIVER	MW	no	yes	no	yes	yes	yes	no	yes
25	MO	MCDOWELL	MW	yes	yes	yes	yes	yes	yes	yes	yes
26	NC	LENOIR	SE	no	no	no	no	no	no	no	no
27	NJ	BRIDGEPORT	NE	no	no	no	no	no	no	no	no
28	NJ	BRIDGEPORT	NE	no	yes	yes	yes	yes	yes	yes	no
29	NY	CLARENCE	NY	no	no	no	no	yes	no	no	yes
30	NY	ROCHESTER	NY	yes	no	yes	yes	no	yes	no	no
31	PA	CONSHOHOCKEN	AP	no	no	no	no	no	no	no	no
32	PA	CONSHOHOCKEN	AP	no	no	no	no	no	no	no	no
33	SC	ROCK HILL	SE	yes	yes	no	yes	yes	yes	yes	no
34	SC	ROEBUCK	SE	no	no	no	no	no	no	no	no
35	SC	GREER	SE	no	no	no	no	no	no	no	no
36	TN	KINGSPORT	SE	no	no	no	no	no	no	no	no
37	TN	KINGSPORT	SE	no	no	no	yes	yes	yes	no	yes
38	TN	KINGSPORT	SE	no	no	no	yes	yes	yes	no	yes
39	TX	DEER PARK	TX	yes	yes	yes	yes	yes	yes	yes	no
40	WA	CHEHALIS	NW	no	no	no	no	no	no	no	no
41	WA	CHEHALIS	NW	no	no	no	no	no	no	no	no

TABLE 10-24
Commercial Facilities - Pollution Control Devices

OBS	STATE	TOWN	COMPACT	Cyclone	Electostatic Precipitator	Wet Electrostatic Precipitator	Baghouse	Quench	Venturi Scrubber	Packed Bed Scrubber	High Impact Scrubber	Wet Ionizing Scrubber	None	Other
1	AL	BIRMINGHAM	SE	no	no	no	no	no	no	no	no	no	yes	no
2	AR	EL DORADO	C	no	no	no	no	no	yes	no	no	no	no	no
3	AR	EL DORADO	C	no	no	no	no	no	yes	yes	no	no	no	no
4	AR	JEFFERSON	C	no	no	no	no	yes	yes	yes	no	yes	no	no
5	AR	JEFFERSON	C	no	no	no	no	yes	yes	yes	no	yes	no	no
6	CA	MARTINEZ	SW	no	no	no	no	no	no	no	no	no	yes	no
7	CA	RANCHO CORDOVA	SW	no	no	no	yes	no	no	no	no	no	no	yes
8	CO	GOLDEN	RM	yes	no	no	no	yes	no	yes	no	no	no	no
9	IL	CHICAGO	CM	no	no	no	no	yes	no	yes	no	yes	no	yes
10	IL	SAUGET	CM	yes	no	no	no	yes	yes	no	no	no	no	no
11	IL	SAUGET	CM	no	no	no	yes	no	no	no	no	no	no	yes
12	KS	COFFEEVILLE	C	no	no	no	no	yes	no	no	no	yes	no	no
13	KY	CARROLLTON	CM	no	no	no	yes	no	no	yes	no	no	no	no
14	KY	BRANDENBURG	CM	no	no	no	no	no	no	yes	no	no	no	no
15	KY	CALVERT CITY	CM	no	no	no	no	no	no	no	no	no	no	no
16	KY	CALVERT CITY	CM	no	no	no	no	no	no	no	no	no	no	no
17	KY	CLAY	CM	no	no	no	no	no	no	no	no	no	no	no
18	LA	BATON ROUGE	C	no	no	yes	no	no	no	yes	no	no	no	no
19	MA	PITTSFIELD	MA	no	no	no	no	yes	no	yes	no	no	no	no
20	MI	MIDLAND	MW	no	no	yes	no	no	yes	yes	no	no	no	no
21	MN	COTTAGE GROVE	MW	no	no	yes	no	yes	yes	yes	no	no	no	no
22	MO	COLUMBIA	MW	no	no	no	no	no	no	no	no	no	yes	no
23	MO	SOUTH RIVER	MW	no	no	no	no	yes	yes	yes	no	no	no	no
24	MO	SOUTH RIVER	MW	no	no	no	no	yes	no	yes	no	no	no	no
25	MO	MCDOWELL	MW	yes	no	yes	no	yes	no	yes	no	no	no	no
26	NC	LENOIR	SE	yes	no	no	yes	no	no	no	no	no	no	no
27	NJ	BRIDGEPORT	NE	no	no	no	no	no	yes	yes	no	no	no	no
28	NJ	BRIDGEPORT	NE	no	no	no	no	no	yes	yes	no	no	no	no
29	NY	CLARENCE	NY	yes	no	no	no	no	yes	no	no	no	no	no
30	NY	ROCHESTER	NY	no	no	no	no	yes	yes	no	yes	no	no	no
31	PA	CONSHOHOCKEN	AP	no	no	no	yes	yes	no	yes	no	no	no	no
32	PA	CONSHOHOCKEN	AP	no	no	no	no	yes	yes	yes	no	no	no	no
33	SC	ROCK HILL	SE	yes	no	no	no	yes	yes	no	yes	no	no	no
34	SC	ROEBUCK	SE	no	no	no	yes	yes	yes	no	no	no	no	no
35	SC	GREER	SE	no	no	no	no	no	no	no	no	no	no	yes
36	TN	KINGSPORT	SE	no	no	no	no	yes	yes	yes	no	no	no	yes
37	TN	KINGSPORT	SE	no	no	no	no	yes	yes	no	no	no	no	yes
38	TN	KINGSPORT	SE	no	no	no	no	yes	yes	no	no	no	no	yes
39	TX	DEER PARK	TX	no	no	no	no	yes	yes	yes	no	no	no	no
40	WA	CHEHALIS	NW	no	no	no	no	no	no	no	no	no	no	yes
41	WA	CHEHALIS	NW	no	no	no	no	no	no	no	no	no	yes	no

TABLE 10-25
Commercial Facilities - Operating Time and Downtime

OBS	STATE	TOWN	COMPACT	Operating	Type	Hours With Some Hazardous Influent	Hours With No Hazardous Influent	Downtime Hours Repair And Maint.	Downtime Hours No Waste	Downtime Hours Other
1	AL	BIRMINGHAM	SE	yes	Fixed	667	3288	1612	1063	2130
2	AR	EL DORADO	C	yes	Fixed	7284	100	1376	0	0
3	AR	EL DORADO	C	.	Mobile	5736	115	1512	0	1397
4	AR	JEFFERSON	C	no	Fixed	44	110	5	5	8596
5	AR	JEFFERSON	C	yes	Fixed	112	400	720	10	7518
6	CA	MARTINEZ	SW	yes	Fixed	4062	4062	636	0	0
7	CA	RANCHO CORDOVA	SW	yes	Fixed	8059	438	263	0	0
8	CO	GOLDEN	RM	yes	Fixed	160	80	.	8520	.
9	IL	CHICAGO	CM	yes	Fixed	7546	189	821	0	204
10	IL	SAUGET	CM	yes	Fixed	.	.	.	.	.
11	IL	SAUGET	CM	yes	Fixed	.	.	.	.	.
12	KS	COFFEEVILLE	C	yes	Fixed	2104	5760	128	0	768
13	KY	CARROLLTON	CM	yes	Fixed	6031	0	2157	0	500
14	KY	BRANDENBURG	CM	yes	Fixed	1200	0	0	7560	0
15	KY	CALVERT CITY	CM	yes	Fixed	.	.	.	.	.
16	KY	CALVERT CITY	CM	yes	Fixed	.	.	.	.	.
17	KY	CLAY	CM	no	Fixed	.	.	.	.	.
18	LA	BATON ROUGE	C	yes	Fixed	6963	216	1581	0	0
19	MA	PITTSFIELD	MA	yes	Fixed	7007	0	953	0	800
20	MI	MIDLAND	MW	yes	Fixed	6912	432	1416	.	.
21	MN	COTTAGE GROVE	MW	yes	Fixed	6082	0	2425	0	253
22	MO	COLUMBIA	MW	yes	Fixed	468	624	80	0	7588
23	MO	SOUTH RIVER	MW	yes	Fixed	6848	0	588	1114	210
24	MO	SOUTH RIVER	MW	yes	Fixed	0	2536	280	0	5944
25	MO	MCDOWELL	MW	yes	Mobile	840	0	168	7608	144
26	NC	LENOIR	SE	yes	Fixed	7884	0	788	0	88
27	NJ	BRIDGEPORT	NE	yes	Fixed	7113	0	1318	0	329
28	NJ	BRIDGEPORT	NE	yes	Fixed	6908	0	1442	.	410
29	NY	CLARENCE	NY	yes	Fixed	3400	0	600	0	4760
30	NY	ROCHESTER	NY	yes	Fixed	7356	0	1404	0	0
31	PA	CONSHOHOCKEN	AP	no	Fixed	0	600	8060	50	50
32	PA	CONSHOHOCKEN	AP	no	Fixed	0	20	8690	10	40
33	SC	ROCK HILL	SE	yes	Fixed	4730	0	900	2260	870
34	SC	ROEBUCK	SE	yes	Fixed	7884	.	856	.	20
35	SC	GREER	SE	yes	Fixed	40	0	40	0	8680
36	TN	KINGSPORT	SE	yes	Fixed	6343	0	2177	0	240
37	TN	KINGSPORT	SE	yes	Fixed	5000	2400	1120	0	240
38	TN	KINGSPORT	SE	yes	Fixed	4925	2325	1270	0	240
39	TX	DEER PARK	TX	yes	Fixed	8060	0	700	0	0
40	WA	CHEHALIS	NW	yes	Fixed	3212	0	70	200	5278
41	WA	CHEHALIS	NW	yes	Fixed	3212	0	70	200	5278

TABLE 10-26
Commercial Facilities - Feed Rates

OBS	STATE	TOWN	COMPACT	Thermal Rating (Million Btu/hr)	Average Heating Value Hazardous Waste (Btu/lb)	Average Heating Value Nonhazardous Waste (Btu/lb)	Feed Rate Liquids	Units	Feed Rate Sludge	Units	Feed Rate Solids (lb/hr)	Feed Rate Gases (Million scf/hr)
1	AL	BIRMINGHAM	SE	3	6000	14000	0	.	0	.	500	0
2	AR	EL DORADO	C	170	8500	.	20000	lb/hr	800	lb/hr	4700	.
3	AR	EL DORADO	C	10	18000	18000	390	lb/hr	0	.	0	.
4	AR	JEFFERSON	C	2	10000	.	100	lb/hr	.	.	.	.
5	AR	JEFFERSON	C	3	10000	.	20	lb/hr	60	lb/hr	100	.
6	CA	MARTINEZ	SW	18	15000	19000	1060	lb/hr	0	gal/hr	0	0
7	CA	RANCHO CORDOVA	SW	.	.	.	0	.	0	.	650	0
8	CO	GOLDEN	RM	.	4000	4000	2	.	5	.	100	0
9	IL	CHICAGO	CM	120	12000	12000	6000	lb/hr	900	lb/hr	2010	0
10	IL	SAUGET	CM	14	.	.	1000	lb/hr	150	lb/hr	550	.
11	IL	SAUGET	CM	16	.	.	1000	lb/hr	150	lb/hr	550	.
12	KS	COFFEEVILLE	C	62	10000	0	2500	lb/hr	0	.	1667	0
13	KY	CARROLLTON	CM	16	10000	500	700	lb/hr	2000	lb/hr	0	0
14	KY	BRANDENBURG	CM	40	13000	.	124	gal/hr	0	.	0	0
15	KY	CALVERT CITY	CM	.	.	.	.	.	.	.	.	.
16	KY	CALVERT CITY	CM	.	.	.	.	.	.	.	.	.
17	KY	CLAY	CM	.	.	.	.	.	.	.	.	.
18	LA	BATON ROUGE	C	131	106	.	8000	lb/hr	8000	lb/hr	10000	0
19	MA	PITTSFIELD	MA	21	14000	0	132	gal/hr	0	gal/hr	0	0
20	MI	MIDLAND	MW	80	100	.	1680	gal/hr	300	gal/hr	12000	.
21	MN	COTTAGE GROVE	MW	115	7600	6100	480	gal/hr	3000	lb/hr	12000	.
22	MO	COLUMBIA	MW	.	.	.	20	lb/hr	0	.	0	0
23	MO	SOUTH RIVER	MW	48	750	0	15500	lb/hr	.	.	.	.
24	MO	SOUTH RIVER	MW	2	.	6000	.	.	.	.	200	.
25	MO	MCDOWELL	MW	6	2347	0	300	lb/hr	1000	lb/hr	2000	0
26	NC	LENOIR	SE	14	3500	0	2800	lb/hr	0	.	0	0
27	NJ	BRIDGEPORT	NE	75	10000	.	7200	lb/hr	0	.	0	0
28	NJ	BRIDGEPORT	NE	35	8000	.	900	lb/hr	0	.	1622	0
29	NY	CLARENCE	NY	2	4000	.	0	lb/hr	0	lb/hr	60	0
30	NY	ROCHESTER	NY	133	8500	5000	2000	gal/hr	0	.	10000	0
31	PA	CONSHOHOCKEN	AP	3	6000	6000	600	lb/hr	0	.	0	0
32	PA	CONSHOHOCKEN	AP	1	6000	6000	250	lb/hr	0	.	0	0
33	SC	ROCK HILL	SE	42	6500	8000	1200	gal/hr	2000	lb/hr	3000	1
34	SC	ROEBUCK	SE	50	8000	.	9000	lb/hr	0	.	0	0
35	SC	GREER	SE	1	0	0	0	.	0	.	200	0
36	TN	KINGSPORT	SE	40	10000	8000	4800	lb/hr	0	.	0	0
37	TN	KINGSPORT	SE	55	10000	5000	6000	lb/hr	0	.	7200	0
38	TN	KINGSPORT	SE	55	10000	5000	6000	lb/hr	0	.	7200	0
39	TX	DEER PARK	TX	150	10000	5000	5600	lb/hr	2700	lb/hr	7500	1
40	WA	CHEHALIS	NW	117	.	0	0	.	0	.	170	0
41	WA	CHEHALIS	NW	2	.	.	8	gal/hr	0	.	0	0

TABLE 10-27
Incinerator Feed Rate (Solids)

	Solids Feed Rate (lb/hr)				
	N	MIN	MAX	MEAN	STD
COMPACT					
C	4	100	10,000	4,117	4,362
CM	3	550	2,010	1,037	843
MW	4	200	12,000	6,550	6,336
NE	1	1,622	1,622	1,622	.
NW	1	170	170	170	.
NY	2	60	10,000	5,030	7,029
RM	1	100	100	100	.
SE	5	200	7,200	3,620	3,444
SW	1	650	650	650	.
TX	1	7,500	7,500	7,500	.
ALL	23	60	12,000	3,651	4,196

TABLE 10-28
Number of Employees by Facility

OBS	STATE	TOWN	COMPACT	Total	Hazardous Waste Operations	Support Operations	Contractors
1	AL	BIRMINGHAM	SE	43	6	1	0
2	AR	EL DORADO	C	275	135	90	50
3	AR	JEFFERSON	C	15	13	2	12
4	CA	MARTINEZ	SW	100	50	50	0
5	CA	RANCHO CORDOVA	SW	103	21	82	0
6	CO	GOLDEN	RM	35	3	32	0
7	IL	CHICAGO	[illegible]	82	31	51	17
8	IL	SAUGET	CM	60	35	15	10
9	KS	COFFEEVILLE	C	60	39	21	0
10	KY	CARROLLTON	CM	300	20	5	0
11	KY	BRANDENBURG	CM	283	10	5	0
12	KY	CALVERT CITY	CM	90	46	44	0
13	KY	CLAY	CM	5	4	5	0
14	LA	BATON ROUGE	C	143	59	84	0
15	MA	PITTSFIELD	MA	6500	23	3	10
16	MI	MIDLAND	MW	5000	200	200	4600
17	MN	COTTAGE GROVE	MW	950	452	126	10
18	MO	COLUMBIA	MW	8154	3	4	0
19	MO	SOUTH RIVER	MW	500	40	35	0
20	MO	MCDOWELL	MW	55	25	10	20
21	NC	LENOIR	SE	50	40	10	0
22	NJ	BRIDGEPORT	NE	100	38	62	0
23	NY	CLARENCE	NY	18	10	8	0
24	NY	ROCHESTER	NY	24159	2000	200	30
25	PA	CONSHOHOCKEN	AP	80	6	2	0
26	SC	ROCK HILL	SE	67	48	19	0
27	SC	ROEBUCK	SE	35	18	17	0
28	SC	GREER	SE	20	12	8	2
29	TN	KINGSPORT	SE	9000	1570	257	25
30	TX	DEER PARK	TX	165	125	40	0
31	WA	CHEHALIS	NW	10	6	4	0

TABLE 10-29
Incinerator Facilities - Number of Employees

		COMPACT												
		AP	C	CM	MA	MW	NE	NW	NY	RM	SE	SW	TX	ALL
Total	N	1	4	6	1	5	1	1	2	1	6	2	1	31
	MIN	80	15	5	6,500	55	100	10	18	35	20	100	165	5
	MAX	80	275	300	6,500	8,154	100	10	24,159	35	9,000	103	165	24,159
	MEAN	80	123	137	6,500	2,932	100	10	12,089	35	1,536	102	165	1,821
	STD	.	114	124	.	3,524	.	.	17,070	.	3,657	2	.	4,820
Hazardous Waste Operations	N	1	4	6	1	5	1	1	2	1	6	2	1	31
	MIN	6	13	4	23	3	38	6	10	3	6	21	125	3
	MAX	6	135	46	23	452	38	6	2,000	3	1,570	50	125	2,000
	MEAN	6	62	24	23	144	38	6	1,005	3	282	36	125	164
	STD	.	52	16	.	189	.	.	1,407	.	631	21	.	445
Support Operations	N	1	4	6	1	5	1	1	2	1	6	2	1	31
	MIN	2	2	5	3	4	62	4	8	32	1	50	40	1
	MAX	2	90	51	3	200	62	4	200	32	257	82	40	257
	MEAN	2	49	21	3	75	62	4	104	32	52	66	40	48
	STD	.	44	21	.	85	.	.	136	.	101	23	.	65
Contractors	N	1	4	6	1	5	1	1	2	1	6	2	1	31
	MIN	0	0	0	10	0	0	0	0	0	0	0	0	0
	MAX	0	50	17	10	4,600	0	0	30	0	25	0	0	4,600
	MEAN	0	16	5	10	926	0	0	15	0	5	0	0	154
	STD	.	24	7	.	2,054	.	.	21	.	10	0	.	825

TABLE 10-30

TYPICAL TRANSPORTATION DISTANCE TO
COMMERCIAL HAZARDOUS WASTE COMBUSTORS IN THE U.S.
BY COMPACT

COMPACT REGIONS	NUMBER OF COMBUSTOR	AREA (sq. mi.)	SQUARE MILES PER COMBUSTOR	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)*
Northwest	1	1,078,196	1,078,196	414	828
Rocky Mountains	1	434,054	434,054	263	526
Southwestern	2	420,524	210,262	183	366
Central	4	330,527	82,632	115	229
Midwest	5	402,569	80,514	113	226
Central Midwest	6	96,755	16,126	51	101
Southeast	6	383,661	63,944	101	202
Northeast	1	12,805	12,805	45	90
Appalachian	1	82,045	82,045	114	229
Unaffiliated States:					
Dist. of Columbia	0	55,831	55,831	94	189
Maine	0	59,112	59,112	97	194
Massachusetts	1	8,284	8,284	36	73
New Hampshire	0	17,563	17,563	53	106
New York	2	49,108	24,554	63	125
Rhode Island	0	6,230	6,230	31	63
Texas	1	266,807	266,807	206	412
Vermont	0	17,898	17,898	53	107

Notes: * Assumes a factor of 2.0 to convert straight line distance to transportation distance.

Distances for unaffiliated states without facilities were based on the area of all states which would have to be travelled through in order to reach a facility. The following combinations were made:

ME = ME + MA + NH
NH = NH + MA   DC = DC + MD + PA
VT = VT + MA   RI = RI + CT

TABLE 10-31. Specific Permit Requirements for Municipal Landfills

State	Soil Conditions	Groundwater Information	Surface Water Information	Total Acreage	Life of Facility	Future Use	P.E. Certification
Alabama	X	X			X		X
Alaska	X	X	X				
Arizona		X	X				
Arkansas	X	X	X		X	X	X
California	X	X	X	X	X	X	X
Colorado	X	X	X	X	X		
Connecticut	X	X			X	X	X
Delaware		X	X				X
Florida	X	X	X	X	X		X
Georgia							
Hawaii							
Idaho		X	X	X			
Illinois	X	X	X	X			X
Indiana	X		X			X	
Iowa	X	X		X			
Kansas				X			X
Kentucky	X	X	X	X	X		X
Louisiana	X	X					X
Maine	X	X	X				
Maryland	X	X	X	X	X		X
Massachusetts	X	X	X		X		
Michigan	X	X	X			X	X
Minnesota	X	X	X				
Mississippi							
Missouri	X	X	X				X
Montana	X	X	X	X			
Nebraska	X	X	X				
Nevada	X	X					
New Hampshire	X	X			X		
New Jersey		X		X	X	X	X

TABLE 10-31. Specific Permit Requirements for Municipal Landfills (Continued)

State	Soil Conditions	Groundwater Information	Surface Water Information	Total Acreage	Life of Facility	Future Use	P.E. Certification
New Mexico			X	X	X		
New York	X	X	X		X		X
No. Carolina	X	X	X				
No. Dakota	X	X	X				
Ohio	X	X					
Oklahoma	X	X	X		X		
Oregon	X	X	X		X	X	X
Pennsylvania	X	X	X		X	X	
Rhode Island	X	X	X		X	X	
So. Carolina	X	X	X				X
So. Dakota		X	X				
Tennessee			X				
Texas	X	X	X	X	X	X	X
Utah	X	X	X	X			
Vermont	X	X	X	X			X
Virginia							X
Washington							
W. Virginia	X	X	X				
Wisconsin	X	X	X		X	X	X
Wyoming	X	X			X	X	
TOTAL	37	41	35	15	20	12	21

Source: EPA88c.

TABLE 10-32. Design Criteria for Municipal Landfills

State	Liner Design	Leachate Management	Run-on/ run-off Controls	Gas Controls
Alabama	X		X	X
Alaska	X	X	X	X
Arizona			X	
Arkansas		X	X	
California	X	X	X	X
Colorado		X		X
Connecticut			X	X
Delaware	X	X	X	X
Florida	X	X	X	X
Georgia			X	X
Hawaii				
Idaho				X
Illinois		X	X	
Indiana			X	X
Iowa			X	X
Kansas			X	X
Kentucky	X	X	X	X
Louisiana	X		X	
Maine			X	
Maryland	X	X	X	
Massachusetts	X	X	X	
Michigan	X	X	X	X
Minnesota		X	X	X
Mississippi	X	X	X	X
Missouri	X	X	X	
Montana	X	X	X	X
Nebraska	X	X		X
Nevada			X	
New Hampshire				X
New Jersey		X	X	X

TABLE 10-32. Design Criteria for Municipal Landfills (Continued)

State	Liner Design	Leachate Management	Run-on/ run-off Controls	Gas Controls
New Mexico			X	
New York	X	X	X	X
No. Carolina			X	X
No. Dakota		X	X	X
Ohio		X	X	
Oklahoma	X	X	X	
Oregon		X	X	X
Pennsylvania		X	X	
Rhode Island			X	
So. Carolina			X	X
So. Dakota			X	
Tennessee			X	
Texas	X		X	X
Utah				
Vermont	X		X	
Virginia				
Washington		X		
W. Virginia				X
Wisconsin	X	X	X	X
Wyoming				
TOTAL	19	25	40	28

Source: EPA88c.

TABLE 10-33. Updated Review of Design, Operation and Closure Standards for Municipal Solid Waste Landfills

	Liners			LCS			Final Cover			GWM			CA	
State	NS	PS	DS	NS	PS	DS	NS	PS	DS	NS	PS	DS	NS	PS
Alabama			X		X				X		X		X	
Alaska	X			X					X	X*			X*	
Arizona	X			X					X	X*			X*	
Arkansas		X			X				X	X*			X	
California			X		X				X			X		X
Colorado	X*			X*					X		X		X*	
Connecticut	X*			X*					X		X			X
Delaware		X			X				X		X		X*	
Florida		X	X		X	X		X			X		X	
Georgia	X*			X*					X	X*			X*	
Hawaii	X			X					X		X		X	
Idaho	X*				X					X		X		X*
Illinois	X			X*				X		X			X	
Indiana			X			X			X		X			X
Iowa		X			X				X		X		X*	
Kansas	X*			X*			X*				X		X	
Kentucky			X		X				X			X		X
Louisiana			X	X					X		X		X*	
Maine		X			X				X		X		X	
Maryland			X		X				X		X			X
Massachusetts	X*			X*					X	X*			X*	
Michigan			X			X			X			X		X
Minnesota			X			X			X			X	X	
Mississippi		X		X*					X		X		X*	
Missouri			X			X			X		X		X	

TABLE 10-33. Updated Review of Design, Operation and Closure Standards for Municipal Solid Waste Landfills (Continued)

	Liners			LCS			Final Cover			GWM			CA	
State	NS	PS	DS	NS	PS	DS	NS	PS	DS	NS	PS	DS	NS	PS
Montana	X*			X*					X		X		X*	
Nebraska	X*				X				X		X			X
Nevada	X			X					X	X*			X*	
New Hampshire	X*			X*					X		X		X	
New Jersey	X				X			X			X		X	
New Mexico	X			X					X	X			X	
New York			X		X				X		X		X	
No. Carolina	X*				X				X		X			X
No. Dakota	X*				X				X		X		X*	
Ohio	X*				X				X		X			X
Oklahoma			X		X				X		X		X	
Oregon	X*				X				X		X			X
Pennsylvania			X			X*			X		X		X*	
Rhode Island	X			X					X		X			X
So. Carolina		X		X					X		X		X	
So. Dakota	X			X					X	X*			X*	
Tennessee	X*			X*					X	X				X
Texas			X	X					X		X			X
Utah			X	X					X	X			X	
Vermont	X			X*					X		X		X	
Virginia	X*			X*					X	X*			X	
Washington		X			X				X	X			X*	
W. Virginia	X*			X*			X*			X*			X	
Wisconsin		X		X*					X		X		X	
Wyoming	X*			X*					X		X		X	
TOTAL	27	9	15	26	19	6	2	3	45	14	32	4	37	13

Source: EPA88c.

NS = No Standard.
PS = Performance Standard.
DS = Design Standard.
* = Possibly in guidance based on 1986 Subtitle D census.

TABLE 10-34. Operation and Maintenance Standards for Municipal Solid Waste Landfills

State	Waste Management	Leachate Controls	Gas Controls	Cover	Safety	Other O&M Controls
Alabama	X	X	X	X	X	X
Alaska	X	X	X	X	X	X
Arizona	X			X	X	X
Arkansas	X	X		X	X	X
California	X	X	X	X	X	X
Colorado	X	X	X	X	X	X
Connecticut	X			X	X	X
Delaware	X	X		X	X	X
Florida	X	X	X	X	X	X
Georgia	X			X	X	X
Hawaii	X	X		X	X	X
Idaho	X	X		X	X	X
Illinois	X	X		X	X	X
Indiana	X			X	X	X
Iowa	X	X		X	X	X
Kansas	X		X		X	
Kentucky	X	X	X	X	X	X
Louisiana	X	X		X	X	X
Maine	X	X	X	X	X	X
Maryland	X	X		X	X	X
Massachusetts	X	X	X	X	X	X
Michigan	X	X		X	X	X
Minnesota	X	X		X	X	X
Mississippi	X	X	X	X	X	X
Missouri	X	X	X	X	X	X

TABLE 10-34. Operation and Maintenance Standards for Municipal Solid Waste Landfills (Continued)

State	Waste Manage-ment	Leachate Controls	Gas Controls	Cover	Safety	Other O&M Controls
Montana	X	X		X	X	X
Nebraska	X	X			X	X
Nevada	X	X		X	X	X
New Hampshire	X		X	X	X	X
New Jersey	X	X	X	X		X
New Mexico	X			X	X	X
New York	X	X	X	X	X	X
No. Carolina	X	X	X	X	X	X
No. Dakota	X	X		X	X	X
Ohio	X	X		X	X	X
Oklahoma	X	X	X	X	X	X
Oregon	X	X	X		X	X
Pennsylvania	X	X			X	X
Rhode Island	X			X	X	X
So. Carolina	X			X	X	X
So. Dakota	X	X		X	X	X
Tennessee	X			X	X	X
Texas	X	X	X	X	X	X
Utah	X			X	X	X
Vermont	X			X	X	X
Virginia	X			X	X	X
Washington	X	X		X	X	X
W. Virginia	X		X	X	X	X
Wisconsin	X	X	X	X	X	X
Wyoming	X		X	X	X	X
TOTAL	50	35	21	46	49	49

Source: EPA88c.

TABLE 10-35. Location Standards and Restrictions for Municipal Solid Waste Landfills

State	Floodplain Protection	Minimum Distances	Critical Habitat	Geologically Sensitive Areas	Soil Conditions
Alabama	X	X	X	X	
Alaska	X	X			
Arizona					
Arkansas	X	X			X
California	X	X		X	
Colorado	X	X			
Connecticut	X	X	X		
Delaware		X			
Florida	X	X		X	
Georgia					
Hawaii	X				
Idaho					
Illinois					
Indiana	X	X			
Iowa	X	X			
Kansas	X	X	X		
Kentucky	X	X	X		
Louisiana	X	X	X		
Maine	X	X	X		
Maryland					
Massachusetts	X	X	X		
Michigan	X	X			
Minnesota	X	X			
Mississippi	X	X			
Missouri	X	X			

TABLE 10-35. Location Standards and Restrictions for Municipal Solid Waste Landfills (Continued)

State	Floodplain Protection	Minimum Distances	Critical Habitat	Geologically Sensitive Areas	Soil Conditions
Montana	X	X			
Nebraska	X	X			
Nevada		X			
New Hampshire	X		X		
New Jersey		X			
New Mexico		X			
New York		X	X		X
No. Carolina	X	X	X		
No. Dakota					
Ohio	X	X			
Oklahoma	X	X			
Oregon	X				
Pennsylvania	X				
Rhode Island	X	X	X		
So. Carolina					
So. Dakota	X	X	X		
Tennessee	X	X			
Texas	X	X	X		
Utah		X			
Vermont	X	X			
Virginia					
Washington		X			
W. Virginia	X		X		
Wisconsin	X	X			
Wyoming		X			
TOTAL	34	37	14	3	2

Source: EPA88c.

TABLE 10-36. Monitoring Requirements for Municipal Solid Waste Landfills

State	Ground Water	Surface Water	Leachate	Air
Alabama	X			
Alaska	X	X	X	
Arizona	X			
Arkansas			X	
California	X		X	
Colorado	X			
Connecticut	X			
Delaware	X		X	
Florida	X		X	
Georgia				
Hawaii	X			
Idaho	X			
Illinois	X	X	X	
Indiana	X		X	
Iowa	X			
Kansas	X	X	X	
Kentucky	X			
Louisiana	X			
Maine	X	X		
Maryland	X		X	
Massachusetts	X		X	
Michigan	X	X	X	
Minnesota	X	X		
Mississippi				
Missouri	X		X	

TABLE 10-36. Monitoring Requirements for Municipal Solid Waste Landfills (Continued)

State	Ground Water	Surface Water	Leachate	Air
Montana	X			
Nebraska			X	
Nevada				
New Hampshire	X			
New Jersey	X		X	
New Mexico				
New York	X			
No. Carolina	X	X	X	
No. Dakota	X		X	
Ohio	X		X	
Oklahoma	X		X	
Oregon	X			
Pennsylvania	X		X	
Rhode Island	X			
So. Carolina	X			
So. Dakota	X	X		
Tennessee				
Texas	X		X	
Utah				
Vermont	X			
Virginia				
Washington			X	
W. Virginia	X			
Wisconsin	X	X	X	
Wyoming	X			
TOTAL	40	9	22	0

Source: EPA88c.

TABLE 10-37. Closure, Post-Closure, and Financial Responsibility Requirements for Municipal Solid Waste Landfills

State	Closure Requirements	Post-Closure Requirements	Financial Responsibility Requirements
Alabama	X	X	
Alaska	X	X	
Arizona	X	X	
Arkansas	X	X	X
California	X	X	X
Colorado	X	X	
Connecticut	X	X	X
Delaware	X	X	
Florida	X	X	X
Georgia	X	X	
Hawaii	X	X	
Idaho	X	X	X
Illinois	X	X	
Indiana	X	X	
Iowa	X	X	
Kansas	X	X	X
Kentucky	X	X	X
Louisiana	X	X	X
Maine	X	X	
Maryland	X	X	
Massachusetts	X	X	X
Michigan	X	X	X
Minnesota	X	X	
Mississippi	X	X	
Missouri	X	X	

TABLE 10-37. Closure, Post-Closure, and Financial Responsibility Requirements for Municipal Solid Waste Landfills (Continued)

StateR	Closure Requirements	Post-Closure Requirements	Financial Responsibility Requirements
Montana	X		X
Nebraska	X	X	X
Nevada	X		
New Hampshire	X	X	
New Jersey	X	X	X
New Mexico	X		
New York	X	X	X
No. Carolina	X	X	
No. Dakota	X		X
Ohio	X	X	
Oklahoma	X	X	X
Oregon	X	X	X
Pennsylvania	X		
Rhode Island	X	X	X
So. Carolina	X	X	
So. Dakota	X	X	
Tennessee	X	X	
Texas	X	X	X
Utah	X		
Vermont	X	X	X
Virginia	X		
Washington	X	X	
W. Virginia			
Wisconsin	X	X	X
Wyoming	X	X	
TOTAL	49	42	19

Source: EPA88c.

Figure 10-6

1985 Active Municipal Waste Landfill Sites
Source: EPA88e.

TABLE 10-38

Number of Landfills in Survey - by State

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
AK	16	1.6	16	1.6
AL	25	2.5	41	4.1
AR	12	1.2	53	5.2
AZ	9	0.9	62	6.1
CA	50	4.9	112	11.1
CT	1	0.1	113	11.2
DE	2	0.2	115	11.4
FL	25	2.5	140	13.8
GA	36	3.6	176	17.4
HI	2	0.2	178	17.6
IA	16	1.6	194	19.2
ID	13	1.3	207	20.5
IL	21	2.1	228	22.6
IN	9	0.9	237	23.4
KS	24	2.4	261	25.8
KY	15	1.5	276	27.3
LA	8	0.8	284	28.1
MA	18	1.8	302	29.9
MD	7	0.7	309	30.6
ME	39	3.9	348	34.4
MI	19	1.9	367	36.3
MN	9	0.9	376	37.2
MO	8	0.8	384	38.0
MS	13	1.3	397	39.3
MT	18	1.8	415	41.0
NC	18	1.8	433	42.8
ND	18	1.8	451	44.6
NE	8	0.8	459	45.4
NH	8	0.8	467	46.2
NJ	10	1.0	477	47.2
NM	34	3.4	511	50.5
NV	12	1.2	523	51.7
NY	45	4.5	568	56.2
OH	25	2.5	593	58.7
OK	37	3.7	630	62.3
OR	9	0.9	639	63.2
PA	14	1.4	653	64.6
RI	2	0.2	655	64.8
SC	5	0.5	660	65.3
SD	6	0.6	666	65.9
TN	16	1.6	682	67.5
TX	115	11.4	797	78.8
UT	10	1.0	807	79.8
VA	21	2.1	828	81.9
VT	13	1.3	841	83.2
WA	13	1.3	854	84.5
WI	136	13.5	990	97.9
WV	9	0.9	999	98.8
WY	12	1.2	1011	100.0

TABLE 10-39

Number of Landfills in Survey - by Compact

COMPACT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
AP	32	3.2	32	3.2
C	89	8.8	121	12.0
CM	36	3.6	157	15.5
MA	18	1.8	175	17.3
ME	39	3.9	214	21.2
MW	222	22.0	436	43.1
NE	11	1.1	447	44.2
NH	8	0.8	455	45.0
NW	81	8.0	536	53.0
NY	45	4.5	581	57.5
RI	2	0.2	583	57.7
RM	58	5.7	641	63.4
SE	159	15.7	800	79.1
SW	83	8.2	883	87.3
TX	115	11.4	998	98.7
VT	13	1.3	1011	100.0

TABLE 10-40

Comparison of Results on Facility Ownership

Owner	EPA88	SC&A Team
Federal	3.3%	3.2%
State	0.9%	0.9%
County	28.8%	28.9%
City	28.3%	28.2%
Other gov't.	24.9%	25.2%
Private	13.9%	13.6%

TABLE 10-41

Age of Facilities - by State

STATE	AGE N	AGE MIN	AGE MAX	AGE MEAN	AGE STD
AK	15	2	36	18	28
AL	25	3	41	12	12
AR	12	4	32	11	21
AZ	9	6	29	17	19
CA	48	0	56	21	24
CT	0	.	.	.	.
DE	2	2	6	4	4
FL	24	2	41	14	19
GA	36	0	40	13	21
HI	2	11	16	14	9
IA	16	3	16	12	7
ID	13	10	76	24	46
IL	21	4	86	24	45
IN	9	2	18	12	13
KS	24	4	34	13	14
KY	15	3	32	13	17
LA	8	0	61	9	29
MA	17	6	64	30	44
MD	7	4	46	27	29
ME	39	6	50	20	29
MI	19	2	20	12	10
MN	9	4	21	12	10
MO	8	3	16	10	11
MS	13	0	26	10	21
MT	18	3	96	32	73
NC	18	1	41	15	25
ND	18	0	100	26	71
NE	8	11	78	33	56
NH	8	0	56	17	44

(CONTINUED)

TABLE 10-41 (cont.)

Age of Facilities - by State

	AGE				
	N	MIN	MAX	MEAN	STD
STATE					
NJ	10	2	43	24	23
NM	33	1	71	17	37
NV	11	2	86	23	58
NY	45	[illegible]	66	27	36
OH	25	[illegible]	47	19	21
OK	37	0	31	10	13
OR	9	10	24	14	10
PA	14	1	36	14	23
RI	2	23	31	[illegible]	9
SC	5	8	15	[illegible]	7
SD	6	10	15	12	5
TN	16	2	23	9	11
TX	114	0	64	17	36
UT	10	1	56	25	51
VA	21	0	38	15	22
VT	12	4	30	[illegible]	18
WA	13	5	86	30	53
WI	132	2	86	23	32
WV	9	1	28	12	23
WY	12	2	51	14	38
ALL	997	0	100	19	34

TABLE 10-42

Age of Facilities - by Compact

	AGE				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	32	1	46	15	26
C	89	0	78	14	27
CM	36	4	86	19	38
MA	17	6	64	30	44
ME	39	6	50	20	29
MW	218	2	86	20	29
NE	10	2	43	24	23
NH	8	0	56	17	44
NW	80	1	96	24	51
NY	45	3	66	27	36
RI	2	23	31	25	9
RM	56	1	86	17	41
SE	158	0	41	13	19
SW	81	0	100	21	39
TX	114	0	64	17	36
VT	12	4	30	17	18
ALL	997	0	100	19	34

TABLE 10-43

Facility Lifetime - by State

	LIFETIME				
	N	MIN	MAX	MEAN	STD
STATE					
AK	15	9	116	43	74
AL	25	8	300	44	144
AR	12	8	64	24	48
AZ	9	11	49	27	28
CA	46	3	151	47	58
CT	0	.	.	.	.
DE	2	33	34	34	1
FL	24	7	58	20	23
GA	36	8	43	20	22
HI	2	14	17	16	5
IA	16	14	59	25	19
ID	13	22	95	48	52
IL	20	13	100	35	47
IN	9	9	47	26	31
KS	24	13	100	38	59
KY	15	7	74	27	42
LA	8	5	75	30	61
MA	17	16	97	40	54
MD	7	7	70	41	41
ME	38	11	424	46	188
MI	19	3	66	30	32
MN	9	17	33	28	14
MO	8	10	50	29	29
MS	12	10	53	23	33
MT	18	14	150	70	101
NC	18	14	49	25	22
ND	18	7	171	53	105
NE	8	17	100	55	68
NH	8	3	62	21	45

(CONTINUED)

TABLE 10-43 (cont.)

Facility Lifetime - by State

	LIFETIME				
	N	MIN	MAX	MEAN	STD
STATE					
NJ	10	10	44	28	21
NM	33	10	180	44	102
NV	11	11	120	58	94
NY	45	10	125	38	55
OH	25	5	124	40	62
OK	37	6	80	24	28
OR	9	20	225	89	159
PA	14	7	83	29	52
RI	2	38	51	41	15
SC	5	15	32	22	17
SD	6	15	60	34	47
TN	16	10	56	21	29
TX	113	2	160	38	74
UT	10	17	960	197	771
VA	21	11	102	41	61
VT	12	21	62	38	36
WA	13	10	99	52	59
WI	130	14	252	40	67
WV	9	6	49	26	45
WY	12	11	99	39	70
ALL	989	2	960	40	114

TABLE 10-44

Facility Lifetime - by Compact

	LIFETIME				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	32	6	83	30	46
C	89	5	100	33	52
CM	35	7	100	31	45
MA	17	16	97	40	54
ME	38	11	424	46	188
MW	216	3	252	37	59
NE	10	10	44	28	21
NH	8	3	62	21	45
NW	80	9	960	76	300
NY	45	10	125	38	55
RI	2	38	51	41	15
RM	56	10	180	45	94
SE	157	7	300	27	68
SW	79	3	171	45	70
TX	113	2	160	38	74
VT	12	21	62	38	36
ALL	989	2	960	40	114

TABLE 10-45

Closure Dates

Closure Year	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1986	10	1.0	10	1.0
1987	58	5.8	68	6.8
1988	53	5.3	121	12.1
1989	34	3.4	155	15.5
1990	77	7.7	232	23.1
1991	41	4.1	273	27.2
1992	41	4.1	314	31.3
1993	12	1.2	326	32.5
1994	22	2.2	348	34.7
1995	46	4.6	394	39.3
1996	34	3.4	428	42.7
1997	22	2.2	450	44.9
1998	23	2.3	473	47.2
1999	84	8.4	557	55.5
2000	109	10.9	666	66.4
2001	15	1.5	681	67.9
2002	13	1.3	694	69.2
2003	8	0.8	702	70.0
2004	13	1.3	715	71.3
2005	23	2.3	738	73.6
2006	20	2.0	758	75.6
2007	14	1.4	772	77.0
2008	6	0.6	778	77.6
2009	4	0.4	782	78.0
2010	30	3.0	812	81.0
2011	9	0.9	821	81.9
2012	6	0.6	827	82.5
2013	6	0.6	833	83.1
2014	2	0.2	835	83.3
2015	11	1.1	846	84.3
2016	4	0.4	850	84.7
2017	2	0.2	852	84.9
2018	8	0.8	860	85.7
2019	3	0.3	863	86.0
2020	21	2.1	884	88.1
2021	2	0.2	886	88.3
2022	1	0.1	887	88.4
2023	2	0.2	889	88.6
2025	9	0.9	898	89.5
2026	3	0.3	901	89.8
2027	6	0.6	907	90.4
2030	9	0.9	916	91.3
2031	2	0.2	918	91.5
2032	1	0.1	919	91.6
2034	2	0.2	921	91.8
2035	7	0.7	928	92.5
2036	4	0.4	932	92.9
2037	3	0.3	935	93.2
2040	6	0.6	941	93.8
2042	2	0.2	943	94.0
2043	1	0.1	944	94.1
2044	2	0.2	946	94.3
2050	19	1.9	965	96.2
2051	1	0.1	966	96.3
2053	1	0.1	967	96.4
2055	1	0.1	968	96.5
2056	1	0.1	969	96.6
2057	1	0.1	970	96.7
2059	1	0.1	971	96.8
2060	1	0.1	972	96.9
2061	1	0.1	973	97.0
2068	1	0.1	974	97.1
2070+	29	2.9	1003	100.0

Frequency Missing = 8

TABLE 10-46

Facility Area By State

	Area (acres)				
	N	MIN	MAX	MEAN	STD
STATE					
AK	16	1	95	8	44
AL	25	6	5250	214	1593
AR	12	15	175	59	142
AZ	9	7	160	60	159
CA	50	10	1528	232	689
CT	1	61	61	61	.
DE	2	540	560	550	18
FL	25	10	2310	287	867
GA	36	2	596	89	217
HI	2	12	30	21	32
IA	16	22	600	115	236
ID	13	5	400	95	263
IL	21	10	5109	377	2786
IN	9	20	310	80	160
KS	24	2	480	85	213
KY	15	14	500	148	397
LA	8	10	262	87	228
MA	18	8	120	37	73
MD	7	34	589	201	380
ME	39	1	260	27	118
MI	19	20	400	82	192
MN	9	8	175	68	134
MO	8	6	240	48	127
MS	13	7	160	56	148
MT	18	3	100	33	73
NC	18	5	356	111	187
ND	18	2	310	40	181
NE	8	20	160	75	131
NH	8	10	90	21	38

(CONTINUED)

TABLE 10-46 (cont.)

Facility Area By State

	Area (acres)				
	N	MIN	MAX	MEAN	STD
STATE					
NJ	10	5	424	68	255
NM	34	2	270	30	142
NV	12	2	555	63	216
NY	45	1	2430	61	469
OH	25	9	700	134	304
OK	37	3	270	59	102
OR	9	2	580	77	309
PA	14	4	525	125	300
RI	2	80	154	95	84
SC	5	130	460	234	348
SD	6	5	160	75	179
TN	16	5	635	82	228
TX	115	1	3416	80	822
UT	10	1	344	61	281
VA	21	10	300	105	188
VT	13	5	75	24	63
WA	13	2	920	94	365
WI	136	1	425	21	101
WV	9	1	183	59	177
WY	12	7	126	45	92
ALL	1011	1	5250	83	628

TABLE 10-47

Facility Capacity By State

	Capacity (Million cu yd)				
	N	MIN	MAX	MEAN	STD
STATE					
AK	16.0	0.0	0.7	0.1	0.4
AL	25.0	0.1	27.8	2.1	9.0
AR	12.0	0.1	2.2	0.6	1.5
AZ	9.0	0.0	10.4	1.0	5.3
CA	50.0	0.0	193.1	7.6	44.5
CT	1.0	1.8	1.8	1.8	.
DE	2.0	7.6	9.5	8.6	1.8
FL	24.0	0.0	23.0	3.7	10.0
GA	34.0	0.0	8.5	1.0	3.0
HI	2.0	0.1	0.7	0.4	1.0
IA	16.0	0.1	56.3	3.5	23.2
ID	12.0	0.0	6.3	1.1	4.5
IL	21.0	0.1	20.6	2.5	9.5
IN	9.0	0.3	14.7	2.4	8.0
KS	24.0	0.0	27.0	1.7	10.2
KY	15.0	0.1	7.4	1.7	5.6
LA	7.0	0.1	19.4	2.9	11.1
MA	18.0	0.0	7.0	1.0	3.4
MD	7.0	0.2	9.1	2.9	6.1
ME	37.0	0.0	1.5	0.2	0.7
MI	19.0	0.0	63.9	8.6	37.2
MN	8.0	0.0	3.8	0.7	2.0
MO	8.0	0.4	11.6	1.9	6.9
MS	13.0	0.1	9.4	1.6	6.5
MT	18.0	0.0	4.2	0.7	3.1
NC	17.0	0.2	14.7	3.0	9.0
ND	18.0	0.0	3.8	0.4	2.4
NE	8.0	0.3	5.7	1.5	4.2
NH	8.0	0.0	2.9	0.3	1.3

(CONTINUED)

TABLE 10-47 (cont.)

Facility Capacity By State

STATE	Capacity (Million cu yd)				
	N	MIN	MAX	MEAN	STD
NJ	10.0	0.0	13.4	1.9	7.1
NM	33.0	0.0	15.0	0.7	6.7
NV	11.0	0.0	23.0	1.0	9.0
NY	42.0	0.0	363.6	3.8	71.6
OH	25.0	0.0	45.1	5.6	22.7
OK	37.0	0.0	80.1	2.1	16.8
OR	9.0	0.0	11.3	2.0	7.5
PA	14.0	0.1	28.5	3.6	12.2
RI	2.0	0.4	23.7	5.0	26.4
SC	4.0	1.0	5.5	3.5	5.2
SD	6.0	0.1	5.8	2.3	6.6
TN	15.0	0.1	3.0	0.9	2.2
TX	112.0	0.0	119.8	1.2	14.9
UT	9.0	0.0	2.6	0.6	2.3
VA	20.0	0.1	28.4	1.8	8.6
VT	12.0	0.0	4.8	0.6	3.5
WA	12.0	0.0	47.1	2.5	17.6
WI	134.0	0.0	11.0	0.2	1.7
WV	9.0	0.0	3.6	0.8	3.1
WY	12.0	0.0	22.9	2.3	16.6
ALL	986.0	0.0	363.6	1.8	21.0

TABLE 10-48

Facility Depth By State

	Depth (yd)				
	N	MIN	MAX	MEAN	STD
STATE					
AK	16	0	19	4	14
AL	25	0	21	4	10
AR	12	1	8	3	5
AZ	9	0	15	2	7
CA	50	0	42	5	16
CT	1	6	6	6	.
DE	2	3	4	3	1
FL	24	0	28	4	9
GA	34	0	19	3	10
HI	2	1	12	6	19
IA	16	0	68	7	42
ID	12	0	8	2	6
IL	21	0	30	5	14
IN	9	1	14	5	8
KS	24	0	78	6	39
KY	15	0	12	3	7
LA	7	1	17	4	9
MA	18	0	20	5	10
MD	7	1	7	3	4
ME	37	0	8	2	5
MI	19	0	132	20	75
MN	8	1	10	3	5
MO	8	1	19	8	9
MS	13	1	24	7	19
MT	18	0	31	4	19
NC	17	1	17	5	10
ND	18	0	13	3	8
NE	8	1	7	4	5
NH	8	1	7	3	5

(CONTINUED)

TABLE 10-48 (cont.)

Facility Depth By State

	Depth (yd)				
	N	MIN	MAX	MEAN	STD
STATE					
NJ	10	0	16	5	11
NM	33	0	11	2	7
NV	11	0	13	1	6
NY	42	0	31	5	13
OH	25	0	33	7	16
OK	37	0	331	7	69
OR	9	0	13	3	10
PA	14	1	23	5	11
RI	2	1	32	7	35
SC	4	1	7	4	7
SD	6	1	9	5	8
TN	15	1	6	2	3
TX	112	0	122	5	32
UT	9	0	124	15	104
VA	20	0	20	5	13
VT	12	0	13	3	9
WA	12	0	12	6	10
WI	134	0	47	3	14
WV	9	1	5	2	3
WY	12	0	38	6	27
ALL	986	0	331	4	26

TABLE 10-49

Facility Area By Compact

	Area (acres)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	32	1	589	121	325
C	89	2	480	72	158
CM	36	10	5109	268	2139
MA	18	8	120	37	73
ME	39	1	260	27	118
MW	222	1	700	47	187
NE	11	5	424	68	242
NH	8	10	90	21	38
NW	81	1	920	54	239
NY	45	1	2430	61	469
RI	2	80	154	95	84
RM	58	2	555	39	152
SE	159	2	5250	134	746
SW	83	2	1528	145	582
TX	115	1	3416	80	822
VT	13	5	75	24	63
ALL	1011	1	5250	83	628

TABLE 10-50

Facility Capacity By Compact

	Capacity (Million cu yd)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	32.0	0.0	28.5	2.5	9.2
C	88.0	0.0	80.1	1.7	12.5
CM	36.0	0.1	20.6	2.1	8.0
MA	18.0	0.0	7.0	1.0	3.4
ME	37.0	0.0	1.5	0.2	0.7
MW	219.0	0.0	63.9	1.6	15.8
NE	11.0	0.0	13.4	1.9	6.8
NH	8.0	0.0	2.9	0.3	1.3
NW	78.0	0.0	47.1	1.0	7.7
NY	42.0	0.0	363.6	3.8	71.6
RI	2.0	0.4	23.7	5.0	26.4
RM	56.0	0.0	23.0	1.1	9.9
SE	152.0	0.0	28.4	1.9	7.6
SW	83.0	0.0	193.1	4.4	35.4
TX	112.0	0.0	119.8	1.2	14.9
VT	12.0	0.0	4.8	0.6	3.5
ALL	986.0	0.0	363.6	1.8	21.0

TABLE 10-51

Facility Depth By Compact

	Depth (yd)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	32	1	23	3	8
C	88	0	331	5	49
CM	36	0	30	4	12
MA	18	0	20	5	10
ME	37	0	8	2	5
MW	219	0	132	5	29
NE	11	0	16	5	10
NH	8	1	7	3	5
NW	78	0	124	5	37
NY	42	0	31	5	13
RI	2	1	32	7	35
RM	56	0	38	3	14
SE	152	0	28	4	11
SW	83	0	42	4	14
TX	112	0	122	5	32
VT	12	0	13	3	9
ALL	986	0	331	4	26

TABLE 10-52

Average Annual Quantity of Waste (Metric Tons) By State

	Annual Waste (MT)				
	N	MEAN	MIN	MAX	STD
STATE					
AK	15	1,701	36	17,418	8,945
AL	25	60,056	1,127	901,440	260,667
AR	12	37,505	1,446	150,240	118,297
AZ	9	37,725	400	602,071	263,268
CA	50	135,249	132	3,396,557	786,157
CT	1	117,936	117,936	117,936	.
DE	2	195,296	195,183	195,410	203
FL	25	185,019	1,361	1,249,997	553,606
GA	36	50,067	73	297,475	166,512
HI	2	19,958	14,515	25,402	19,628
IA	16	52,512	4,434	340,200	194,521
ID	13	11,852	120	56,246	44,332
IL	21	155,121	181	1,126,800	563,432
IN	9	94,267	12,019	563,400	268,878
KS	24	28,739	36	680,400	189,006
KY	15	59,899	5,634	450,720	285,340
LA	8	34,789	340	172,368	103,320
MA	18	24,638	236	226,800	107,915
MD	7	160,956	4,264	849,765	536,009
ME	39	2,440	6	31,550	13,775
MI	19	196,795	1,134	1,802,880	651,216
MN	9	39,297	1,814	600,960	258,986
MO	8	100,417	11,268	563,400	342,755
MS	13	89,539	145	631,008	426,040
MT	18	2,744	19	9,766	6,959
NC	18	137,306	23	983,321	578,597
ND	18	5,996	36	37,560	22,619
NE	8	36,852	7,258	619,740	284,736
NH	8	19,605	227	127,915	67,291

(CONTINUED)

TABLE 10-52 (cont.)

Average Annual Quantity of Waste (Metric Tons) By State

	Annual Waste (MT)				
	N	MEAN	MIN	MAX	STD
STATE					
NJ	10	101,038	3,756	683,562	374,655
NM	34	5,848	54	97,656	31,626
NV	12	20,047	75	574,217	214,919
NY	45	77,425	14	6,259,680	1,198,602
OH	25	140,002	751	751,951	379,370
OK	37	47,291	91	563,400	184,190
OR	9	63,212	9	413,160	344,782
PA	12	111,801	154	1,690,200	523,819
RI	2	449,631	51,898	2,065,800	2,282,036
SC	5	155,159	51,710	255,830	217,844
SD	6	39,924	263	97,656	97,827
TN	16	40,414	1,127	327,817	130,130
TX	112	28,913	5	944,639	208,437
UT	10	5,620	75	18,780	18,843
VA	21	48,279	519	1,224,720	365,772
VT	13	5,647	159	37,560	24,963
WA	13	71,652	113	824,995	364,760
WI	134	14,744	11	1,447,562	299,798
WV	9	22,463	39	90,144	73,538
WY	12	9,694	123	30,048	24,142
ALL	1,003	49,540	5	6,259,680	429,837

TABLE 10-53

Average Annual Quantity of Waste (Metric Tons) By Compact

	Annual Waste (MT)				
	N	MEAN	MIN	MAX	STD
COMPACT					
AP	30	85,527	39	1,690,200	425,092
C	89	36,923	36	680,400	180,362
CM	36	109,744	181	1,126,800	476,650
MA	18	24,638	236	226,800	107,915
ME	39	2,440	6	31,550	13,775
MW	220	46,495	11	1,802,880	366,260
NE	11	101,680	3,756	683,562	355,490
NH	8	19,605	227	127,915	67,291
NW	80	20,611	9	824,995	192,758
NY	45	77,425	14	6,259,680	1,198,602
RI	2	449,631	51,898	2,065,800	2,282,036
RM	58	8,985	54	574,217	98,776
SE	159	83,243	23	1,249,997	381,487
SW	83	80,123	36	3,396,557	628,467
TX	112	28,913	5	944,639	208,437
VT	13	5,647	159	37,560	24,963
ALL	1,003	49,540	5	6,259,680	429,837

TABLE 10-54

Types of Wastes and Packaging By State

	Non-Containerized Bulk Liquids (%)					Containerized Liquids (%)					Containerized Other Wastes (%)				
	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD
STATE															
AK	15	0	0	5	3	15	0	0	0	0	15	0	0	0	0
AL	25	0	0	2	1	25	0	0	0	0	25	0	0	1	1
AR	12	0	0	1	1	12	0	0	0	0	12	0	0	2	1
AZ	9	1	0	5	5	9	0	0	0	0	9	0	0	0	0
CA	50	1	0	17	8	50	0	0	0	0	50	0	0	0	0
CT	1	0	0	0	.	1	0	0	0	.	1	0	0	0	.
DE	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0
FL	23	0	0	0	0	23	0	0	0	0	22	0	0	1	1
GA	36	0	0	2	1	36	0	0	10	4	35	0	0	10	4
HI	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0
IA	16	0	0	5	3	16	0	0	1	1	16	0	0	0	0
ID	13	0	0	3	2	13	0	0	1	0	13	0	0	2	1
IL	21	0	0	5	3	21	0	0	1	0	19	0	0	1	0
IN	9	0	0	0	0	9	0	0	0	0	7	0	0	0	0
KS	24	0	0	1	1	24	0	0	1	1	24	0	0	1	1
KY	15	0	0	0	0	15	0	0	1	1	14	0	0	2	1
LA	8	0	0	0	0	8	0	0	0	0	8	0	0	0	0
MA	18	0	0	0	0	18	0	0	0	0	18	0	0	0	0
MD	7	0	0	0	0	7	0	0	0	0	7	0	0	0	0
ME	38	0	0	0	0	38	0	0	1	0	38	0	0	0	0
MI	19	0	0	0	0	19	0	0	0	0	19	0	0	1	1
MN	9	0	0	0	0	9	0	0	0	0	9	0	0	0	0
MO	8	0	0	2	1	8	0	0	1	0	8	0	0	1	0
MS	11	0	0	0	0	11	0	0	2	2	11	0	0	0	0
MT	18	0	0	0	0	18	0	0	0	0	18	0	0	0	0
NC	17	0	0	0	0	18	0	0	0	0	18	0	0	0	0
ND	16	0	0	0	0	16	0	0	1	1	16	0	0	0	0
NE	8	0	0	2	1	8	0	0	0	0	8	0	0	0	0

(CONTINUED)

TABLE 10-54 (cont.)

Types of Wastes and Packaging By State

	Non-Containerized Bulk Liquids (%)					Containerized Liquids (%)					Containerized Other Wastes (%)				
	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD
STATE															
NH	8	0	0	0	0	8	0	0	0	0	8	0	0	0	0
NJ	10	0	0	0	0	10	0	0	0	0	10	0	0	0	0
NM	34	0	0	5	2	34	0	0	1	0	34	0	0	0	0
NV	12	0	0	1	0	12	0	0	0	0	12	0	0	0	0
NY	45	0	0	0	0	45	0	0	0	0	45	1	0	20	8
OH	25	0	0	0	0	25	0	0	0	0	23	1	0	5	4
OK	37	1	0	50	10	37	1	0	50	10	37	0	0	1	0
OR	9	0	0	1	0	9	0	0	0	0	9	0	0	0	0
PA	14	0	0	0	0	14	0	0	0	0	13	1	0	20	7
RI	2	1	0	4	4	2	0	0	0	0	2	0	0	0	0
SC	5	0	0	0	0	5	0	0	0	0	5	0	0	0	0
SD	6	0	0	0	0	6	0	0	0	0	6	0	0	0	0
TN	16	0	0	0	0	16	0	0	1	1	16	0	0	0	0
TX	114	0	0	5	1	115	0	0	1	0	115	0	0	1	0
UT	10	0	0	0	0	10	0	0	0	0	10	0	0	0	0
VA	21	0	0	0	0	21	0	0	0	0	21	0	0	1	1
VT	13	0	0	0	0	13	0	0	2	1	13	0	0	3	2
WA	13	0	0	2	1	13	0	0	0	0	13	0	0	0	0
WI	134	0	0	0	0	134	0	0	0	0	133	0	0	10	2
WV	9	0	0	0	0	9	0	0	0	0	9	0	0	1	0
WY	12	0	0	0	0	12	0	0	1	1	12	0	0	1	1
ALL	999	0	0	50	3	1,001	0	0	50	2	990	0	0	20	2

TABLE 10-55

Types of Wastes and Packaging By Compact

	Non-Containerized Bulk Liquids (%)					Containerized Liquids (%)					Containerized Other Wastes (%)				
	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD	N	MEAN	MIN	MAX	STD
COMPACT															
AP	32	0	0	0	0	32	0	0	0	0	31	0	0	20	5
C	89	0	0	50	7	89	0	0	50	7	89	0	0	2	1
CM	36	0	0	5	2	36	0	0	1	0	33	0	0	2	1
MA	18	0	0	0	0	18	0	0	0	0	18	0	0	0	0
ME	38	0	0	0	0	38	0	0	1	0	38	0	0	0	0
MW	220	0	0	5	1	220	0	0	1	0	215	0	0	10	2
NE	11	0	0	0	0	11	0	0	0	0	11	0	0	0	0
NH	8	0	0	0	0	8	0	0	0	0	8	0	0	0	0
NW	80	0	0	5	2	80	0	0	1	0	80	0	0	2	1
NY	45	0	0	0	0	45	0	0	0	0	45	1	0	20	8
RI	2	1	0	4	4	2	0	0	0	0	2	0	0	0	0
RM	58	0	0	5	2	58	0	0	1	0	58	0	0	1	0
SE	154	0	0	2	1	155	0	0	10	2	153	0	0	10	2
SW	81	1	0	17	7	81	0	0	1	0	81	0	0	0	0
TX	114	0	0	5	1	115	0	0	1	0	115	0	0	1	0
VT	13	0	0	0	0	13	0	0	2	1	13	0	0	3	2
ALL	999	0	0	50	3	1,001	0	0	50	2	990	0	0	20	2

TABLE 10-56

Cross Tabulation of Area and Trench Landfill Methods

Area	TRENCH Yes	No
Yes	40.90	59.10
No	92.25	7.75

TABLE 10-57

Waste:Cover Ratios

Waste:Cover Ratio	Percentage of Population
1:1	4
2:1	11
3:1	22
4:1	22
5:1	9
6:1	5
7:1	1
8:1	2
9:1	1
10:1	4
Other	
A:A or B:B	10
Other	9

TABLE 10-58

Liner Types for Active and Planned Landfill Units

Liner Type	Percentage of Landfill Units with Liner Type: Active	Planned
In-situ clay	27.5%	30.2%
Re-compacted clay	18.6	20.2
Soil	20.7	15.4
Synthetic membrane	1.1	6.4
Asphalt	0.1*	0.1
Other	6.6	8.0
None or unknown	39.7	34.5

*Estimated standard of error estimate exceeds 50 percent of estimate.

Source: EPA88e.

TABLE 10-59

Liner Thickness by Liner Type for Active and Planned Landfill Units

	Type of Landfill Unit	
Liner Type	Active	Planned
In-situ clay (ft)	29.6	11.9
Re-compacted clay (ft)	4.0	3.5
Soil (ft)	17.5*	24.6*
Synthetic membrane (mils)	44.8	52.8
Asphalt (in.)	7.6**	1.0**
Other (ft)	25.6*	28.5*

*Estimated standard of error estimate exceeds 25 percent of estimate.

**Estimated standard of error estimate exceeds 50 percent of estimate.

Source: EPA88e.

TABLE 10-60

Final Cover Types for Active and Planned Landfill Units

	Percentage of Landfill Units with Final Cover Type	
Final Cover Type	Active	Planned
Soil	49.8%	49.5%
Sand or gravel	14.2	10.4
Re-compacted clay	32.4	32.9
Synthetic membrane	1.7	2.5
Topsoil	37.3	37.3
Other	5.2	10.2
Unknown	6.0	4.3

Source: EPA88e.

TABLE 10-61

Final Cover Thickness by Final Cover Type for Active and Planned Landfill Units

	Type of Landfill Unit	
Final Cover Type	Active	Planned
Soil (ft)	2.0	2.1
Sand or gravel (ft)	2.0	2.5
Re-compacted clay (ft)	2.1	1.8
Synthetic membrane (mils)	36.2	32.4
Topsoil (ft)	1.2	1.1
Other (ft)	2.0	2.6

Source: EPA88e.

TABLE 10-62

Leachate Disposal Method for Active and Planned Landfill Units

Leachate Disposal Method	Type of Landfill Unit: Active	Type of Landfill Unit: Planned
Percent of units with leachate system	11.5%	21.2%
Recirculate		
Spray on active landfill area	21.0	30.4
Injection	5.1*	1.9**
Other	5.1*	3.2*
Land application, spread, or treatment	12.6*	9.1*
Truck to POTW or sewer	21.6	39.5
Discharge through sewer to POTW	16.8	16.2
Discharge to surface water	13.5*	3.4**
Other or unknown off-site treatment	2.7**	3.2**
On-site treatment		
Biological	14.2*	16.6
Physical/chemical	7.0*	7.3*

*Estimated standard error of estimate exceeds 25 percent of estimate.

**Estimated standard error of estimate exceeds 50 percent of estimate.

Source: EPA88e.

TABLE 10-63

Percent of Facilities within 100-Year Flood Plain

Row Pct	Yes	No
AP	2.16	97.84
C	20.44	79.56
CM	17.45	82.55
MA	13.62	86.38
ME	2.56	97.44
MW	5.40	94.60
NE	3.80	96.20
NH	13.80	86.20
NW	8.14	91.86
NY	13.79	86.21
RI	0.00	100.00
RM	10.57	89.43
SE	13.71	86.29
SW	11.87	88.13
TX	28.70	71.30
VT	0.00	100.00

Frequency Missing = 26.006063765

TABLE 10-64

Percentage of Facilities in Designated Wetland

Row Pct	Yes	No
AP	1.08	98.92
C	0.37	99.63
CM	7.14	92.86
MA	19.68	80.32
ME	5.13	94.87
MW	5.53	94.47
NE	11.40	88.60
NH	0.00	100.00
NW	7.16	92.84
NY	22.07	77.93
RI	100.00	0.00
RM	1.92	98.08
SE	4.76	95.24
SW	3.02	96.98
TX	0.93	99.07
VT	7.69	92.31

Frequency Missing = 19.504547824

TABLE 10-65

Percentage of Facilities with Karst Terrain

Row Pct	Yes	No
AP	4.38	95.62
C	6.32	93.68
CM	12.71	87.29
MA	0.00	100.00
ME	2.56	97.44
MW	3.30	96.70
NE	0.00	100.00
NH	0.00	100.00
NW	3.91	96.09
NY	2.76	97.24
RI	0.00	100.00
RM	7.70	92.30
SE	5.52	94.48
SW	1.51	98.49
TX	0.93	99.07
VT	0.00	100.00

Frequency Missing = 32.507579707

TABLE 10-66

Percentage of Facilities
With Wells within One Mile

By State

Row Pct	No	Yes
AK	96.77	3.23
AL	84.32	15.68
AR	83.33	16.67
AZ	72.76	27.24
CA	61.36	38.64
CT	100.00	0.00
DE	50.00	50.00
FL	56.50	43.50
GA	53.46	46.54
HI	100.00	0.00
IA	13.12	86.88
ID	61.54	38.46
IL	56.12	43.88
IN	29.98	70.02
KS	44.08	55.92
KY	73.33	26.67
LA	26.00	74.00
MA	31.81	68.19
MD	0.00	100.00
ME	51.28	48.72
MI	50.07	49.93
MN	22.54	77.46
MO	79.94	20.06
MS	76.92	23.08
MT	55.56	44.44

(Continued)

TABLE 10-66 (cont.)

Percentage of Facilities
With Wells within One Mile

By State

Row Pct	No	Yes
NC	55.52	44.48
ND	77.78	22.22
NE	55.20	44.80
NH	69.00	31.00
NJ	52.10	47.90
NM	55.11	44.89
NV	97.01	2.99
NY	55.15	44.85
OH	40.79	59.21
OK	57.93	42.07
OR	51.49	48.51
PA	49.34	50.66
RI	0.00	100.00
SC	20.00	80.00
SD	66.67	33.33
TN	70.70	29.30
TX	68.86	31.14
UT	80.00	20.00
VA	44.01	55.99
VT	38.46	61.54
WA	32.51	67.49
WI	37.78	62.22
WV	55.56	44.44
WY	58.33	41.67

TABLE 10-67

Percentage of Facilities With Wells within One Mile By Compact

Row Pct	No	Yes
AP	43.19	56.81
C	54.65	45.35
CM	64.32	35.68
MA	31.81	68.19
ME	51.28	48.72
MW	37.06	62.94
NE	53.92	46.08
NH	69.00	31.00
NW	65.80	34.20
NY	55.15	44.85
RI	0.00	100.00
RM	62.49	37.51
SE	59.76	40.24
SW	67.64	32.36
TX	68.86	31.14
VT	38.46	61.54

TABLE 10-68

Percentage of Facilities With Rivers, Streams, Lakes or Reservoirs Used for Drinking within One Mile

By State

Row Pct	No	Yes
AK	80.65	19.35
AL	100.00	0.00
AR	100.00	0.00
AZ	87.87	12.13
CA	96.43	3.57
CT	100.00	0.00
DE	100.00	0.00
FL	100.00	0.00
GA	89.93	10.07
HI	100.00	0.00
IA	100.00	0.00
ID	100.00	0.00
IL	93.93	6.07
IN	86.65	13.35
KS	90.34	9.66
KY	100.00	0.00
LA	100.00	0.00
MA	100.00	0.00
MD	100.00	0.00
ME	92.31	7.69
MI	100.00	0.00
MN	96.82	3.18
MO	100.00	0.00
MS	92.31	7.69
MT	100.00	0.00

(Continued)

TABLE 10-68 (cont.)

Percentage of Facilities With Rivers, Streams, Lakes or Reservoirs Used for Drinking within One Mile By State

Row Pct	No	Yes
NC	84.16	15.84
ND	100.00	0.00
NE	100.00	0.00
NH	86.20	13.80
NJ	100.00	0.00
NM	100.00	0.00
NV	100.00	0.00
NY	88.95	11.05
OH	94.73	5.27
OK	90.81	9.19
OR	87.87	12.13
PA	86.68	13.32
RI	100.00	0.00
SC	100.00	0.00
SD	100.00	0.00
TN	98.30	1.70
TX	92.50	7.50
UT	100.00	0.00
VA	94.66	5.34
VT	84.62	15.38
WA	89.98	10.02
WI	97.74	2.26
WV	100.00	0.00
WY	91.67	8.33

TABLE 10-69

Percentage of Facilities With Rivers, Streams, Lakes or Reservoirs Used for Drinking within One Mile

By Compact

Row Pct	No	Yes
AP	94.54	5.46
C	94.07	5.93
CM	96.82	3.18
MA	100.00	0.00
ME	92.31	7.69
MW	97.36	2.64
NE	100.00	0.00
NH	86.20	13.80
NW	93.48	6.52
NY	88.95	11.05
RI	100.00	0.00
RM	98.08	1.92
SE	93.90	6.10
SW	96.66	3.34
TX	92.50	7.50
VT	84.62	15.38

TABLE 10-70

Percentage of Facilities With Rivers, Streams, Lakes, and Reservoirs Not Used for Drinking within One Mile

By State

Row Pct	No	Yes
AK	35.48	64.52
AL	30.04	69.96
AR	66.67	33.33
AZ	84.89	15.11
CA	56.43	43.57
CT	0.00	100.00
DE	0.00	100.00
FL	40.07	59.93
GA	15.51	84.49
HI	0.00	100.00
IA	26.24	73.76
ID	53.85	46.15
IL	24.28	75.72
IN	66.74	33.26
KS	61.28	38.72
KY	20.00	80.00
LA	39.14	60.86
MA	6.06	93.94
MD	6.18	93.82
ME	20.51	79.49
MI	21.75	78.25
MN	25.82	74.18
MO	60.19	39.81
MS	69.23	30.77
MT	33.33	66.67

(Continued)

TABLE 10-70 (cont.)

Percentage of Facilities
With Rivers, Streams, Lakes, and Reservoirs
Not Used for Drinking
within One Mile

By State

Row Pct	No	Yes
NC	26.98	73.02
ND	72.22	27.78
NE	55.20	44.80
NH	13.80	86.20
NJ	32.10	67.90
NM	77.17	22.83
NV	69.72	30.28
NY	32.42	67.58
OH	31.63	68.37
OK	35.56	64.44
OR	48.51	51.49
PA	44.08	55.92
RI	0.00	100.00
SC	20.00	80.00
SD	83.33	16.67
TN	43.10	56.90
TX	63.19	36.81
UT	90.00	10.00
VA	32.02	67.98
VT	15.38	84.62
WA	40.06	59.94
WI	39.85	60.15
WV	44.44	55.56
WY	75.00	25.00

TABLE 10-71

Percentage of Facilities
With Rivers, Streams, Lakes, and Reservoirs
Not Used for Drinking
within One Mile

By Compact

Row Pct	No	Yes
AP	36.66	63.34
C	52.45	47.55
CM	22.24	77.76
MA	6.06	93.94
ME	20.51	79.49
MW	37.96	62.04
NE	30.88	69.12
NH	13.80	86.20
NW	46.27	53.73
NY	32.42	67.58
RI	0.00	100.00
RM	75.49	24.51
SE	32.43	67.57
SW	66.56	33.44
TX	63.19	36.81
VT	15.38	84.62

TABLE 10-72

Hydrogeologic Characteristics of Upper Acquifer-By State

		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS
Permeabili-	N	15	25	12	9	50	1	2	25	36	2	16	13	21	9	24
ty (cm/sec)	MEAN	9.3E-01	6.0E-01	5.8E-01	8.5E-01	7.5E-01	1.0E+00	1.8E-03	1.9E-01	8.5E-01	5.0E-01	3.3E-01	8.1E-01	3.4E-01	3.4E-01	8.4E-01
	MIN	2.6E-04	1.0E-08	1.3E-06	2.7E-04	1.0E-06	1.0E+00	1.0E-04	4.6E-07	1.0E-04	1.0E-02	1.0E-10	9.3E-05	1.0E-09	4.0E-08	1.0E-06
	MAX	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	3.5E-03	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	6.6E-01	1.1E+00	1.3E+00	9.1E-01	9.3E-01	.	3.1E-03	7.5E-01	8.8E-01	1.8E+00	1.2E+00	9.8E-01	1.1E+00	1.1E+00	8.9E-01
Porosity	N	1	11	5	1	14	1	2	14	5	0	5	2	10	6	4
(%)	MEAN	4.0E+01	2.8E+01	2.8E+01	3.0E+01	3.1E+01	7.5E+01	3.5E+01	2.3E+01	3.4E+01	.	3.4E+01	5.5E+01	2.6E+01	4.1E+01	1.7E+01
	MIN	4.0E+01	2.0E+00	1.0E+01	3.0E+01	4.0E-01	7.5E+01	3.5E+01	2.5E-01	4.0E+00	.	3.0E+01	2.0E+01	1.5E-01	4.5E-01	4.0E+00
	MAX	4.0E+01	4.5E+01	5.0E+01	3.0E+01	5.5E+01	7.5E+01	3.5E+01	4.5E+01	7.0E+01	.	4.0E+01	9.0E+01	6.0E+01	8.0E+01	3.0E+01
	STD	.	3.3E+01	4.4E+01	.	3.1E+01	.	0.0E+00	2.7E+01	6.7E+01	.	1.1E+01	1.3E+02	4.0E+01	5.4E+01	3.4E+01
Hydraulic	N	2	12	3	0	11	1	2	9	4	0	5	1	9	7	3
Gradient	MEAN	8.0E+00	5.7E+00	2.0E+00	.	1.3E+01	7.0E+00	1.8E-01	2.7E+00	2.8E+00	.	3.9E+00	4.0E+00	5.2E+00	3.8E+00	1.8E+00
(%)	MIN	1.0E+00	1.0E+00	1.0E+00	.	1.0E-01	7.0E+00	1.0E-01	2.0E-02	9.0E-02	.	1.0E+00	4.0E+00	1.0E-02	5.0E-02	2.5E-01
	MAX	1.5E+01	2.2E+01	3.0E+00	.	6.0E+01	7.0E+00	2.5E-01	4.4E+01	1.0E+01	.	3.6E+01	4.0E+00	2.0E+01	1.0E+01	4.0E+00
	STD	2.5E+01	1.5E+01	2.5E+00	.	4.2E+01	.	1.3E-01	1.6E+01	1.2E+01	.	2.1E+01	.	1.5E+01	9.1E+00	5.1E+00
Horizontal	N	2	11	4	1	9	0	2	13	3	0	5	1	9	6	4
Flow Rate	MEAN	2.0E+01	3.8E+02	5.5E+01	6.0E+02	6.0E+02	.	1.9E+03	1.7E+02	5.4E+01	.	1.7E+04	8.0E-01	3.2E+03	3.0E+00	5.4E+00
(ft/yr)	MIN	8.0E+00	1.0E-02	2.0E-03	6.0E+02	2.5E-01	.	1.0E+02	1.5E-02	5.0E+00	.	1.0E-02	8.0E-01	3.0E-03	3.0E-01	1.5E+00
	MAX	3.3E+01	1.6E+03	2.0E+02	6.0E+02	3.0E+03	.	3.6E+03	1.1E+03	1.2E+02	.	7.3E+04	8.0E-01	2.0E+04	7.0E+00	1.0E+01
	STD	4.5E+01	1.1E+03	2.5E+02	.	2.4E+03	.	3.2E+03	4.3E+02	1.5E+02	.	8.1E+04	.	1.6E+04	6.7E+00	9.8E+00

		KY	LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ
Permeabili-	N	15	8	18	7	39	19	9	8	13	18	18	18	8	8	10
ty (cm/sec)	MEAN	7.3E-01	6.7E-01	5.4E-01	6.9E-04	9.0E-01	5.5E-01	4.2E-01	9.0E-01	7.7E-01	6.7E-01	8.6E-01	7.3E-01	8.3E-01	5.5E-01	8.3E-01
	MIN	1.0E-10	1.6E-07	1.0E-10	1.0E-09	2.0E-07	2.0E-08	2.0E-09	1.0E-06	2.8E-03	1.0E-05	1.0E-06	2.0E-07	1.0E-06	1.0E-04	1.0E-05
	MAX	1.0E+00	1.0E+00	1.0E+00	1.3E-03	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	1.2E+00	1.0E+00	1.2E+00	1.2E-03	7.8E-01	1.0E+00	1.2E+00	6.4E-01	1.1E+00	1.2E+00	8.6E-01	1.2E+00	9.8E-01	1.3E+00	7.6E-01
Porosity	N	2	0	9	5	3	8	5	2	4	0	1	3	1	4	5
(%)	MEAN	4.1E+01	.	2.8E+01	2.3E+01	2.3E+01	2.5E+01	1.6E+01	3.5E+00	2.5E+01	.	2.9E+01	3.4E+01	4.6E+01	2.2E+01	1.7E+01
	MIN	3.8E+01	.	6.0E-02	3.0E-01	1.0E+01	2.0E-01	1.6E-01	1.0E+00	1.0E+01	.	2.9E+01	2.0E+01	4.6E+01	2.5E-01	3.0E-01
	MAX	4.4E+01	.	5.0E+01	3.5E+01	4.0E+01	5.0E+01	4.0E+01	6.0E+00	3.0E+01	.	2.9E+01	4.3E+01	4.6E+01	3.5E+01	4.0E+01
	STD	1.1E+01	.	4.1E+01	3.5E+01	3.9E+01	3.6E+01	4.8E+01	4.5E+00	2.5E+01	.	.	3.2E+01	.	4.0E+01	2.1E+01
Hydraulic	N	1	0	8	5	3	11	5	1	3	1	1	1	2	4	2
Gradient	MEAN	6.0E-01	.	8.5E-01	6.9E-01	3.7E+00	7.2E-01	1.5E+00	5.0E+00	9.0E+00	1.6E+01	4.0E+00	5.0E+01	6.0E-01	2.5E+00	2.8E+00
(%)	MIN	6.0E-01	.	1.0E-02	1.0E-01	2.0E+00	3.0E-02	1.0E-02	5.0E+00	6.0E-02	1.6E+01	4.0E+00	5.0E+01	2.5E-01	2.0E-01	6.0E-01
	MAX	6.0E-01	.	2.0E+00	3.3E+00	5.0E+00	1.7E+00	3.8E+00	5.0E+00	2.5E+01	1.6E+01	4.0E+00	5.0E+01	2.0E+00	7.5E+00	5.0E+00
	STD	.	.	1.9E+00	2.4E+00	3.9E+00	1.1E+00	3.8E+00	.	3.5E+01	.	.	.	2.0E+00	8.8E+00	3.9E+00
Horizontal	N	3	0	9	6	3	7	5	2	4	1	2	5	3	5	5
Flow Rate	MEAN	5.2E+03	.	5.1E+02	1.4E+03	3.2E+01	4.5E+02	6.9E+01	7.5E-01	7.5E+00	1.3E+03	1.9E+01	1.0E+02	2.1E+00	5.9E+02	9.9E+01
(ft/yr)	MIN	5.5E+01	.	1.5E-01	2.0E+00	1.4E-02	5.0E+01	1.5E-01	5.0E-01	3.0E+00	1.3E+03	1.5E+00	1.0E+00	1.0E+00	1.0E-03	3.0E+00
	MAX	1.5E+04	.	1.7E+03	4.0E+03	6.6E+01	1.0E+03	3.0E+02	1.0E+00	1.1E+01	1.3E+03	9.0E+01	3.2E+02	2.5E+00	2.1E+03	2.6E+02
	STD	2.3E+04	.	1.5E+03	3.6E+03	8.4E+01	8.9E+02	3.3E+02	4.5E-01	9.6E+00	.	1.0E+02	3.4E+02	1.2E+00	2.2E+03	1.5E+02

TABLE 10-72 (cont.)

Hydrogeologic Characteristics of Upper Acquifer-By State

		NM	NV	NY	OH	OK	OR	PA	RI
Permeabili-ty (cm/sec)	N	34	12	45	25	37	9	14	2
	MEAN	8.1E-01	9.7E-01	7.3E-01	8.7E-01	5.5E-01	6.4E-01	6.0E-01	8.0E-01
	MIN	4.4E-07	3.0E-03	8.0E-10	1.0E-08	8.6E-11	1.0E-05	1.0E-06	3.5E-04
	MAX	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	9.7E-01	3.7E-01	1.0E+00	7.2E-01	9.2E-01	1.2E+00	1.1E+00	1.1E+00
Porosity (%)	N	7	2	13	4	11	3	6	1
	MEAN	2.0E+01	8.2E+00	3.5E+01	6.1E+00	2.6E+01	1.9E+01	2.6E+01	2.0E+01
	MIN	1.5E-01	1.0E+00	3.0E-01	1.5E-01	5.0E+00	5.0E-01	1.5E-01	2.0E+01
	MAX	4.0E+01	1.0E+01	7.5E+01	4.0E+01	5.5E+01	4.0E+01	6.0E+01	2.0E+01
	STD	3.6E+01	1.0E+01	4.9E+01	2.9E+01	2.0E+01	5.1E+01	5.2E+01	.
Hydraulic Gradient (%)	N	6	2	12	2	11	3	7	2
	MEAN	8.8E-01	2.2E+00	6.2E+00	2.9E-01	2.0E+00	3.1E+00	6.0E+00	7.2E+00
	MIN	2.0E-02	2.0E+00	2.0E-02	1.6E-01	1.0E-02	1.3E+00	1.0E-02	4.0E+00
	MAX	3.0E+00	3.0E+00	2.5E+01	8.0E-01	4.4E+00	6.0E+00	2.9E+01	8.0E+00
	STD	3.3E+00	1.1E+00	1.6E+01	7.3E-01	1.7E+00	6.5E+00	1.6E+01	4.5E+00
Horizontal Flow Rate (ft/yr)	N	6	2	11	5	8	1	7	2
	MEAN	3.1E+01	2.1E+01	1.8E+02	9.8E+02	2.3E+01	1.4E+02	2.6E+02	3.7E+02
	MIN	1.8E-02	1.0E+00	5.1E-02	1.0E+00	7.0E-03	1.4E+02	1.0E+00	2.3E+01
	MAX	1.2E+02	1.0E+02	3.0E+03	1.5E+03	1.5E+02	1.4E+02	1.8E+03	4.5E+02
	STD	1.2E+02	1.1E+02	1.2E+03	1.3E+03	6.6E+01	.	9.3E+02	4.8E+02

		SC	SD	TN	TX	UT	VA	VT
Permeabili-ty (cm/sec)	N	5	6	16	115	9	2[illegible]	13
	MEAN	4.0E-01	8.4E-01	7.8E-01	7.7E-01	8.1E-01	5.7E-01	6.9E-01
	MIN	2.8E-07	1.8E-02	1.0E-06	1.0E-12	3.0E-02	3.[illegible]E-08	1.0E-07
	MAX	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	1.4E+00	1.0E+00	1.0E+00	1.1E+00	9.8E-01	1.2E+00	1.2E+00
Porosity (%)	N	2	1	2	18	0	5	2
	MEAN	1.0E+01	1.7E+01	4.0E+01	2.4E+01	.	2.5E+01	3.0E+01
	MIN	4.3E-01	1.7E+01	3.0E+01	5.0E+00	.	2.0E+00	3.0E+01
	MAX	2.0E+01	1.7E+01	4.2E+01	4.7E+01	.	5.0E+01	3.0E+01
	STD	3.5E+01	.	1.4E+01	2.8E+01	.	5.6E+01	0.0E+00
Hydraulic Gradient (%)	N	2	0	2	18	2	5	4
	MEAN	1.1E+00	.	1.6E+00	3.4E+00	2.0E+00	3.8E+00	4.9E+00
	MIN	2.0E-01	.	1.2E-01	4.0E-02	1.0E+00	5.0E-0[illegible]	3.0E-01
	MAX	2.0E+00	.	2.0E+00	2.0E+01	3.0E+00	1.2E+0[illegible]	1.0E+01
	STD	3.2E+00	.	2.1E+00	1.3E+01	3.6E+00	1.2E+01	1.1E+01
Horizontal Flow Rate (ft/yr)	N	3	0	3	22	1	6	1
	MEAN	1.2E+02	.	3.2E+01	2.5E+03	9.0E+00	2.5E+01	7.0E+01
	MIN	2.0E+01	.	6.3E-01	2.0E-03	9.0E+00	1.0E+00	7.0E+01
	MAX	2.5E+02	.	6.3E+01	3.5E+04	9.0E+00	1.0E+02	7.0E+01
	STD	3.0E+02	.	8.0E+01	1.9E+04	.	9.6E+01	.

		WA	WI	WV	WY	ALL
Permeabili-ty (cm/sec)	N	13	136	9	11	1008
	MEAN	6.6E-01	8.8E-01	8.9E-01	6.4E-01	7.4E-01
	MIN	9.1E-06	1.0E-07	5.1E-05	1.0E-07	1.0E-12
	MAX	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	1.1E+00	8.1E-01	8.5E-01	1.3E+00	1.0E+00
Porosity (%)	N	4	16	1	2	233
	MEAN	2.9E+01	2.0E+01	1.0E-02	1.7E+01	2.6E+01
	MIN	2.0E+01	4.0E-01	1.0E-02	8.0E+00	1.0E-02
	MAX	4.0E+01	4.0E+01	1.0E-02	2.5E+01	9.0E+01
	STD	2.1E+01	3.1E+01	.	3.1E+01	3.8E+01
Hydraulic Gradient (%)	N	4	17	2	1	219
	MEAN	3.3E+00	2.3E+00	1.7E+01	7.5E+00	4.2E+00
	MIN	8.0E-02	1.0E-02	4.0E+00	7.5E+00	1.0E-02
	MAX	7.0E+00	1.5E+01	3.0E+01	7.5E+00	6.0E+01
	STD	7.0E+00	1.1E+01	4.7E+01	.	1.8E+01
Horizontal Flow Rate (ft/yr)	N	4	17	2	1	232
	MEAN	7.0E+03	1.2E+02	7.3E+02	5.0E+00	1.2E+03
	MIN	1.0E-01	4.0E-03	1.0E-01	5.0E+00	1.0E-03
	MAX	1.5E+04	8.6E+02	1.5E+03	5.0E+00	7.3E+04
	STD	1.7E+04	5.6E+02	2.6E+03	.	1.4E+04

TABLE 10-73

Hydrogeologic Characteristics of Upper Acquifer-By Compact

		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX
Permeabili-	N	32	89	36	18	39	222	11	8	79	45	2	57	159	83	115
ty (cm/sec)	MEAN	6.0E-01	7.0E-01	5.3E-01	5.4E-01	9.0E-01	7.8E-01	8.4E-01	5.5E-01	7.5E-01	7.3E-01	8.0E-01	8.0E-01	6.7E-01	7.6E-01	7.7E-01
	MIN	1.0E-09	8.6E-11	1.0E-10	1.0E-10	2.0E-07	1.0E-10	1.0E-05	1.0E-04	9.1E-06	8.0E-10	3.5E-04	1.0E-07	1.0E-08	2.0E-07	1.0E-12
	MAX	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00	1.0E+00
	STD	1.1E+00	1.0E+00	1.2E+00	1.2E+00	7.8E-01	9.9E-01	7.2E-01	1.3E+00	1.1E+00	1.0E+00	1.1E+00	9.7E-01	1.1E+00	9.7E-01	1.1E+00
Porosity	N	14	21	12	9	3	46	6	4	10	13	1	11	44	19	18
(%)	MEAN	2.2E+01	2.5E+01	2.9E+01	2.8E+01	2.3E+01	2.3E+01	2.6E+01	2.2E+01	3.3E+01	3.5E+01	2.0E+01	1.8E+01	2.6E+01	3.1E+01	2.4E+01
	MIN	1.0E-02	4.0E+00	1.5E-01	6.0E-02	1.0E+01	1.5E-01	3.0E-01	2.5E-01	5.0E-01	3.0E-01	2.0E+01	1.5E-01	2.5E-01	4.0E-01	5.0E+00
	MAX	6.0E+01	5.5E+01	6.0E+01	5.0E+01	4.0E+01	8.0E+01	7.5E+01	3.5E+01	9.0E+01	7.5E+01	2.0E+01	4.0E+01	7.0E+01	5.5E+01	4.7E+01
	STD	4.2E+01	3.0E+01	3.9E+01	4.1E+01	3.9E+01	4.0E+01	3.6E+01	4.0E+01	6.1E+01	4.9E+01	.	3.1E+01	3.8E+01	3.0E+01	2.8E+01
Hydraulic	N	16	19	10	8	3	48	3	4	13	12	2	9	38	12	18
Gradient	MEAN	6.0E+00	1.8E+00	4.5E+00	8.5E-01	3.7E+00	2.3E+00	4.2E+00	2.5E+00	5.0E+00	6.2E+00	7.2E+00	1.9E+00	4.2E+00	1.7E+01	3.4E+00
(%)	MIN	1.0E-02	1.0E-02	1.0E-02	1.0E-02	2.0E+00	1.0E-02	6.0E-01	2.0E-01	8.0E-02	2.0E-02	4.0E+00	2.0E-02	2.0E-02	1.0E-01	4.0E-02
	MAX	3.0E+01	4.4E+00	2.0E+01	2.0E+00	5.0E+00	3.6E+01	7.0E+00	7.5E+00	1.6E+01	2.5E+01	8.0E+00	7.5E+00	4.4E+01	6.0E+01	2.0E+01
	STD	2.0E+01	2.5E+00	1.5E+01	1.9E+00	3.9E+00	9.9E+00	4.1E+00	8.8E+00	1.3E+01	1.6E+01	4.5E+00	6.1E+00	1.5E+01	4.8E+01	1.3E+01
Horizontal	N	17	19	12	9	3	47	5	5	10	11	2	9	45	15	22
Flow Rate	MEAN	8.2E+02	2.4E+01	3.8E+03	5.1E+02	3.2E+01	2.2E+03	9.9E+01	5.9E+02	2.2E+03	1.8E+02	3.7E+02	2.5E+01	1.4E+02	3.8E+02	2.5E+03
(ft/yr)	MIN	1.0E-01	2.0E-03	3.0E-03	1.5E-01	1.4E-02	4.0E-03	3.0E+00	1.0E-03	1.0E-01	5.1E-02	2.3E+01	1.8E-02	1.0E-02	2.5E-01	2.0E-03
	MAX	4.0E+03	2.0E+02	2.0E+04	1.7E+03	6.6E+01	7.3E+04	2.6E+02	2.1E+03	1.5E+04	3.0E+03	4.5E+02	1.2E+02	1.6E+03	3.0E+03	3.5E+0[illegible]
	STD	2.6E+03	1.2E+02	1.7E+04	1.5E+03	8.4E+01	2.7E+04	1.5E+02	2.2E+03	1.2E+04	1.2E+03	4.8E+02	1.1E+02	6.6E+02	1.9E+03	1.9E+04

		VT	ALL
Permeabili-	N	13	1008
ty (cm/sec)	MEAN	6.9E-01	7.4E-01
	MIN	1.0E-07	1.0E-12
	MAX	1.0E+00	1.0E+00
	STD	1.2E+00	1.0E+00
Porosity	N	2	233
(%)	MEAN	3.0E+01	2.6E+01
	MIN	3.0E+01	1.0E-02
	MAX	3.0E+01	9.0E+01
	STD	0.0E+00	3.8E+01
Hydraulic	N	4	219
Gradient	MEAN	4.9E+00	4.2E+00
(%)	MIN	3.0E-01	1.0E-02
	MAX	1.0E+01	6.0E+01
	STD	1.1E+01	1.8E+01
Horizontal	N	1	232
Flow Rate	MEAN	7.0E+01	1.2E+03
(ft/yr)	MIN	7.0E+01	1.0E-03
	MAX	7.0E+01	7.3E+04
	STD	.	1.4E+04

TABLE 10-74. Mean Distances (ft.) by State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Property Line to Residence	MEAN	6,297	2,054	4,459	5,303	2,782	100	200	2,602	2,170	1,650	1,606	3,185	1,026	992	2,225	766	3,822
Unit to Residence	MEAN	7,065	2,783	4,689	5,789	3,370	2,001	2,450	2,986	2,870	1,650	2,001	3,338	1,306	1,269	2,489	1,289	4,244
High Water Table	MEAN	196	30	39	150	117	5	8	16	14	4	14	220	200	19	54	50	12
Bedrock	MEAN	12	62	445	108	418	300	4,500	66	222	20	114	250	78	126	210	19	44
Unit to Private Well	MEAN	400	1,741	1,615	4,197	1,525	.	1,300	1,729	1,392	.	1,827	1,846	1,259	1,907	1,839	1,825	2,336
Unit to Public Well	MEAN	.	1	.	.	3,401	.	.	3,600	1,440	.	.	.	2,450	.	.	.	360
Unit to River/Stream	MEAN	3,687	.	.	5,280	972	.	.	.	1,968	.	.	.	1,000	4,700	1,982	.	.
Unit to Lake/ Reservoir	MEAN	5,280	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Not Used, River/Stream	MEAN	1,528	1,130	1,033	858	1,700	25	200	1,105	1,220	1,525	1,145	2,667	769	533	1,515	2,011	1,532
Not Used, Lake/ Reservoir	MEAN	2,890	1,258	.	.	3,595	.	2,300	2,281	2,619	.	250	.	574	.	100	2,400	5,000
Not Used, Wetland	MEAN	517	2,250	2,000	.	49	200	150	598	1,411	.	.	.	55	.	.	2,640	125

(CONTINUED)

TABLE 10-74. Mean Distances (ft.) by State (Continued)

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Property Line to Residence	MEAN	1,294	528	1,681	1,007	1,949	549	2,690	2,799	2,424	5,706	2,201	1,409	628	5,841	6,729	1,975	885
Unit to Residence	MEAN	1,597	1,607	2,147	1,171	2,096	1,004	2,835	3,067	3,006	6,540	2,492	1,628	783	6,685	7,640	2,489	1,543
High Water Table	MEAN	9	7	210	35	10	162	48	67	10	36	101	8	9	223	199	19	60
Bedrock	MEAN	86	91	64	177	128	69	123	54	154	118	132	24	105	197	597	104	52
Unit to Private Well	MEAN	643	1,525	1,723	2,357	1,870	450	3,380	2,389	2,786	2,195	3,852	2,490	421	2,860	2,112	1,762	1,112
Unit to Public Well	MEAN	2,925	2,063	1,500	0	5,280	.	.	1,000	.	3,700	.	.	1,370	3,297	3,960	790	1,930
Unit to River/Stream	MEAN	.	.	.	.	2,000	.	.	.	1,583	.	.	1,200	.	.	.	475	250
Unit to Lake/ Reservoir	MEAN	.	.	3,168	.	1,000	.	.	.	5,000	.	.	.	.	.	.	5,000	.
Not Used, River/Stream	MEAN	951	1,127	1,411	2,127	2,004	2,192	1,200	2,057	1,423	1,667	145	1,455	1,531	2,592	751	1,592	941
Not Used, Lake/ Reservoir	MEAN	450	2,582	4,000	2,000	1,000	150	.	.	3,200	350	.	1,900	3,250	0	4,111	560	1,400
Not Used, Wetland	MEAN	296	2,387	1,961	1,589	751	.	.	3,000	900	3,200	1,300	1,133	89	.	.	780	100

(CONTINUED)

TABLE 10-74. Mean Distances (ft.) by State (Continued)

		STATE														
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Property Line to Residence	MEAN	2,130	3,768	1,736	166	795	3,028	2,956	3,478	8,426	719	1,011	3,058	2,340	2,152	4,708
Unit to Residence	MEAN	2,331	4,574	2,231	299	916	3,396	3,483	3,996	8,690	1,203	1,290	3,677	3,045	2,787	4,856
High Water Table	MEAN	101	72	80		3	687	52	87	98	31	40	98	77	488	160
Bedrock	MEAN	72	155	33	5	200	180	38	812	30	292	62	107	61	96	136
Unit to Private Well	MEAN	1,869	1,421	1,962	2,104	1,110	2,158	2,502	1,921	2,500	1,750	557	1,140	2,041	1,463	2,025
Unit to Public Well	MEAN	601	.	.	2,400	1,000	5,000	.	1,940	.	757	.	5,000	2,329	.	.
Unit to River/Stream	MEAN	1,299	1,800	822	.	.	.	130	1,641	.	3,000	.	2,300	1,300	.	4,800
Unit to Lake/ Reservoir	MEAN	1,750	.	.	.	.	.	.	2,617	.	.	3,450	.	3,500	.	.
Not Used, River/Stream	MEAN	1,331	1,456	1,487	100	2,606	400	2,556	1,822	1,000	758	654	814	2,313	1,480	3,000
Not Used, Lake/ Reservoir	MEAN	1,091	.	2,605	1,200	2,500	.	.	1,237	.	500	1,000	3,506	2,843	.	2,300
Not Used, Wetland	MEAN	3,000	.	100	100	300	.	1,500	100	.	0	2,501	2,237	1,280	.	.

TABLE 10-75. Distances (ft.) - Number of Observations in the Sample by State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Property Line to Residence	N	16	25	12	9	50	1	2	25	36	2	16	13	21	9	24	15	8
Unit to Residence	N	16	25	12	9	50	1	2	25	36	2	16	13	21	9	24	15	8
High Water Table	N	9	21	11	9	43	1	2	22	31	2	14	11	12	8	20	11	4
Bedrock	N	9	19	8	6	34	1	2	21	23	1	13	4	20	9	18	13	5
Unit to Private Well	N	1	5	2	2	11	0	1	8	13	0	13	5	8	6	11	4	4
Unit to Public Well	N	0	1	0	0	6	0	0	1	3	0	0	0	2	0	0	0	1
Unit to River/Stream	N	3	0	0	1	2	0	0	0	4	0	0	0	1	1	3	0	0
Unit to Lake/ Reservoir	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Not Used, River/Stream	N	9	19	3	2	18	1	1	9	29	2	11	6	15	4	8	11	5
Not Used, Lake/ Reservoir	N	2	3	0	0	4	0	1	7	5	0	2	0	2	0	1	1	1
Not Used, Wetland	N	6	2	1	0	3	1	1	10	8	0	0	0	2	0	0	1	2

(CONTINUED)

TABLE 10-75. Distances (ft.) - Number of Observations in the Sample by State (Continued)

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Property Line to Residence	N	17	7	39	19	9	8	13	18	18	18	8	8	10	34	12	45	25
Unit to Residence	N	18	7	39	19	9	8	13	18	18	18	8	8	10	34	12	45	25
High Water Table	N	10	5	28	16	9	8	6	14	13	14	6	6	8	27	11	27	21
Bedrock	N	13	6	26	15	7	8	6	11	7	12	5	7	4	21	8	25	21
Unit to Private Well	N	7	7	17	10	6	1	3	8	7	4	3	3	3	11	1	14	15
Unit to Public Well	N	4	3	1	1	1	0	0	2	0	2	0	0	1	6	1	2	2
Unit to River/Stream	N	0	0	0	0	1	0	0	0	4	0	0	1	0	0	0	2	1
Unit to Lake/ Reservoir	N	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	1	0
Not Used, River/Stream	N	15	6	28	12	6	5	4	11	11	3	3	6	7	7	3	23	19
Not Used, Lake/ Reservoir	N	4	3	1	4	2	1	0	0	2	2	0	2	2	1	2	6	2
Not Used, Wetland	N	14	2	5	6	6	0	0	1	5	1	1	3	4	0	0	11	2

(CONTINUED)

TABLE 10-75. Distances (ft.) - Number of Observations in the Sample by State (Continued)

		STATE														
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Property Line to Residence	N	37	9	14	2	5	6	16	115	10	21	13	13	136	9	12
Unit to Residence	N	37	9	14	2	5	6	16	115	10	21	13	13	136	9	12
High Water Table	N	33	6	11	0	4	3	14	74	7	18	9	12	91	7	12
Bedrock	N	28	8	13	2	3	3	12	71	4	17	10	10	72	6	11
Unit to Private Well	N	15	4	7	2	4	2	5	28	1	11	8	9	78	4	5
Unit to Public Well	N	2	0	0	1	1	1	0	5	0	2	0	1	7	0	0
Unit to River/Stream	N	2	1	2	0	0	0	1	5	0	1	0	1	2	0	1
Unit to Lake/ Reservoir	N	2	0	0	0	0	0	0	3	0	0	2	0	1	0	0
Not Used, River/Stream	N	22	5	9	1	4	1	8	36	1	14	9	9	55	5	2
Not Used, Lake/ Reservoir	N	6	0	2	1	1	0	0	11	0	1	1	2	19	0	1
Not Used, Wetland	N	1	0	1	2	1	0	1	2	0	1	5	3	39	0	0

TABLE 10-76. Distances (ft.) - Minimum - by State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Property Line to Residence	MIN	4	100	90	200	0	100	100	50	50	1,500	0	300	10	75	30	50	250
Unit to Residence	MIN	400	100	280	210	50	2,001	1,300	180	100	1,500	40	450	80	250	200	150	300
High Water Table	MIN	0	5	4	25	0	5	7	1	2	2	0	50	5	0	4	2	4
Bedrock	MIN	0	0	0	2	0	300	3,500	1	0	20	36	0	2	15	0	2	0
Unit to Private Well	MIN	400	8	600	4,000	50	.	1,300	600	1	.	540	450	500	600	250	700	1,320
Unit to Public Well	MIN	.	1	.	.	300	.	.	3,600	0	.	.	.	900	.	.	.	360
Unit to River/Stream	MIN	500	.	.	5,280	350	.	.	.	200	.	.	.	1,000	4,700	0	.	.
Unit to Lake/ Reservoir	MIN	5,280	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Not Used, River/Stream	MIN	30	0	300	700	20	25	200	200	0	50	150	1,000	15	50	40	50	10
Not Used, Lake/ Reservoir	MIN	500	400	.	.	2,000	.	2,300	100	800	.	200	.	10	.	100	2,400	5,000
Not Used, Wetland	MIN	50	500	2,000	.	0	200	150	10	300	.	.	.	10	.	.	2,640	50

(CONTINUED)

TABLE 10-76. Distances (ft.) - Minimum - by State (Continued)

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Property Line to Residence	MIN	100	25	100	0	200	300	80	50	0	1	400	100	50	100	300	12	25
Unit to Residence	MIN	110	300	300	200	800	400	300	150	250	1,800	450	150	100	300	1,320	50	30
High Water Table	MIN	4	5	0	7	4	10	6	0	3	2	10	2	4	21	1	0	2
Bedrock	MIN	10	0	2	20	13	2	40	0	2	0	5	10	0	0	5	2	0
Unit to Private Well	MIN	1	500	15	150	400	450	2,540	300	1	1,320	500	380	100	400	2,112	2	65
Unit to Public Well	MIN	1,500	1,600	1,500	0	5,280	.	.	0	.	3,500	.	.	1,370	1,200	3,960	0	960
Unit to River/Stream	MIN	.	.	.	.	2,000	.	.	.	100	.	.	1,200	.	.	.	50	250
Unit to Lake/ Reservoir	MIN	.	.	2,640	.	1,000	.	.	.	5,000	.	.	.	.	.	.	5,000	.
Not Used, River/Stream	MIN	20	75	50	20	200	75	1	125	0	1,000	100	100	25	50	500	0	10
Not Used, Lake/ Reservoir	MIN	100	150	4,000	2,000	1,000	150	.	.	1,400	100	.	1,000	1,500	0	500	1	800
Not Used, Wetland	MIN	0	2,000	5	100	100	.	.	3,000	0	3,200	1,300	200	0	.	.	0	0

(CONTINUED)

TABLE 10-76. Distances (ft.) - Minimum - by State (Continued)

		STATE														
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Property Line to Residence	MIN	20	528	50	30	86	1,800	50	10	1,100	50	20	20	20	2	260
Unit to Residence	MIN	60	528	150	200	200	1,800	150	70	1,100	200	300	150	185	1,000	260
High Water Table	MIN	0	20	4	.	2	10	10	0	5	3	5	5	0	4	12
Bedrock	MIN	0	0	4	3	25	50	12	0	0	1	2	0	0	0	7
Unit to Private Well	MIN	0	800	30	900	300	1,315	500	300	2,500	275	5	400	300	50	600
Unit to Public Well	MIN	200	.	.	2,400	1,000	5,000	.	510	.	13	.	5,000	800	.	.
Unit to River/Stream	MIN	880	1,800	100	.	.	.	130	100	.	3,000	.	2,300	1,300	.	4,800
Unit to Lake/ Reservoir	MIN	1,500	.	.	.	.	.	.	400	.	.	1,700	.	3,500	.	.
Not Used, River/Stream	MIN	50	100	0	100	125	400	100	0	1,000	20	35	0	1	100	1,000
Not Used, Lake/ Reservoir	MIN	100	.	1,000	1,200	2,500	.	.	2	.	500	1,000	1,500	1	.	2,300
Not Used, Wetland	MIN	3,000	.	100	100	300	.	1,500	100	.	0	5	100	50	.	.

TABLE 10-77. Distances (ft.) - Maximum - by State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Property Line to Residence	MAX	42,240	7,920	15,840	31,680	21,120	100	300	10,560	7,920	1,800	5,280	8,920	3,000	3,000	5,280	2,100	13,200
Unit to Residence	MAX	42,240	7,920	15,840	34,320	21,120	2,001	3,600	10,560	10,560	1,800	5,400	8,920	4,000	3,000	5,280	4,000	13,200
High Water Table	MAX	650	90	150	500	480	5	8	80	60	5	50	600	1,250	50	270	200	30
Bedrock	MAX	40	300	3,000	800	8,000	300	5,500	350	3,500	20	240	700	375	250	2,500	100	100
Unit to Private Well	MAX	400	3,000	2,630	5,000	4,000	.	1,300	4,000	5,000	.	3,100	3,960	3,000	3,960	4,290	4,200	3,500
Unit to Public Well	MAX	.	1	.	.	5,100	.	.	3,600	3,000	.	.	.	4,000	.	.	.	360
Unit to River/Stream	MAX	5,280	.	.	5,280	3,500	.	.	.	4,500	.	.	.	1,000	4,700	3,960	.	.
Unit to Lake/ Reservoir	MAX	5,280	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Not Used, River/Stream	MAX	5,280	5,000	1,800	1,500	5,200	25	200	4,000	4,400	3,000	4,000	5,000	4,400	2,150	3,960	5,280	5,000
Not Used, Lake/ Reservoir	MAX	5,280	5,000	.	.	5,280	.	2,300	4,500	4,000	.	300	.	2,500	.	100	2,400	5,000
Not Used, Wetland	MAX	1,700	4,000	2,000	.	200	200	150	5,000	4,500	.	.	.	100	.	.	2,640	200

(CONTINUED)

TABLE 10-77. Distances (ft.) - Maximum - by State (Continued)

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Property Line to Residence	MAX	5,280	1,500	6,600	2,640	3,960	2,400	10,560	7,920	12,144	31,680	5,280	7,920	2,000	31,680	23,760	7,500	3,000
Unit to Residence	MAX	6,600	3,900	7,920	2,640	3,960	2,600	10,560	7,920	13,728	31,680	5,280	7,920	2,640	31,680	25,080	8,400	5,280
High Water Table	MAX	40	15	2,000	150	35	300	100	200	80	100	235	16	20	1,500	700	90	260
Bedrock	MAX	400	500	1,000	500	300	160	300	200	800	525	280	40	440	2,000	3,000	1,300	350
Unit to Private Well	MAX	1,300	3,500	3,960	4,000	4,000	450	4,000	5,280	5,000	3,960	5,280	4,500	1,000	5,280	2,112	4,752	3,000
Unit to Public Well	MAX	5,000	4,200	1,500	0	5,280	.	.	2,000	.	3,900	.	.	1,370	5,280	3,960	4,000	2,900
Unit to River/Stream	MAX	.	.	.	.	2,000	.	.	.	3,000	.	.	1,200	.	.	.	900	250
Unit to Lake/ Reservoir	MAX	.	.	3,696	.	1,000	.	.	.	5,000	.	.	.	.	.	.	5,000	.
Not Used, River/Stream	MAX	3,000	2,300	5,000	5,280	4,000	4,000	2,800	5,280	5,280	3,000	200	3,500	4,000	5,280	1,320	5,280	3,000
Not Used, Lake/ Reservoir	MAX	900	5,000	4,000	2,000	1,000	150	.	.	5,000	600	.	2,800	5,000	0	5,000	2,000	2,000
Not Used, Wetland	MAX	1,000	3,960	5,000	2,500	1,320	.	.	3,000	3,600	3,200	1,300	2,200	700	.	.	2,600	200

(CONTINUED)

TABLE 10-77. Distances (ft.) - Maximum - by State (Continued)

		STATE														
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Property Line to Residence	MAX	15,840	10,560	13,200	200	2,640	5,280	10,560	26,400	26,400	3,000	2,640	15,840	26,400	5,280	15,840
Unit to Residence	MAX	21,120	13,200	13,200	700	2,640	5,280	10,560	26,400	26,400	3,960	2,640	15,840	50,800	5,280	15,840
High Water Table	MAX	1,500	100	300	.	5	2,000	120	1,500	200	100	100	400	1,000	2,640	950
Bedrock	MAX	500	550	120	5	400	440	100	40,000	60	4,000	184	600	325	500	1,200
Unit to Private Well	MAX	5,280	2,640	4,500	2,400	2,800	3,000	5,000	5,250	2,500	5,000	2,640	3,500	5,220	3,700	4,000
Unit to Public Well	MAX	700	.	.	2,400	1,000	5,000	.	3,550	.	1,500	.	5,000	3,000	.	.
Unit to River/Stream	MAX	3,000	1,800	1,000	.	.	.	130	5,000	.	3,000	.	2,300	1,300	.	4,800
Unit to Lake/ Reservoir	MAX	2,000	.	.	.	.	.	.	5,000	.	.	5,200	.	3,500	.	.
Not Used, River/Stream	MAX	5,280	3,960	4,000	100	5,200	400	5,000	5,280	1,000	4,000	2,000	2,500	5,280	3,000	5,000
Not Used, Lake/ Reservoir	MAX	2,640	.	3,000	1,200	2,500	.	.	5,000	.	500	1,000	4,000	5,280	.	2,300
Not Used, Wetland	MAX	3,000	.	100	100	300	.	1,500	100	.	0	5,000	4,000	5,000	.	.

TABLE 10-78. Distances (ft.) - Standard Deviation - by State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Property Line to Residence	STD	25,170	4,142	12,317	25,578	8,889	.	179	6,700	5,823	541	3,411	6,690	2,174	2,771	4,247	1,598	10,291
Unit to Residence	STD	24,657	4,786	11,883	27,621	9,008	.	2,057	6,647	6,619	541	4,000	6,446	2,970	2,513	3,980	2,565	10,075
High Water Table	STD	599	50	112	406	261	.	1	48	34	5	38	420	878	41	167	151	31
Bedrock	STD	43	226	2,669	442	2,341	.	1,789	112	1,834	.	177	846	219	180	1,480	72	103
Unit to Private Well	STD	.	2,614	3,660	1,133	3,594	.	.	2,147	3,535	.	2,230	3,569	1,078	3,444	3,842	4,082	1,981
Unit to Public Well	STD	.	.	.	.	4,397	.	.	.	3,834	.	.	.	2,773	.	.	.	.
Unit to River/Stream	STD	7,037	.	.	.	3,569	.	.	.	4,658	.	.	.	.	.	5,049	.	.
Unit to Lake/ Reservoir	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Not Used, River/Stream	STD	4,120	2,402	1,914	907	2,770	.	.	2,111	2,913	5,319	3,165	4,392	2,923	1,421	3,899	4,242	5,235
Not Used, Lake/ Reservoir	STD	8,618	3,694	.	.	4,559	.	.	3,011	3,354	.	180	.	2,720	.	.	.	.
Not Used, Wetland	STD	1,590	3,130	.	.	168	.	.	2,101	3,923	.	.	.	80	.	.	.	134

(CONTINUED)

TABLE 10-78. Distances (ft.) - Standard Deviation - by State (Continued)

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Property Line to Residence	STD	3,677	1,180	4,374	1,810	3,432	953	8,424	5,547	7,295	18,336	4,264	6,777	1,420	19,326	16,409	4,455	1,708
Unit to Residence	STD	4,056	2,892	4,580	1,622	3,054	1,334	8,158	5,464	8,068	17,418	4,680	6,614	1,609	21,588	16,202	4,755	2,679
High Water Table	STD	22	6	1,185	62	17	188	108	170	30	76	190	13	13	728	537	48	183
Bedrock	STD	264	358	496	283	278	137	260	151	743	403	324	25	293	1,081	2,556	527	163
Unit to Private Well	STD	1,469	2,457	3,259	2,953	4,293	.	1,924	4,308	5,196	3,089	4,098	4,890	841	3,493	.	3,547	1,967
Unit to Public Well	STD	3,969	2,089	.	.	.	.	.	3,606	.	721	.	.	.	4,199	.	4,533	3,498
Unit to River/Stream	STD	.	.	.	.	.	.	.	.	3,083	.	.	.	.	.	.	1,533	.
Unit to Lake/ Reservoir	STD	.	.	1,904	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Not Used, River/Stream	STD	2,513	1,914	3,403	3,275	3,429	3,290	2,973	3,831	5,198	2,944	134	3,332	3,266	4,422	791	3,766	2,167
Not Used, Lake/ Reservoir	STD	871	6,184	.	0	0	.	.	.	6,491	901	.	3,245	3,130	.	5,099	1,502	2,164
Not Used, Wetland	STD	951	2,221	5,995	1,782	1,128	.	.	.	3,895	.	.	2,567	475	.	.	1,869	361

(CONTINUED)

TABLE 10-78. Distances (ft.) - Standard Deviation - by State (Continued)

		STATE														
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Property Line to Residence	STD	4,169	8,935	5,390	193	2,807	3,028	7,869	11,418	19,375	2,105	2,770	12,242	7,322	4,641	12,693
Unit to Residence	STD	4,943	10,346	5,814	567	2,622	3,067	7,951	12,249	19,181	2,517	2,448	11,951	12,896	3,690	12,422
High Water Table	STD	480	95	247	.	4	2,901	76	481	192	67	99	277	401	2,479	674
Bedrock	STD	256	482	59	2	481	574	77	12,118	75	2,447	178	325	161	506	902
Unit to Private Well	STD	2,759	2,114	3,768	1,700	2,987	3,038	5,044	3,687	.	3,205	2,188	1,959	2,704	3,990	4,096
Unit to Public Well	STD	567	.	.	.	.	.	.	3,127	.	2,681	.	.	2,422	.	.
Unit to River/Stream	STD	2,402	.	1,020	.	.	.	.	4,999	.	.	.	.	0	.	.
Unit to Lake/ Reservoir	STD	447	.	.	.	.	.	.	5,876	.	.	6,310	.	.	.	.
Not Used, River/Stream	STD	2,809	3,877	2,983	.	5,643	.	4,019	4,196	.	2,923	1,515	1,616	3,594	3,409	7,212
Not Used, Lake/ Reservoir	STD	1,445	.	2,266	.	.	.	.	3,859	.	.	.	2,833	4,133	.	.
Not Used, Wetland	STD	.	.	.	0	.	.	.	0	.	.	5,096	4,328	3,512	.	.

TABLE 10-79. Mean Distances (ft.) by Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Property Line to Residence	MEAN	1,656	2,731	902	1,294	1,681	1,957	607	1,409	4,412	1,975	166	5,720	2,111	3,897	3,478	1,011	2,716
Unit to Residence	MEAN	2,346	2,988	1,298	1,597	2,147	2,559	829	1,628	4,858	2,489	299	6,414	2,639	4,519	3,996	1,290	3,231
High Water Table	MEAN	225	67	114	9	210	63	9	8	122	19	.	202	25	132	87	40	89
Bedrock	MEAN	187	189	51	86	64	80	129	24	87	104	5	243	155	269	812	62	214
Unit to Private Well	MEAN	1,661	2,073	1,511	643	1,723	1,913	421	2,490	1,759	1,762	2,104	2,578	1,918	1,960	1,921	557	1,850
Unit to Public Well	MEAN	2,063	494	2,450	2,925	1,500	2,313	1,370	.	1,438	790	2,400	3,323	1,440	3,667	1,940	.	2,357
Unit to River/Stream	MEAN	822	1,738	1,000	.	.	1,894	.	1,200	3,032	475	.	4,800	1,843	2,890	1,641	.	1,989
Unit to Lake/ Reservoir	MEAN	.	1,750	.	.	3,168	3,006	.	.	5,280	5,000	.	.	5,000	.	2,617	3,450	3,387
Not Used, River/Stream	MEAN	1,368	1,280	1,384	951	1,411	1,909	1,443	1,455	1,720	1,592	100	2,394	1,351	1,558	1,822	654	1,567
Not Used, Lake/ Reservoir	MEAN	2,571	1,084	1,387	450	4,000	2,274	3,250	1,900	3,127	560	1,200	2,287	2,399	2,513	1,237	1,000	1,971
Not Used, Wetland	MEAN	1,747	1,497	1,787	296	1,961	1,208	99	1,133	1,203	780	100	.	986	1,314	100	2,501	1,100

TABLE 10-80. Distances (ft.) - Number of Observations in the Sample by Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Property Line to Residence	N	32	89	36	17	39	222	11	8	81	45	2	58	159	83	115	13	1,010
Unit to Residence	N	32	89	36	18	39	222	11	8	81	45	2	58	159	83	115	13	1,011
High Water Table	N	25	74	23	10	28	167	9	6	61	27	0	50	129	69	74	9	761
Bedrock	N	27	64	33	13	26	145	5	7	47	25	2	40	108	55	71	10	678
Unit to Private Well	N	19	35	12	7	17	129	3	3	28	14	2	17	56	19	28	8	397
Unit to Public Well	N	3	3	2	4	1	11	1	0	3	2	1	7	8	9	5	0	60
Unit to River/Stream	N	2	5	1	0	0	5	0	1	5	2	0	1	10	3	5	0	40
Unit to Lake/ Reservoir	N	0	2	0	0	2	2	0	0	1	1	0	0	1	0	3	2	14
Not Used, River/Stream	N	21	41	26	15	28	112	8	6	43	23	1	12	98	24	36	9	503
Not Used, Lake/ Reservoir	N	6	8	3	4	1	30	2	2	4	6	1	4	19	6	11	1	108
Not Used, Wetland	N	4	5	3	14	5	53	5	3	10	11	2	0	28	4	2	5	154

TABLE 10-81. Distances (ft.) - Minimum - by Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	WE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Property Line to Residence	MIN	2	20	10	100	100	0	50	100	4	12	30	100	0	0	10	20	0
Unit to Residence	MIN	150	60	80	110	300	30	100	150	150	50	200	260	100	50	70	300	30
High Water Table	MIN	4	0	2	4	0	0	4	2	0	0	.	1	1	0	0	5	0
Bedrock	MIN	0	0	2	10	2	0	0	10	0	2	3	0	0	0	0	2	0
Unit to Private Well	MIN	30	0	500	1	15	65	100	380	300	2	900	400	1	50	300	5	0
Unit to Public Well	MIN	1,600	200	900	1,500	1,500	0	1,370	.	0	0	2,400	1,200	0	300	510	.	0
Unit to River/Stream	MIN	100	0	1,000	.	.	250	.	1,200	500	50	.	4,800	100	350	100	.	0
Unit to Lake/ Reservoir	MIN	.	1,500	.	.	2,640	1,000	.	.	5,280	5,000	.	.	5,000	.	400	1,700	400
Not Used, River/Stream	MIN	0	10	15	20	50	1	25	100	0	0	100	50	0	20	0	35	0
Not Used, Lake/ Reservoir	MIN	150	100	100	100	4,000	1	1,500	1,000	500	1	1,200	0	100	100	2	1,000	0
Not Used, Wetland	MIN	100	50	10	0	5	0	0	200	50	0	100	.	0	0	100	5	0

TABLE 10-82. Distances (ft.) - Maximum - by Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Property Line to Residence	MAX	13,200	15,840	3,000	5,280	6,600	26,400	2,000	7,920	42,240	7,500	200	31,680	12,144	31,680	26,400	2,640	42,240
Unit to Residence	MAX	13,200	21,120	4,000	6,600	7,920	50,800	2,640	7,920	42,240	8,400	700	31,680	13,728	34,320	26,400	2,640	50,800
High Water Table	MAX	2,640	1,500	1,250	40	2,000	1,000	20	16	650	90	.	1,500	120	2,000	1,500	100	2,640
Bedrock	MAX	5,500	3,000	375	400	1,000	500	440	40	700	1,300	5	3,000	4,000	8,000	40,000	184	40,000
Unit to Private Well	MAX	4,500	5,280	4,200	1,300	3,960	5,220	1,000	4,500	5,280	4,752	2,400	5,280	5,000	5,000	5,250	2,640	5,280
Unit to Public Well	MAX	4,200	700	4,000	5,000	1,500	5,280	1,370	.	5,000	4,000	2,400	5,280	3,600	5,100	3,550	.	5,280
Unit to River/Stream	MAX	1,000	3,960	1,000	.	.	4,700	.	1,200	5,280	900	.	4,800	4,500	5,280	5,000	.	5,280
Unit to Lake/ Reservoir	MAX	.	2,000	.	.	3,696	3,500	.	.	5,280	5,000	.	.	5,000	.	5,000	5,200	5,280
Not Used, River/Stream	MAX	4,000	5,280	5,280	3,000	5,000	5,280	4,000	3,500	5,280	5,280	100	5,280	5,280	5,200	5,280	2,000	5,280
Not Used, Lake/ Reservoir	MAX	5,000	5,000	2,500	900	4,000	5,280	5,000	2,800	5,280	2,000	1,200	5,000	5,000	5,280	5,000	1,000	5,280
Not Used, Wetland	MAX	3,960	3,000	2,640	1,000	5,000	5,000	700	2,200	4,000	2,600	100	.	5,000	3,200	100	5,000	5,000

TABLE 10-83. Distances (ft.) - Standard Deviation - by Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Property Line to Residence	STD	4,446	6,701	1,955	3,677	4,374	6,077	1,363	6,777	15.189	4,455	193	17,370	6,112	13,823	11,418	2,770	9,743
Unit to Residence	STD	4,505	6,782	2,770	4,056	4,580	10,361	1,600	6,614	15,105	4,755	567	18,848	6,467	14,055	12,249	2,448	10,841
High Water Table	STD	1,334	342	654	22	1,185	315	12	13	359	48	.	668	63	642	481	99	520
Bedrock	STD	1,599	1,226	188	264	496	200	279	25	374	527	2	1,459	1,297	1,875	12,118	178	4,052
Unit to Private Well	STD	3,106	3,295	2,388	1,469	3,259	2,770	841	4,890	3,192	3,547	1,700	3,577	3,666	3,516	3,687	2,188	3,218
Unit to Public Well	STD	2,089	515	2,773	3,969	.	3,760	.	.	4,231	4,533	.	3,848	3,329	3,727	3,127	.	3,802
Unit to River/Stream	STD	1,020	3,847	.	.	.	4,283	.	.	5,494	1,533	.	.	3,508	6,312	4,999	.	4,245
Unit to Lake/ Reservoir	STD	.	447	.	.	1,904	2,833	.	.	.	.	.	.	.	.	5,876	6,310	3,794
Not Used, River/Stream	STD	2,650	3,216	3,770	2,513	3,403	3,444	3,104	3,332	3,688	3,766	.	4,298	3,426	2,663	4,196	1,515	3,470
Not Used, Lake/ Reservoir	STD	4,043	2,428	3,116	871	.	3,974	3,130	3,245	5,298	1,502	.	5,384	3,311	5,558	3,859	.	3,880
Not Used, Wetland	STD	2,357	1,700	2,677	951	5,995	3,159	416	2,567	3,417	1,869	0	.	3,032	3,591	0	5,096	3,098

TABLE 10-84

Private Wells Within One Mile By State

Number and Population Served

	No. of Private Wells					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AK	1	14	14	14	.	0	.	.	.	.
AL	5	1	12	3	7	1	2	2	2	.
AR	2	1	5	3	7	1	2	2	2	.
AZ	3	1	10	7	8	2	10	30	20	36
CA	11	1	150	24	109	8	2	600	114	509
DE	1	13	13	13	.	0	.	.	.	.
FL	10	1	100	19	46	4	3	85	39	88
GA	13	2	200	34	150	5	2	800	182	883
IA	13	1	20	5	13	5	1	12	5	12
ID	5	1	25	9	26	2	6	6	6	0
IL	9	2	60	8	25	2	4	7	5	3
IN	6	1	29	8	18	2	13	60	37	85
KS	12	1	30	5	21	7	2	80	18	70
KY	2	1	2	2	2	0	.	.	.	.
LA	4	1	1	1	0	1	6	6	6	.
MA	8	1	1,100	192	996	4	6	950	250	1,190
MD	5	12	500	155	261	2	730	1,500	1,115	689
ME	19	1	50	9	28	14	4	60	20	43
MI	9	1	200	54	150	3	45	75	53	22
MN	6	1	33	14	36	1	132	132	132	.
MO	1	45	45	45	.	1	158	158	158	.
MS	3	3	10	6	9	1	10	10	10	.
MT	7	1	20	7	19	6	1	35	11	32
NC	7	4	100	24	88	2	8	16	12	14
ND	4	1	9	4	10	2	1	6	3	9
NE	4	1	2	1	1	2	2	4	3	4
NH	3	1	200	91	265	1	3	3	3	.
NJ	3	5	81	19	61	2	15	30	18	17

(CONTINUED)

TABLE 10-84 (cont.)

Private Wells Within One Mile By State

Number and Population Served

	No. of Private Wells					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
NM	13	1	25	6	18	3	2	100	36	142
NV	1	3	3	3	.	0	.	.	.	.
NY	15	1	50	9	31	7	6	250	36	140
OH	13	1	50	14	39	8	5	150	58	123
OK	14	1	25	3	8	8	1	75	15	31
OR	4	1	20	8	21	1	60	60	60	.
PA	5	2	316	45	186	1	56	56	56	.
RI	1	1	1	1	.	0	.	.	.	.
SC	4	4	40	16	42	0	.	.	.	.
SD	2	1	2	2	2	2	5	412	209	734
TN	5	1	7	4	7	3	6	30	17	31
TX	29	1	50	6	25	10	2	31	11	29
UT	1	10	10	10	.	1	30	30	30	.
VA	11	3	53	19	38	7	24	154	68	125
VT	8	1	20	7	16	5	3	50	22	56
WA	9	1	20	8	15	3	15	100	34	69
WI	75	1	70	10	32	39	2	100	17	54
WV	4	1	45	13	54	3	2	135	50	189
WY	5	1	30	11	34	2	3	120	62	211
ALL	395	1	1,100	17	163	184	1	1,500	45	311

TABLE 10-85

Private Wells Within One Mile By Compact

Number and Population Served

	No. of Private Wells					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
COMPACT										
AP	15	1	500	54	207	6	2	1,500	168	868
C	36	1	30	3	13	19	1	80	13	47
CM	11	1	60	6	23	2	4	7	5	3
MA	8	1	1,100	192	996	4	6	950	250	1,190
ME	19	1	50	9	28	14	4	60	20	43
MW	123	1	200	12	54	59	1	158	26	92
NE	3	5	81	19	61	2	15	30	18	17
NH	3	1	200	91	265	1	3	3	3	.
NW	27	1	25	8	18	13	1	100	19	53
NY	15	1	50	9	31	7	6	250	36	140
RI	1	1	1	1	.	0	.	.	.	.
RM	19	1	30	7	22	5	2	120	46	150
SE	58	1	200	21	83	23	2	800	74	416
SW	20	1	150	15	83	14	1	600	97	457
TX	29	1	50	6	25	10	2	31	11	29
VT	8	1	20	7	16	5	3	50	22	56
ALL	395	1	1,100	17	163	184	1	1,500	45	311

TABLE 10-86

Public Wells Within One Mile By State

Number and Population Served

	No. of Public Wells					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AK	0	.	.	.	.	0	.	.	.	.
AL	1	1	1	1	.	1	7	7	7	.
CA	6	1	3	2	3	2	50	4,000	2,025	7,122
FL	1	3	3	3	.	1	75	75	75	.
GA	3	1	2	1	1	3	6	150	60	199
IL	2	1	1	1	0	0	.	.	.	.
KS	1	3	3	3	.	1	5,700	5,700	5,700	.
LA	1	3	3	3	.	1	2,100	2,100	2,100	.
MA	4	1	3	2	2	2	6,000	6,000	6,000	0
MD	2	1	10	3	10	0	.	.	.	.
ME	1	1	1	1	.	1	18	18	18	.
MI	0	.	.	.	.	1	2	2	2	.
MN	1	1	1	1	.	0	.	.	.	.
MT	2	1	2	2	2	1	100	100	100	.
ND	2	3	5	4	4	2	825	1,240	1,033	748
NE	1	1	1	1	.	1	4	4	4	.
NJ	2	4	17	11	12	0	.	.	.	.
NM	5	1	6	2	6	0	.	.	.	.
NV	0	.	.	.	.	0	.	.	.	.
NY	2	1	1	1	0	0	.	.	.	.
OH	2	3	15	9	22	2	12	55,000	27,506	99,143
OK	2	2	4	4	2	2	4,700	8,500	5,450	4,306
RI	1	1	1	1	.	0	.	.	.	.
SC	1	5	5	5	.	0	.	.	.	.
SD	1	1	1	1	.	1	2,000	2,000	2,000	.
TX	4	1	2	2	1	1	4,500	4,500	4,500	.
UT	1	1	1	1	.	1	1,200	1,200	1,200	.
VA	2	3	4	3	2	1	200	200	200	.
WA	1	1	1	1	.	1	180	180	180	.
WI	7	1	3	2	2	3	12	1,142	418	1,603
ALL	59	1	17	2	6	29	2	55,000	3,639	25,792

TABLE 10-87

Public Wells Within One Mile By Compact

Number and Population Served

	No. of Public Wells					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
COMPACT										
AP	2	1	10	3	10	0	.	.	.	.
C	5	1	4	3	3	5	4	8,500	3,437	6,575
CM	2	1	1	1	0	0	.	.	.	.
MA	4	1	3	2	2	2	6,000	6,000	6,000	0
ME	1	1	1	1	.	1	18	18	18	.
MW	10	1	15	3	11	6	2	55,000	9,378	57,000
NE	2	4	17	11	12	0	.	.	.	.
NW	4	1	2	1	1	3	100	1,200	599	1,457
NY	2	1	1	1	0	0	.	.	.	.
RI	1	1	1	1	.	0	.	.	.	.
RM	5	1	6	2	6	0	.	.	.	.
SE	8	1	5	3	4	6	6	200	87	194
SW	9	1	5	2	4	5	50	4,000	1,623	3,835
TX	4	1	2	2	1	1	4,500	4,500	4,500	.
ALL	59	1	17	2	6	29	2	55,000	3,639	25,792

TABLE 10-88

Rivers/Streams Within One Mile By State

Number and Population Served

	No. of Rivers/Streams					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AK	3	1	2	1	1	3	2	900	306	1,311
AZ	1	1	1	1	.	0	.	.	.	.
CA	2	1	1	1	0	0	.	.	.	.
GA	4	1	1	1	0	0	.	.	.	.
IL	1	1	1	1	.	0	.	.	.	.
IN	0	.	.	.	.	0	.	.	.	.
KS	3	1	1	1	0	2	2	250,000	49,375	283,283
ME	0	.	.	.	.	0	.	.	.	.
MN	1	2	2	2	.	0	.	.	.	.
MS	0	.	.	.	.	0	.	.	.	.
NC	4	1	1	1	0	1	150,000	150,000	150,000	.
NH	1	1	1	1	.	0	.	.	.	.
NY	2	1	1	1	0	0	.	.	.	.
OH	1	1	1	1	.	0	.	.	.	.
OK	1	1	1	1	.	0	.	.	.	.
OR	1	1	1	1	.	1	300	300	300	.
PA	2	1	1	1	0	0	.	.	.	.
TN	1	1	1	1	.	0	.	.	.	.
TX	5	1	2	1	1	2	3,200	12,000	7,600	15,866
VA	1	1	1	1	.	1	7,000	7,000	7,000	.
WA	1	1	1	1	.	0	.	.	.	.
WI	1	1	1	1	.	0	.	.	.	.
WY	1	1	1	1	.	0	.	.	.	.
ALL	37	1	2	1	1	10	2	250,000	14,350	118,302

TABLE 10-89

Rivers/Streams Within One Mile By Compact

Number and Population Served

	No. of Rivers/Streams					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
COMPACT										
AP	2	1	1	1	0	0	.	.	.	
C	4	1	1	1	0	2	2	250,000	49,375	283,283
CN	1	1	1	1	.	0	.	.	.	.
ME	0	.	.	.	.	0	.	.	.	.
MW	3	1	2	1	1	0	.	.	.	.
NH	1	1	1	1	.	0	.	.	.	.
NW	5	1	2	1	1	4	2	900	305	1,071
NY	2	1	1	1	0	0	.	.	.	.
RM	1	1	1	1	.	0	.	.	.	.
SE	10	1	1	1	0	2	7,000	150,000	35,242	162,039
SW	3	1	1	1	0	0	.	.	.	.
TX	5	1	2	1	1	2	3,200	12,000	7,600	15,866
ALL	37	1	2	1	1	10	2	250,000	14,350	118,302

TABLE 10-90

Lakes/Reservoirs Within One Mile By State

Number and Population Served

	No. of Lakes/Reservoirs					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AK	1	2	2	2	.	1	2	2	2	.
ME	2	1	2	2	2	1	1,475	1,475	1,475	.
MN	1	1	1	1	.	0	.	.	.	.
MS	0	.	.	.	.	0	.	.	.	.
NC	1	1	1	1	.	1	150,000	150,000	150,000	.
NY	1	1	1	1	.	0	.	.	.	.
OK	1	1	1	1	.	1	2,000	2,000	2,000	.
TX	3	1	1	1	0	2	3,200	20,000	11,600	30,290
VT	2	1	1	1	0	0	.	.	.	.
WI	1	1	1	1	.	1	774	774	774	.
ALL	13	1	2	1	1	7	2	150,000	11,445	75,293

TABLE 10-91

Lakes/Reservoirs Within One Mile By Compact

Number and Population Served

	No. of Lakes/Reservoirs					Population Served				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
COMPACT										
C	1	1	1	1	.	1	2,000	2,000	2,000	.
ME	2	1	2	2	2	1	1,475	1,475	1,475	.
MW	2	1	1	1	0	1	774	774	774	.
NW	1	2	2	2	.	1	2	2	2	.
NY	1	1	1	1	.	0	.	.	.	.
SE	1	1	1	1	.	1	150,000	150,000	150,000	.
TX	3	1	1	1	0	2	3,200	20,000	11,600	30,290
VT	2	1	1	1	0	0	.	.	.	.
ALL	13	1	2	1	1	7	2	150,000	11,445	75,293

TABLE 10-92

Population Served by Nearest Water Source By State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Private Well	N	0	1	2	1	8	0	1	4	9	0	8	3	3	1	7	2	1
	MEAN	.	2	3	10	5	.	1	3	11	.	10	3	3	13	3	3	6
	MIN	.	2	2	10	2	.	1	2	0	.	0	2	2	13	0	2	6
	MAX	.	2	4	10	10	.	1	3	56	.	50	4	7	13	12	3	6
	STD	.	.	4	.	6	.	.	1	45	.	42	3	4	.	10	2	.
Public Well	N	0	1	0	0	2	0	0	1	3	0	0	0	0	0	0	0	1
	MEAN	.	7	.	.	675	.	.	25	58	.	.	.	.	.	.	.	2,100
	MIN	.	7	.	.	50	.	.	25	0	.	.	.	.	.	.	.	2,100
	MAX	.	7	.	.	1,300	.	.	25	150	.	.	.	.	.	.	.	2,100
	STD	.	.	.	.	2,254	.	.	.	205	.	.	.	.	.	.	.	.
River/Stream	N	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MEAN	306	.	.	.	.	.	.	.	.	.	.	.	.	.	49,375	.	.
	MIN	2	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
	MAX	900	.	.	.	.	.	.	.	.	.	.	.	.	.	250,000	.	.
	STD	1,311	.	.	.	.	.	.	.	.	.	.	.	.	.	283,283	.	.
Lake/ Reservoir	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MEAN	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	MIN	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	MAX	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

(CONTINUED)

TABLE 10-92 (cont.)

Population Served by Nearest Water Source By State

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Private Well	N	3	3	14	5	2	1	1	6	3	2	2	1	0	1	0	6	9
	MEAN	18	6	4	3	3	2	10	4	501	3	3	3	.	0	.	5	14
	MIN	10	2	0	1	2	2	10	0	2	1	2	3	.	0	.	3	0
	MAX	35	12	12	6	4	2	10	11	1,500	6	4	3	.	0	.	8	60
	STD	37	7	8	3	4	.	.	10	2,205	9	4	.	.	.	.	5	46
Public Well	N	3	1	1	0	1	0	0	0	0	2	0	0	0	1	1	0	2
	MEAN	8,000	20	18	.	4,000	.	.	.	.	1,033	.	.	.	0	1,000	.	27,506
	MIN	6,000	20	18	.	4,000	.	.	.	.	825	.	.	.	0	1,000	.	12
	MAX	12,000	20	18	.	4,000	.	.	.	.	1,240	.	.	.	0	1,000	.	55,000
	STD	8,833	.	.	.	.	.	.	.	.	748	.	.	.	.	.	.	99,143
River/Stream	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	MEAN	.	.	.	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	MIN	.	.	.	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	MAX	.	.	.	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lake/ Reservoir	N	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	MEAN	.	.	740	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	MIN	.	.	740	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	MAX	.	.	740	.	.	.	.	.	150,000	.	.	.	.	.	.	.	.
	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

(CONTINUED)

TABLE 10-92 (cont.)

Population Served by Nearest Water Source By State

		STATE															
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	ALL
Private Well	N	9	2	5	0	2	2	2	12	1	5	7	4	47	3	1	212
	MEAN	2	4	4	.	2	5	4	3	6	15	6	22	6	2	3	14
	MIN	0	2	0	.	0	4	2	1	6	3	3	3	0	0	3	0
	MAX	5	5	9	.	4	5	4	8	6	150	12	50	140	4	3	1,500
	STD	2	5	7	.	7	2	2	6	.	89	9	53	51	5	.	264
Public Well	N	2	0	0	0	0	1	0	2	0	1	0	1	3	0	0	30
	MEAN	5,450	.	.	.	.	2,000	.	2,250	.	3,500	.	180	551	.	.	4,098
	MIN	4,700	.	.	.	.	2,000	.	0	.	3,500	.	180	12	.	.	0
	MAX	8,500	.	.	.	.	2,000	.	4,500	.	3,500	.	180	1,142	.	.	55,000
	STD	4,306	.	.	.	.	.	.	8,113	.	.	.	.	1,445	.	.	25,512
River/Stream	N	0	1	0	0	0	0	0	3	0	1	0	0	1	0	1	13
	MEAN	.	300	.	.	.	.	.	9,067	.	7,000	.	.	0	.	9,998	12,518
	MIN	.	300	.	.	.	.	.	3,200	.	7,000	.	.	0	.	9,998	0
	MAX	.	300	.	.	.	.	.	12,000	.	7,000	.	.	0	.	9,998	250,000
	STD	.	.	.	.	.	.	.	12,955	.	.	.	.	.	.	.	102,959
Lake/ Reservoir	N	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	6
	MEAN	.	.	.	.	.	.	.	11,600	.	.	.	.	774	.	.	11,748
	MIN	.	.	.	.	.	.	.	3,200	.	.	.	.	774	.	.	2
	MAX	.	.	.	.	.	.	.	20,000	.	.	.	.	774	.	.	150,000
	STD	.	.	.	.	.	.	.	30,290	.	.	.	.	.	.	.	82,423

TABLE 10-93

Population Served by Nearest Water Source By Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Private Well	N	12	21	5	3	14	73	0	1	16	6	0	2	27	13	12	7	212
	MEAN	3	3	3	18	4	7	.	3	7	5	.	2	68	5	3	6	14
	MIN	0	0	2	10	0	0	.	3	0	3	.	0	0	1	.	3	0
	MAX	12	12	7	35	12	140	.	3	50	8	.	3	1,500	10	8	12	1,500
	STD	6	6	3	37	8	46	.	.	30	5	.	5	732	7	6	9	264
Public Well	N	1	3	0	3	1	6	0	0	1	0	0	2	6	5	2	0	30
	MEAN	20	3,959	.	8,000	18	10,111	.	.	180	.	.	197	706	1,083	2,250	.	4,098
	MIN	20	2,100	.	6,000	18	12	.	.	180	.	.	0	0	50	0	.	0
	MAX	20	8,500	.	12,000	18	55,000	.	.	180	.	.	1,000	3,500	2,000	4,500	.	55,000
	S D	.	5,433	.	8,833	.	56,202	.	.	.	.	.	1,133	3,544	1,824	8,113	.	25,512
River/Stream	N	0	2	0	0	0	1	0	0	4	0	0	1	2	0	3	0	13
	MEAN	.	49,375	.	.	.	0	.	.	305	.	.	9,998	35,242	.	9,067	.	12,518
	MIN	.	2	.	.	.	0	.	.	2	.	.	9,998	7,000	.	3,200	.	0
	MAX	.	250,000	.	.	.	0	.	.	900	.	.	9,998	150,000	.	12,000	.	250,000
	STD	.	283,283	.	.	.	.	.	.	1,071	.	.	.	162,039	.	12,955	.	102,959
Lake/ Reservoir	N	0	0	0	0	1	1	0	0	1	0	0	0	1	0	2	0	6
	MEAN	.	.	.	.	740	774	.	.	2	.	.	.	150,000	.	11,600	.	11,748
	MIN	.	.	.	.	740	774	.	.	2	.	.	.	150,000	.	3,200	.	2
	MAX	.	.	.	.	740	774	.	.	2	.	.	.	150,000	.	20,000	.	150,000
	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	30,290	.	82,423

TABLE 10-94

Monitoring Systems

Media Monitored		Percent which Monitor
Gas		5%
Ground Water		34%
Individual Units	39%	
Facility	84%	
Air		2%
Surface Water		14%

TABLE 10-95

Percentage of Facilities That Monitor Landfill Gas

(By State)

Row Pct	Yes	No
AK	0.00	100.00
AL	1.43	98.57
AR	0.00	100.00
AZ	2.98	97.02
CA	19.91	80.09
CT	0.00	100.00
DE	100.00	0.00
FL	18.15	81.85
GA	2.29	97.71
HI	0.00	100.00
IA	6.56	93.44
ID	0.00	100.00
IL	2.99	97.01
IN	3.28	96.72
KS	0.00	100.00
KY	6.67	93.33
LA	17.43	82.57
MA	21.17	78.83
MD	6.18	93.82
ME	2.56	97.44
MI	6.44	93.56
MN	0.00	100.00
MO	5.19	94.81
MS	0.00	100.00
MT	0.00	100.00

(Continued)

TABLE 10-95 (cont.)

Percentage of Facilities That Monitor Landfill Gas (By State)

Row Pct	Yes	No
NC	7.92	92.08
ND	0.00	100.00
NE	13.80	86.20
NH	0.00	100.00
NJ	31.85	68.15
NM	0.78	99.22
NV	0.00	100.00
NY	5.44	94.56
OH	11.76	88.24
OK	3.90	96.10
OR	0.00	100.00
PA	36.02	63.98
RI	0.00	100.00
SC	0.00	100.00
SD	0.00	100.00
TN	6.90	93.10
TX	3.18	96.82
UT	0.00	100.00
VA	13.30	86.70
VT	7.69	92.31
WA	24.96	75.04
WI	2.24	97.76
WV	0.00	100.00
WY	0.00	100.00

Frequency Missing = 3.2

TABLE 10-96

Percentage of Facilities That
Monitor Air
(By State)

Row Pct	Yes	No
AK	0.00	100.00
AL	2.82	97.18
AR	8.33	91.67
AZ	0.00	100.00
CA	8.56	91.44
CT	0.00	100.00
DE	50.00	50.00
FL	0.00	100.00
GA	0.00	100.00
HI	0.00	100.00
IA	0.00	100.00
ID	0.00	100.00
IL	0.00	100.00
IN	0.00	100.00
KS	0.00	100.00
KY	0.00	100.00
LA	21.72	78.28
MA	0.00	100.00
MD	6.18	93.82
ME	0.00	100.00
MI	2.15	97.85
MN	0.00	100.00
MO	0.00	100.00
MS	0.00	100.00
MT	0.00	100.00

(Continued)

TABLE 10-96 (cont.)

Percentage of Facilities That
Monitor Air
(By State)

Row Pct	Yes	No
NC	6.35	93.65
ND	0.00	100.00
NE	0.00	100.00
NH	0.00	100.00
NJ	3.95	96.05
NM	9.45	90.55
NV	0.00	100.00
NY	2.04	97.96
OH	6.57	93.43
OK	0.00	100.00
OR	0.00	100.00
PA	10.69	89.31
RI	0.00	100.00
SC	0.00	100.00
SD	0.00	100.00
TN	0.00	100.00
TX	2.73	97.27
UT	0.00	100.00
VA	11.99	88.01
VT	7.69	92.31
WA	2.46	97.54
WI	0.19	99.81
WV	0.00	100.00
WY	0.00	100.00

Frequency Missing = 35.707579707

TABLE 10-97

Percentage of Facilities
That Monitor Groundwater
(By State)

Row Pct	Yes	No
AK	9.68	90.32
AL	94.27	5.73
AR	16.67	83.33
AZ	2.98	97.02
CA	44.18	55.82
CT	100.00	0.00
DE	100.00	0.00
FL	93.02	6.98
GA	44.20	55.80
HI	0.00	100.00
IA	100.00	0.00
ID	0.00	100.00
IL	81.79	18.21
IN	59.96	40.04
KS	34.41	65.59
KY	26.67	73.33
LA	43.43	56.57
MA	51.49	48.51
MD	100.00	0.00
ME	23.08	76.92
MI	82.55	17.45
MN	87.09	12.91
MO	39.81	60.19
MS	7.69	92.31
MT	11.11	88.89

(Continued)

TABLE 10-97 (cont.)

Percentage of Facilities
That Monitor Groundwater
(By State)

Row Pct	Yes	No
NC	61.88	38.12
ND	5.56	94.44
NE	17.20	82.80
NH	86.20	13.80
NJ	100.00	0.00
NM	0.00	100.00
NV	2.99	97.01
NY	41.32	58.68
OH	40.71	59.29
OK	48.57	51.43
OR	15.11	84.89
PA	89.31	10.69
RI	100.00	0.00
SC	100.00	0.00
SD	50.00	50.00
TN	58.60	41.40
TX	11.34	88.66
UT	0.00	100.00
VA	46.63	53.37
VT	61.54	38.46
WA	49.92	50.08
WI	13.52	86.48
WV	11.11	88.89
WY	25.00	75.00

TABLE 10-98

Percentage of Facilities
That Monitor Groundwater for
Individual Units

(By State)

Row Pct	Yes	No
AK	0.00	100.00
AL	69.49	30.51
AR	100.00	0.00
AZ	0.00	100.00
CA	30.61	69.39
CT	100.00	0.00
DE	100.00	0.00
FL	20.00	80.00
GA	28.08	71.92
HI	.	.
IA	67.20	32.80
ID	.	.
IL	38.81	61.19
IN	27.74	72.26
KS	62.50	37.50
KY	75.00	25.00
LA	0.00	100.00
MA	50.00	50.00
MD	56.37	43.63
ME	33.33	66.67
MI	17.64	82.36
MN	47.79	52.21
MO	12.40	87.60
MS	100.00	0.00
MT	0.00	100.00

(Continued)

TABLE 10-98 (cont.)

Percentage of Facilities
That Monitor Groundwater for
Individual Units

(By State)

Row Pct	Yes	No
NC	46.13	53.87
ND	100.00	0.00
NE	0.00	100.00
NH	32.02	67.98
NJ	23.95	76.05
NM	.	.
NV	100.00	0.00
NY	41.10	58.90
OH	22.51	77.49
OK	47.33	52.67
OR	0.00	100.00
PA	14.92	85.08
RI	80.25	19.75
SC	0.00	100.00
SD	33.33	66.67
TN	35.33	64.67
TX	56.57	43.43
UT	.	.
VA	14.67	85.33
VT	62.50	37.50
WA	4.94	95.06
WI	27.90	72.10
WV	100.00	0.00
WY	33.33	66.67

Frequency Missing = 3841.6345518

TABLE 10-99

Percentage of Facilities That Monitor Groundwater on a Facility-Wide Basis (By State)

Row Pct	Yes	No
AK	100.00	0.00
AL	64.07	35.93
AR	100.00	0.00
AZ	100.00	0.00
CA	91.92	8.08
CT	0.00	100.00
DE	100.00	0.00
FL	100.00	0.00
GA	85.96	14.04
HI	.	.
IA	73.76	26.24
ID	.	.
IL	85.16	14.84
IN	100.00	0.00
KS	37.50	62.50
KY	50.00	50.00
LA	100.00	0.00
MA	88.22	11.78
MD	100.00	0.00
ME	62.50	37.50
MI	97.40	2.60
MN	100.00	0.00
MO	100.00	0.00
MS	.	.
MT	100.00	0.00

(Continued)

TABLE 10-99 (cont.)

Percentage of Facilities That Monitor Groundwater on a Facility-Wide Basis (By State)

Row Pct	Yes	No
NC	62.85	37.15
ND	100.00	0.00
NE	100.00	0.00
NH	100.00	0.00
NJ	100.00	0.00
NM	.	.
NV	0.00	100.00
NY	78.51	21.49
OH	83.86	16.14
OK	89.28	10.72
OR	100.00	0.00
PA	100.00	0.00
RI	100.00	0.00
SC	100.00	0.00
SD	66.67	33.33
TN	64.67	35.33
TX	73.98	26.02
UT	.	.
VA	100.00	0.00
VT	62.50	37.50
WA	100.00	0.00
WI	94.44	5.56
WV	100.00	0.00
WY	100.00	0.00

Frequency Missing = 3822.2315199

TABLE 10-100

Percentage of Facilities That Monitor Surface Water (By State)

Row Pct	Yes	No
AK	0.00	100.00
AL	32.86	67.14
AR	16.67	83.33
AZ	0.00	100.00
CA	12.82	87.18
CT	100.00	0.00
DE	50.00	50.00
FL	35.55	64.45
GA	53.46	46.54
HI	0.00	100.00
IA	40.97	59.03
ID	0.00	100.00
IL	36.32	63.68
IN	3.28	96.72
KS	9.66	90.34
KY	13.33	86.67
LA	21.72	78.28
MA	25.75	74.25
MD	43.63	56.37
ME	10.53	89.47
MI	17.31	82.69
MN	58.09	41.91
MO	29.94	70.06
MS	0.00	100.00
MT	5.56	94.44

(Continued)

TABLE 10-100 (cont.)

Percentage of Facilities That Monitor Surface Water (By State)

Row Pct	Yes	No
NC	39.69	60.31
ND	0.00	100.00
NE	3.40	96.60
NH	27.60	72.40
NJ	20.00	80.00
NM	0.00	100.00
NV	0.00	100.00
NY	9.62	90.38
OH	30.48	69.52
OK	24.90	75.10
OR	2.98	97.02
PA	7.89	92.11
RI	19.75	80.25
SC	20.00	80.00
SD	0.00	100.00
TN	8.60	91.40
TX	1.82	98.18
UT	0.00	100.00
VA	42.24	57.76
VT	38.46	61.54
WA	7.39	92.61
WI	4.50	95.50
WV	22.22	77.78
WY	0.00	100.00

Frequency Missing = 19.504547824

TABLE 10-101

Percentage of Facilities That Monitor Landfill Gas (By Compact)

Row Pct	Yes	No
AP	17.99	82.01
C	4.08	95.92
CM	4.74	95.26
MA	21.17	78.83
ME	2.56	97.44
MW	3.75	96.25
NE	30.64	69.36
NH	0.00	100.00
NW	3.25	96.75
NY	5.44	94.56
RI	0.00	100.00
RM	0.47	99.53
SE	6.37	93.63
SW	10.72	89.28
TX	3.18	96.82
VT	7.69	92.31

Frequency Missing = 3.2

TABLE 10-102

Percentage of Facilities That Monitor Air (By Compact)

Row Pct	Yes	No
AP	6.54	93.46
C	3.40	96.60
CM	0.00	100.00
MA	0.00	100.00
ME	0.00	100.00
MW	0.88	99.12
NE	3.80	96.20
NH	0.00	100.00
NW	0.33	99.67
NY	2.04	97.96
RI	0.00	100.00
RM	5.77	94.23
SE	2.88	97.12
SW	4.44	95.56
TX	2.73	97.27
VT	7.69	92.31

Frequency Missing = 35.707579707

TABLE 10-103

Percentage of Facilities That Monitor Groundwater (By Compact)

Row Pct	Yes	No
AP	60.58	39.42
C	34.14	65.86
CM	55.52	44.48
MA	51.49	48.51
ME	23.08	76.92
MW	32.00	68.00
NE	100.00	0.00
NH	86.20	13.80
NW	12.68	87.32
NY	41.32	58.68
RI	100.00	0.00
RM	6.25	93.75
SE	58.79	41.21
SW	29.29	70.71
TX	11.34	88.66
VT	61.54	38.46

TABLE 10-104

Percentage of Facilities That Monitor Groundwater for Individual Units (By Compact)

Row Pct	Yes	No
AP	36.04	63.96
C	49.53	50.47
CM	47.09	52.91
MA	50.00	50.00
ME	33.33	66.67
MW	37.03	62.97
NE	26.84	73.16
NH	32.02	67.98
NW	2.82	97.18
NY	41.10	58.90
RI	80.25	19.75
RM	38.39	61.61
SE	35.56	64.44
SW	34.17	65.83
TX	56.57	43.43
VT	62.50	37.50

Frequency Missing = 3841.6345518

TABLE 10-105

Percentage of Facilities That Monitor Groundwater on a Facility-Wide Basis (By Compact)

Row Pct	Yes	No
AP	100.00	0.00
C	73.89	26.11
CM	77.11	22.89
MA	88.22	11.78
ME	62.50	37.50
MW	89.64	10.36
NE	96.20	3.80
NH	100.00	0.00
NW	100.00	0.00
NY	78.51	21.49
RI	100.00	0.00
RM	92.42	7.58
SE	81.23	18.77
SW	88.58	11.42
TX	73.98	26.02
VT	62.50	37.50

Frequency Missing = 3822.2315199

TABLE 10-106

Percentage of Facilities That Monitor Surface Water (By Compact)

Row Pct	Yes	No
AP	20.69	79.31
C	15.56	84.44
CM	25.37	74.63
MA	25.75	74.25
ME	10.53	89.47
MW	13.10	86.90
NE	23.04	76.96
NH	27.60	72.40
NW	2.59	97.41
NY	9.62	90.38
RI	19.75	80.25
RM	0.00	100.00
SE	33.89	66.11
SW	6.66	93.34
TX	1.82	98.18
VT	38.46	61.54

Frequency Missing = 19.504547824

TABLE 10-107

Contaminants Monitored in Ground Water

Frequency	Contaminant/Parameter
>50%	Conductivity
	pH
	Iron
	Chloride
40% - 50%	Alkalinity
	Chemical Oxygen Demand
	Cadmium
	Chromium
	Lead
	Manganese
	Nitrate
	Sulfate
30% - 40%	Hardness
	Temperature
	Total Dissolved Solids
	Total Organic Carbon
	Arsenic
	Copper
	Mercury
	Zinc
	Sodium
30% - 30%	Color
	Turbidity
	Barium
	Selenium
	Silver
	Ammonia
	Nitrite
	Calcium
	Fluoride
	Magnesium
10% - 20%	Acidity
	Biologial Oxygen Demand
	Odor
	Total Suspended Solids
	Nickel
	Total Kjeldahl Nitrogen
	Benzene
	Carbon Tetrachloride
	Chlorobenzene
	Dichloroethanes

TABLE 10-107 (Continued)

Contaminants Monitored in Ground Water

Frequency	Contaminant/Parameter
10% - 20% (Cont.)	Ethyebenzene
	Methyl Chloride
	Phenols
	Tetrachloroethanes
	Tetrachloroethene
	Toluene
	Trichloroethanes
	Vinyl Chloride
	Other Organics
	Xylene
	Phosphate
	Potassium
	Fecal Coliform
10% or less	Oil and Grease
	Oxidation-Reduction Potential
	Taste
	Volatile Solids
	Aluminum
	Silicon
	Organic Nitrogen
	Acetone
	Methyl Ethyl Ketone
	Methyl Isobutyl Ketone
	Pentachlorophenol
	PCBs
	Styrene
	Tetrahydrofuran
	Total Trihalomethanes
	Volatile Acids
	Cyanide
	Fecal Streptococcus
	Lignins
	Tannins
	Total Coliforms

TABLE 10-108

Upgradient Monitoring Wells By State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
Number	N	2	24	2	1	29	1	2	23	14	0	16	0	18	5	8	4	4
	MEAN	1	2	3	2	1	2	14	3	1	.	2	.	2	2	1	1	2
	MIN	0	0	2	2	0	2	10	0	0	.	0	.	0	1	0	0	1
	MAX	1	4	3	2	8	2	17	40	2	.	7	.	10	5	2	2	9
	STD	1	3	2	.	2	.	6	11	2	.	5	.	4	3	2	2	5
Average Depth (ft)	N	1	22	2	1	19	1	2	20	8	0	11	0	15	5	6	3	4
	MEAN	31	87	40	120	131	12	73	50	61	.	46	.	92	45	35	48	37
	MIN	31	10	10	120	20	12	65	6	25	.	15	.	12	25	12	25	22
	MAX	31	400	70	120	345	12	81	180	150	.	120	.	548	100	50	80	41
	STD	.	210	108	.	214	.	14	88	99	.	88	.	329	44	32	72	17
Sampling Episodes per Year	N	1	21	2	1	19	1	2	22	8	0	12	0	15	5	6	3	4
	MEAN	4	2	3	4	6	4	4	4	2	.	2	.	4	4	4	4	2
	MIN	4	1	2	4	1	4	4	4	1	.	2	.	4	4	1	2	2
	MAX	4	4	4	4	18	4	4	4	4	.	4	.	8	4	12	7	2
	STD	.	1	4	.	10	.	0	0	3	.	2	.	3	0	11	6	0
Number of Samples Per Well	N	1	22	2	1	19	1	2	21	8	0	12	0	15	5	5	3	3
	MEAN	1	2	2	1	3	1	5	2	3	.	1	.	2	1	1	3	1
	MIN	1	1	1	1	1	1	4	1	1	.	1	.	1	1	1	1	1
	MAX	1	30	3	1	12	1	7	15	8	.	2	.	6	1	2	5	2
	STD	.	8	4	.	6	.	3	4	6	.	1	.	4	0	1	5	1
Maximum No. of Years Sampled	N	1	22	2	1	19	1	2	22	7	0	12	0	15	5	5	2	4
	MEAN	2	7	4	6	6	2	5	5	2	.	9	.	9	4	6	5	1
	MIN	2	2	3	6	0	2	2	0	0	.	3	.	2	1	1	1	0
	MAX	2	15	5	6	16	2	7	15	5	.	14	.	13	10	12	8	10
	STD	.	6	4	.	11	.	4	8	4	.	7	.	8	7	10	13	7

TABLE 10-108 (cont.)

Upgradient Monitoring Wells By State

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Number	N	10	6	7	17	8	5	1	2	11	1	2	7	10	0	1	23	13
	MEAN	4	4	4	4	2	2	0	0	1	7	7	1	2	.	1	3	1
	MIN	0	0	0	0	0	0	0	0	0	7	1	0	1	.	1	1	0
	MAX	20	21	17	16	3	14	0	0	8	7	9	2	8	.	1	45	4
	STD	15	11	15	9	3	8	.	0	3	.	9	2	3	.	.	12	2
Average Depth (ft)	N	8	4	5	16	7	3	0	0	8	1	2	5	10	0	0	21	8
	MEAN	37	54	34	60	54	38	.	.	35	20	39	35	42	.	.	59	68
	MIN	17	23	11	15	27	15	.	.	18	20	30	15	20	.	.	5	30
	MAX	60	150	50	150	100	80	.	.	80	20	78	81	125	.	.	600	121
	STD	35	91	38	69	67	46	.	.	51	.	54	55	61	.	.	172	57
Sampling Episodes per Year	N	6	6	6	15	7	3	0	0	8	0	2	5	10	0	0	19	8
	MEAN	3	3	4	4	3	4	.	.	2	.	4	3	4	.	.	3	3
	MIN	2	2	2	3	3	4	.	.	1	.	3	2	4	.	.	1	2
	MAX	4	12	4	4	4	4	.	.	4	.	4	4	4	.	.	4	12
	STD	2	5	2	1	1	0	.	.	3	.	1	3	0	.	.	3	5
Number of Samples Per Well	N	7	3	5	15	7	3	0	0	7	1	2	5	8	0	0	16	8
	MEAN	5	2	1	3	1	1	.	.	2	2	3	1	1	.	.	2	3
	MIN	1	1	1	1	1	1	.	.	1	2	1	1	1	.	.	1	1
	MAX	11	2	2	12	3	1	.	.	8	2	10	3	1	.	.	5	7
	STD	8	1	1	7	1	0	.	.	6	.	10	2	0	.	.	3	5
Maximum No. of Years Sampled	N	8	5	6	15	7	3	0	0	8	1	2	5	10	0	0	21	8
	MEAN	5	5	6	6	7	5	.	.	5	1	4	2	5	.	.	5	4
	MIN	0	2	2	3	2	3	.	.	1	1	2	1	1	.	.	1	2
	MAX	12	8	15	9	18	7	.	.	13	1	5	3	16	.	.	13	7
	STD	11	3	13	5	13	3	.	.	11	.	3	3	12	.	.	7	3

TABLE 10-108 (cont.)

Upgradient Monitoring Wells By State

		STATE															
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	ALL
Number	N	22	2	13	2	5	2	10	16	0	11	8	8	20	1	2	399
	MEAN	1	4	2	4	3	8	2	2	.	1	1	1	3	2	3	2
	MIN	0	1	1	3	1	5	0	0	.	0	0	0	0	2	1	0
	MAX	8	5	5	4	8	11	10	5	.	2	6	8	40	2	5	45
	STD	3	5	3	1	8	11	8	3	.	1	5	4	13	.	7	7
Average Depth (ft)	N	18	2	12	2	5	2	6	15	0	8	4	6	18	1	2	319
	MEAN	51	83	137	19	49	114	74	50	.	59	78	81	64	30	40	63
	MIN	18	15	25	15	11	28	20	20	.	15	25	20	8	30	20	5
	MAX	200	100	300	35	160	200	150	160	.	120	192	127	315	30	60	600
	STD	65	96	192	23	161	310	108	85	.	98	197	69	171	.	72	149
Sampling Episodes per Year	N	20	2	13	2	5	2	7	15	0	9	4	6	19	1	2	324
	MEAN	4	4	4	4	3	2	2	2	.	4	3	4	4	1	8	3
	MIN	1	4	4	4	2	1	1	1	.	2	2	4	2	1	4	1
	MAX	18	4	4	4	4	2	4	4	.	4	6	4	4	1	12	18
	STD	5	0	0	0	3	2	2	2	.	2	5	0	2	.	14	4
Number of Samples Per Well	N	18	2	13	2	5	2	7	14	0	8	2	6	19	1	2	308
	MEAN	3	2	1	3	1	2	3	2	.	2	1	2	1	1	1	2
	MIN	1	1	1	3	1	1	1	1	.	1	1	1	1	1	1	1
	MAX	26	2	4	4	2	3	9	6	.	4	1	9	4	1	1	30
	STD	8	1	1	1	1	4	5	3	.	3	0	4	2	.	0	5
Maximum No. of Years Sampled	N	19	2	13	2	5	2	7	13	0	9	4	6	19	1	2	323
	MEAN	2	2	7	6	4	6	5	3	.	3	5	4	4	5	2	5
	MIN	1	1	0	6	2	1	2	0	.	1	2	3	0	5	1	0
	MAX	8	4	15	7	7	12	11	6	.	5	7	10	11	5	2	18
	STD	3	3	11	1	6	20	7	5	.	4	6	4	8	.	2	8

TABLE 10-109

Upgradient Monitoring Wells By Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NH	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Number	N	22	38	22	10	7	84	11	7	14	23	2	3	99	33	16	8	399
	MEAN	3	2	2	4	4	2	2	1	1	3	4	3	2	2	2	1	2
	MIN	0	0	0	0	0	0	1	0	0	1	3	1	0	0	0	0	0
	MAX	21	9	10	20	17	40	8	2	8	45	4	5	40	11	5	6	45
	STD	7	4	4	15	15	8	3	2	4	12	1	5	6	5	3	5	7
Average Depth (ft)	N	19	32	18	8	5	68	11	5	9	21	2	2	77	23	15	4	319
	MEAN	112	42	82	37	34	57	41	35	72	59	19	40	62	120	50	78	63
	MIN	23	10	12	17	11	8	12	15	15	5	15	20	6	20	20	25	5
	MAX	300	200	548	60	50	315	125	81	127	600	35	60	400	345	160	192	600
	STD	175	56	302	35	38	104	59	55	76	172	23	72	141	212	85	197	149
Sampling Episodes per Year	N	22	34	18	6	6	69	11	5	9	19	2	2	80	22	15	4	324
	MEAN	4	4	4	3	4	3	4	3	4	3	4	8	3	5	2	3	3
	MIN	1	1	2	2	2	2	4	2	4	1	4	4	1	1	1	2	1
	MAX	12	18	8	4	4	12	4	4	4	4	4	12	4	18	4	6	18
	STD	3	6	3	2	2	2	0	3	0	3	0	14	3	10	2	5	4
Number of Samples Per Well	N	19	30	18	7	5	69	9	5	9	16	2	2	78	23	14	2	308
	MEAN	1	2	2	5	1	2	1	1	2	2	3	1	2	3	2	1	2
	MIN	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1
	MAX	7	26	6	11	2	12	1	3	9	5	4	1	30	12	6	1	30
	STD	2	6	4	8	1	4	0	2	3	3	1	0	6	6	3	0	5
Maximum No. of Years Sampled	N	21	32	17	8	6	69	11	5	9	21	2	2	[illegible]	23	13	4	323
	MEAN	6	3	8	5	6	6	5	2	3	5	6	2	5	6	3	5	5
	MIN	0	0	1	0	2	0	1	1	1	1	6	1	0	0	0	2	0
	MAX	15	12	13	12	15	18	16	3	10	13	7	2	15	16	6	7	18
	STD	9	6	9	11	13	8	11	3	4	7	1	2	8	11	5	6	8

TABLE 10-110

Downgradient Monitoring Wells By State

		STATE																
		AK	AL	AR	AZ	CA	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KT	LA
Number	N	2	24	2	1	29	1	2	23	14	0	16	0	18	5	8	4	4
	MEAN	2	2	3	5	3	2	12	7	2	.	3	.	3	4	4	2	5
	MIN	2	0	2	5	0	2	11	0	0	.	1	.	0	3	0	0	2
	MAX	3	12	4	5	22	2	13	45	5	.	7	.	7	5	15	3	7
	STD	1	3	4	.	6	.	2	16	4	.	4	.	5	2	12	3	5
Average Depth (ft)	N	2	21	2	1	28	1	2	20	11	0	15	0	17	5	7	2	4
	MEAN	44	57	30	120	73	20	70	53	51	.	33	.	83	59	47	35	35
	MIN	31	8	10	120	19	20	65	6	10	.	10	.	10	25	12	30	21
	MAX	69	250	50	120	210	20	74	250	150	.	100	.	548	100	92	40	40
	STD	56	98	72	.	105	.	8	126	108	.	67	.	315	54	63	18	16
Sampling Episodes per Year	N	2	20	2	1	25	1	2	21	11	0	15	0	17	5	7	3	4
	MEAN	4	2	3	4	7	4	4	4	2	.	2	.	4	4	3	3	2
	MIN	4	2	2	4	1	4	4	4	1	.	2	.	4	4	1	2	2
	MAX	4	4	4	4	18	4	4	4	4	.	4	.	8	4	12	4	2
	STD	0	1	4	.	9	.	0	0	2	.	1	.	2	0	11	3	0
Number of Samples Per Well	N	2	19	2	1	24	1	2	20	11	0	15	0	17	5	7	2	3
	MEAN	2	2	2	1	6	1	5	2	2	.	1	.	1	1	1	2	1
	MIN	1	1	1	1	1	1	4	1	1	.	1	.	1	1	1	1	1
	MAX	5	30	2	1	46	1	7	15	8	.	2	.	5	1	2	3	2
	STD	6	9	2	.	23	.	3	4	6	.	1	.	2	0	1	4	1
Maximum No. of Years Sampled	N	2	20	2	1	26	1	2	21	10	0	15	0	17	5	7	2	4
	MEAN	3	7	4	6	7	2	5	6	3	.	9	.	9	5	6	8	1
	MIN	2	2	3	6	0	2	2	0	1	.	2	.	3	2	1	5	0
	MAX	5	15	5	6	22	2	7	15	5	.	14	.	13	10	15	10	10
	STD	4	8	4	.	10	.	4	8	4	.	8	.	8	6	13	9	7

TABLE 10-110 (cont.)

Downgradient Monitoring Wells By State

		STATE																
		MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH
Number	N	10	6	8	17	8	5	1	2	10	1	2	7	10	0	1	23	13
	MEAN	8	6	5	6	5	2	3	1	2	25	7	4	4	.	0	6	3
	MIN	0	2	0	0	1	1	3	1	0	25	3	1	1	.	0	1	1
	MAX	29	21	17	24	12	9	3	1	3	25	8	6	25	.	0	54	12
	STD	21	13	14	11	8	5	.	0	2	.	6	4	11	.	.	21	5
Average Depth (ft)	N	9	5	7	16	8	5	1	2	9	1	2	7	10	0	0	22	13
	MEAN	35	48	32	62	38	54	100	14	50	20	30	32	41	.	.	55	106
	MIN	5	23	5	6	15	15	100	12	18	20	30	10	20	.	.	5	23
	MAX	75	150	75	150	78	80	100	15	200	20	32	76	125	.	.	500	300
	STD	55	74	59	75	45	49	.	5	112	.	2	41	64	.	.	141	196
Sampling Episodes per Year	N	8	7	7	15	8	5	0	0	10	0	2	7	10	0	0	19	13
	MEAN	4	3	3	4	3	4	.	.	2	.	4	3	4	.	.	3	3
	MIN	3	2	2	3	3	4	.	.	1	.	3	1	4	.	.	1	1
	MAX	4	12	4	4	4	4	.	.	4	.	4	6	4	.	.	4	12
	STD	1	5	2	1	1	0	.	.	3	.	1	4	0	.	.	3	4
Number of Samples Per Well	N	9	4	5	15	8	5	0	1	9	1	2	6	8	0	0	15	13
	MEAN	3	2	1	4	1	1	.	4	2	2	3	1	1	.	.	2	2
	MIN	1	1	1	1	1	1	.	4	1	2	1	1	1	.	.	1	1
	MAX	11	2	2	12	3	1	.	4	8	2	10	3	1	.	.	5	7
	STD	9	1	1	7	1	0	.	.	6	.	10	2	0	.	.	3	4
Maximum No. of Years Sampled	N	9	6	7	15	8	5	1	1	10	1	2	7	10	0	0	21	13
	MEAN	4	5	5	6	7	4	8	1	6	1	4	2	5	.	.	5	4
	MIN	0	2	2	3	2	0	8	1	1	1	2	1	1	.	.	1	1
	MAX	12	8	15	9	14	12	8	1	14	1	5	5	16	.	.	13	7
	STD	8	3	12	4	11	8	.	.	13	.	3	4	11	.	.	6	3

TABLE 10-110 (cont.)

Downgradient Monitoring Wells By State

		STATE															
		OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	ALL
Number	N	22	2	13	2	5	2	10	16	0	11	8	8	20	1	2	399
	MEAN	2	4	4	4	5	9	2	3	.	3	3	4	7	0	2	4
	MIN	1	4	0	1	0	0	0	0	.	0	0	1	1	0	1	0
	MAX	8	6	16	18	9	17	4	10	.	9	5	14	60	0	2	64
	STD	2	2	7	19	8	31	3	6	.	5	5	6	23	.	2	11
Average Depth (ft)	N	20	2	10	2	4	1	8	14	0	9	6	7	18	0	2	358
	MEAN	42	83	134	17	24	28	83	40	.	40	30	115	61	.	40	55
	MIN	18	15	25	15	13	28	20	20	.	15	7	30	15	.	20	5
	MAX	200	100	300	23	50	28	175	65	.	100	60	200	377	.	60	548
	STD	51	96	210	9	45	.	138	33	.	65	54	129	206	.	72	132
Sampling Episodes per Year	N	22	2	11	2	4	1	9	14	0	10	6	8	20	0	2	358
	MEAN	4	4	4	4	4	1	2	2	.	4	2	3	4	.	8	3
	MIN	1	4	4	4	2	1	1	1	.	1	1	1	2	.	4	1
	MAX	36	4	4	4	4	1	4	4	.	6	3	12	4	.	12	36
	STD	9	0	0	0	3	.	2	2	.	3	2	5	2	.	14	5
Number of Samples Per Well	N	20	2	11	2	4	1	9	13	0	9	5	8	20	0	2	338
	MEAN	3	2	1	3	1	1	3	2	.	2	2	2	1	.	1	2
	MIN	1	1	1	3	1	1	1	1	.	1	1	1	1	.	1	1
	MAX	26	2	4	4	2	1	9	6	.	4	8	9	4	.	1	46
	STD	8	1	1	1	1	.	4	4	.	3	8	4	2	.	0	8
Maximum No. of Years Sampled	N	21	2	11	2	4	1	9	12	0	10	7	8	20	0	2	360
	MEAN	3	2	8	6	3	1	4	3	.	3	6	4	5	.	2	5
	MIN	1	1	0	6	2	1	2	0	.	1	2	3	0	.	1	0
	MAX	8	4	15	7	5	1	11	6	.	9	7	10	11	.	2	22
	STD	3	3	11	1	4	.	7	5	.	4	5	4	9	.	2	8

TABLE 10-111

Downgradient Monitoring Wells By Compact

		COMPACT																
		AP	C	CM	MA	ME	MW	NE	NN	NW	NY	RI	RM	SE	SW	TX	VT	ALL
Number	N	22	38	22	10	8	84	11	7	14	23	2	3	98	33	16	8	399
	MEAN	4	3	3	8	5	5	4	4	3	6	4	1	3	5	3	3	4
	MIN	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	MAX	21	15	7	29	17	60	25	6	14	64	18	2	45	25	10	5	64
	STD	9	6	5	21	14	13	10	4	5	21	19	2	9	13	6	5	11
Average Depth (ft)	N	17	35	19	9	7	80	11	7	13	22	2	2	83	31	14	6	358
	MEAN	110	41	77	35	32	57	40	32	75	55	17	40	54	68	40	30	55
	MIN	23	10	10	5	5	6	20	10	12	5	15	20	6	19	20	7	5
	MAX	300	200	548	75	75	377	125	76	200	500	23	60	250	210	65	60	548
	STD	176	50	297	55	59	140	62	41	133	141	9	72	109	104	33	54	132
Sampling Episodes per Year	N	20	37	20	8	7	81	11	7	12	19	2	2	85	27	14	6	358
	MEAN	4	4	4	4	3	3	4	3	4	3	4	8	3	6	2	2	3
	MIN	2	1	2	3	2	1	4	1	1	1	4	4	1	1	1	1	1
	MAX	12	36	8	4	4	12	4	6	12	4	4	12	6	18	4	3	36
	STD	3	8	3	1	2	2	0	4	4	3	0	14	3	9	2	2	5
Number of Samples Per Well	N	17	34	19	9	5	81	9	6	13	15	2	2	81	27	13	5	338
	MEAN	2	2	1	3	1	2	1	1	2	2	3	1	2	6	2	2	2
	MIN	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1
	MAX	7	26	5	11	2	12	1	3	9	5	4	1	30	46	6	8	46
	STD	2	6	2	9	1	4	0	2	4	3	1	0	6	22	4	8	8
Maximum No. of Years Sampled	N	19	36	19	9	7	81	11	7	13	21	2	2	85	29	12	7	360
	MEAN	7	4	9	4	5	6	5	2	3	5	6	2	5	6	3	6	5
	MIN	0	0	3	0	2	0	1	1	1	1	6	1	0	0	0	2	0
	MAX	15	15	13	12	15	14	16	5	10	13	7	2	15	22	6	7	22
	STD	9	7	8	8	12	8	11	4	4	6	1	2	8	10	5	5	8

TABLE 10-112

DISTRIBUTION OF LANDFILLS IN U.S.

STATE	NUMBER OF ACTIVE MUNICIPAL LANDFILLS: 1985 EPA CENSUS	ERG INQUIRY		DATE	% CHANGE '85 TO RECENT
Alabama	122				NA
Alaska	179	141	**		-21.2%
Arizona	96	88		10-90	-8.3%
Arkansas	84	75		8-90	-10.7%
California	401	245		7-90	-38.9%
Colorado	122	126	**	10-90	3.3%
Connecticut	91	39		8-88	-57.1%
Delaware	3	3		11-90	0.0%
Florida	126	101		8-90	-19.8%
Georgia	198	182		7-90	-8.1%
Hawaii	20				NA
Idaho	95	77			-18.9%
Illinois	168	126		12-89	-25.0%
Indiana	98				NA
Iowa	83	85	***		2.4%
Kansas	124	122		5-89	-1.6%
Kentucky	107	75		6-90	-29.9%
Louisiana	93	45		10-90	-51.6%
Maine	294	185		10-89	-37.1%
Maryland	42	11		7-89	-73.8%
Massachusetts	203	84		4-90	-58.6%
Michigan	58	62		10-90	6.9%
Minnesota	105	56		10-90	-46.7%
Mississippi	108	98		6-90	-9.3%
Missouri	106	93		8-89	-12.3%
Montana	129	90			-30.2%
Nebraska	43	39			-9.3%
Nevada	107	108			0.9%
New Hampshire	70	57			-18.6%
New Jersey	73	33		8-90	-54.8%
New Mexico	213	127			-40.4%
New York	304	209		9-90	-31.3%
N. Caroline	124	121	**	10-90	-2.4%
N. Dakota	100	94			-6.0%
Ohio	153	90		88	-41.2%
Oklahoma	132	123		10-90	-6.8%
Oregon	127	86		10-90	-32.3%
Pennsylvania	144	41			-71.5%
Rhode Island	11	8			-27.3%
S. Carolina	80	38		7-90	-52.5%
S. Dakota	55	23			-58.2%
Tennesee	120	110		10-89	-8.3%
Texas	935	645		7-88	-31.0%
Utah	112				NA
Vermont	70	54		5-90	-22.9%
Virginia	147	152		8-89	3.4%
Washington	118	100			-15.3%
Wisconsin	933	250	*	10-90	-73.2%
Wyoming	78	86		12-89	10.3%
W. Virginia	141	47		7-90	-66.7%
TOTAL (data received)	7,251	4,850			
TOTAL	7,645	5,114			
	Avg Decline				-24.0%
	Total decline				-33.1%

Notes: Date is not given for those lists which did not specify any date.
* Count includes industrial landfills.
** Total count minus landfills which are probably not municipal.
*** Out of these 85 facilities, 54 have expired permits.

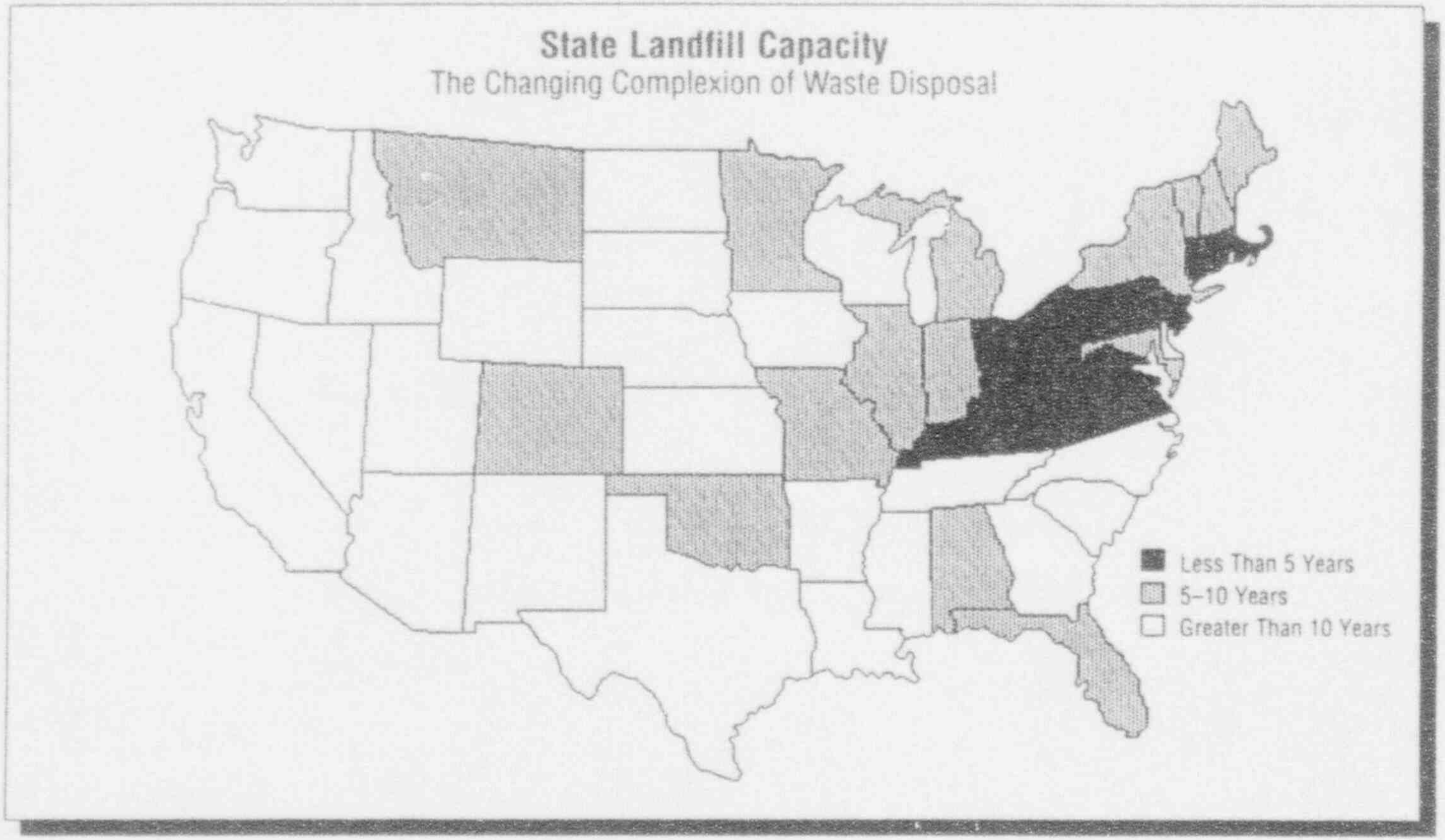

FIGURE 10-7. Remaining Landfill Capacity (Years)

Source: NSW89. Reproduced with permission from the National Solid Wastes Management Association.

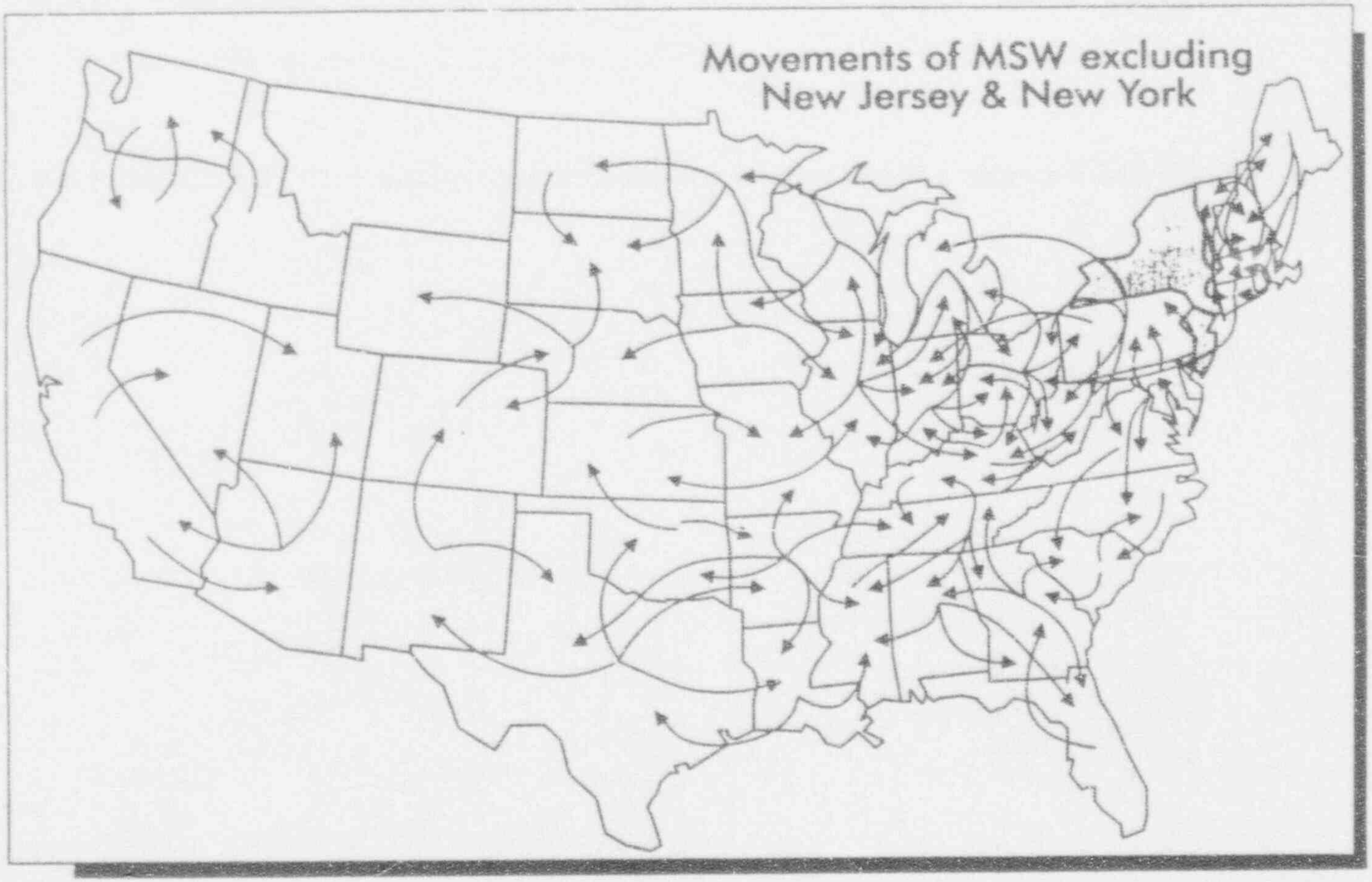

FIGURE 10-8. Interstate Movements of Municipal Waste (except New York and New Jersey)

Source: NSW90. Reproduced with permission from the National Solid Wastes Management Association.

FIGURE 10-9. Interstate Movements of Municipal Waste (New York and New Jersey)

Source: NSW90. Reproduced with permission from the National Solid Wastes Management Association.

TABLE 10-113

Typical Transportation Distance to Municipal Solid Waste Landfills in the U.S. By State

STATE	COMPACT	NUMBER OF MSW LANDFILLS (ERG INQUIRY)	TOTAL AREA (sq. mi.)	SQUARE MILES PER LANDFILL	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)(1)
Alabama	SE	82 (2)	51,705	633	10	20
Alaska	NW	141	591,004	4,192	26	52
Arizona	SW	88	114,000	1,295	14	29
Arkansas	C	75	53,187	709	11	21
California	SW	245	158,706	648	10	20
Colorado	RM	126	104,091	826	11	23
Connecticut	NE	39	5,018	129	5	9
Delaware	AP	3	2,045	682	10	21
Florida	SE	101	58,664	581	10	19
Georgia	SE	182	58,910	324	7	14
Hawaii	NW	13 (2)	6,471	484	9	18
Idaho	NW	77	83,564	1,085	13	26
Illinois	CM	126	56,345	447	8	17
Indiana	MW	66 (2)	36,185	552	9	19
Iowa	MW	85	56,275	662	10	21
Kansas	C	122	82,277	674	10	21
Kentucky	CM	75	40,410	539	9	19
Louisiana	C	45	47,752	1,061	13	26
Maine	UA	185	33,265	180	5	11
Maryland	AP	11	10,460	951	12	25
Massachusetts	UA	84	8,284	99	4	8
Michigan	MW	62	58,527	944	12	25
Minnesota	MW	56	84,402	1,507	15	31
Mississippi	SE	98	47,689	487	9	18
Missouri	MW	93	69,697	749	11	22
Montana	NW	90	147,046	1,634	16	32
Nebraska	C	39	77,355	1,983	18	36
Nevada	RM	108	110,561	1,024	13	26
New Hampshire	UA	57	9,279	163	5	10
New Jersey	NE	33	7,787	236	6	12
W/ Exports (3)		33	446,568	13,532	46	93
New Mexico	RM	127	121,593	957	12	25
New York	UA	209	49,108	235	6	12
W/ Exports (4)		209	367,310	1,757	17	33
N. Carolina	SE	121	52,669	435	8	17
N. Dakota	SW	94	70,702	752	11	22
Ohio	MW	90	41,330	459	9	17
Oklahoma	C	123	69,956	569	10	19
Oregon	NW	86	97,073	1,129	13	27
Pennsylvania	AP	41	45,308	1,105	13	27
Rhode Island	UA	8	1,212	152	5	10
S. Carolina	SE	38	31,113	819	11	23
S. Dakota	SW	23	77,116	3,353	23	46
Tennesee	SE	110	42,144	383	8	16
Texas	UA	645	266,807	414	8	16
Utah	NW	75 (2)	84,899	1,133	13	27
Vermont	UA	54	9,614	178	5	11
Virginia	SE	152	40,767	268	7	13
Washington	NW	100	68,139	681	10	21
Wisconsin	MW	250	56,153	225	6	12
Wyoming	RM	86	97,809	1,137	13	27
W. Virginia	AP	47	24,232	516	9	18
TOTAL		2,721	2,161,622			
AVERAGE				1,372	12	24

Notes: 1) Assumes a factor of 2.0 to convert straight line distance to transportation distance.
2) 1985 Census landfills reduced by 33.1%
3) Includes the area for NJ, AL, IL, KY, MD, MI, MO, OH, PA, VA, WV.
4) Includes the area for NY, CT, IN, KY, MD, MA, NM, OH, PA, VT.

TABLE 10-114

Typical Transportation Distance to Municipal Solid Waste Landfills in the U.S.
By Compact

STATE	NUMBER OF MSW LANDFILLS (ERG INQUIRY)	TOTAL AREA (sq. mi.)	SQUARE MILES PER LANDFILL	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)(1)
Northwest	582	1,078,196	1,853	17	34
Rocky Mountains	447	434,054	971	12	25
Southwestern	532	420,524	790	11	22
Central	404	330,527	818	11	23
Midwest	702	402,569	573	10	19
Central Midwest	201	96,755	481	9	18
Southeast	802	383,661	478	9	17
Northeast (2)	72	451,586	6,272	32	63
Appalachian	102	82,045	804	11	23
Unaffiliated States:					
Maine	185	33,265	180	5	11
Massachusetts	84	8,284	99	4	8
New Hampshire	57	9,279	163	5	10
New York (3)	209	367,310	1,757	17	33
Rhode Island	8	1,212	152	5	10
Texas	645	266,807	414	8	16
Vermont	54	9,614	178	5	11

Notes: 1) Assumes a factor of 2.0 to convert straight line distance to transportation distance.
2) Includes the area for NJ, AL, CT, IL, KY, MD, MI, MO, OH, PA, VA, WV.
3) Includes the area for NY, CT, IN, KY, MD, MA, NM, OH, PA, VT.

TABLE 10-115

Listing of Hazardous Waste Landfills - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
AK	ELMENDORF AFB	61	15	149	48
AL	EMELLE	32	47	88	18
AL	MC INTOSH	31	15	87	58
AL	ANNISTON	33	39	85	51
AL	TROY	31	47	85	59
AR	EL DORADO	33	11	92	42
AR	PINE BLUFF	34	19	92	5
AZ	TUCSON	32	37	111	22
CA	RANCHO CORDOVA	38	37	121	12
CA	BENICIA	38	6	122	8
CA	WESTMORLAND	.	.	.	.
CA	PITTSBURG	37	57	121	52
CA	CASMALIA	30	51	120	32
CA	MARTINEZ	38	1	122	4
CA	RICHMOND	.	.	.	.
CA	BUTTONWILLOW	35	24	119	38
CA	SAN JOAQUIN COUNTY	.	.	.	.
CO	STRASBURG	.	.	.	.
CO	GOLDEN	39	53	105	11
CT	DANBURY	.	.	.	.
CT	MIDDLETOWN	41	32	72	33
CT	TORRINGTON	.	.	.	.
DE	DELAWARE CITY	39	35	75	37
ID	GRAND VIEW	.	.	.	.
ID	SCOVILLE	.	.	.	.
IL	PEORIA	43	30	89	20
IL	STERLING	41	46	89	45
IL	CALUMET CITY	41	39	87	34
IL	ZION	.	.	.	.
IL	ARGONNE	40	43	87	58
IN	ROCHESTER	41	7	86	25
IN	GARY	41	37	87	22
IN	NEWBURGH	37	55	87	20
IN	PORTAGE	87	10	41	37
IN	KOKOMO	40	28	86	9
IN	FORT WAYNE	41	2	850	3
IN	ROACHDALE	.	.	.	.
IN	CHARLESTOWN	38	25	85	39
KS	PARSONS	37	18	95	6
KS	COFFEYVILLE	37	2	95	39
KS	FORT RILEY	39	3	96	46
KY	BOYD CO	.	.	.	.
KY	CARROLLTON	38	42	85	6
KY	MAYSVILLE	.	.	.	.
KY	WILDER	39	4	84	30
LA	WESTLAKE	30	19	93	18
LA	LIVINGSTON	37	27	90	44
LA	CARLYSS	30	7	93	24
LA	PLAQUEMINE	30	19	90	14
LA	BATON ROUGE	30	34	91	13
LA	TAFT	29	59	90	27
LA	BELLE CHASSE	29	41	89	58
LA	BATON ROUGE	29	50	91	30
LA	URANIA	.	.	.	.
MD	BALTIMORE	39	12	76	33
MD	ABERDEEN PROVING GROUND	39	23	76	18
MI	MIDLAND	43	35	84	12
MI	BELLEVILLE	42	13	83	31
MI	ALLEN PARK	42	17	83	12
MI	MIDLAND	43	35	84	11
MN	ANOKA	45	11	93	22
MO	FOREST CITY	40	2	95	14
MO	WRIGHT CITY	38	47	91	2
MO	FORT LEONARD WOOD	37	30	92	0
MS	MOSS POINT	.	.	.	.

TABLE 10-115 (cont.)

Listing of Hazardous Waste Landfills - 1986 Data - By State

STATE	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
NJ	BRIDGEPORT	39	47	75	23
NJ	DEEPWATER	.	.	.	.
NM	WHITE SANDS MISSI	32	23	106	19
NM	CANNON AFB	.	.	.	.
NV	BEATTY	36	46	116	41
NY	QUEENSBURY	43	23	73	27
NY	WATERFORD	42	49	73	35
NY	MODEL CITY	43	13	78	58
NY	SELKIRK	42	34	73	51
NY	NIAGARA FALLS	78	58	43	5
OH	VICKERY	41	22	82	59
OH	OREGON	41	40	83	27
OH	WARREN	41	16	80	51
OH	WILLIAMSBURG	39	7	84	2
OK	WAYNOKA	36	25	98	48
OR	ARLINGTON	45	20	120	15
PA	MANHEIM	.	.	.	.
PA	JOHNSTOWN	40	20	78	55
PA	BULGER	40	23	80	19
SC	PINEWOOD	33	41	80	31
SC	AIKEN	33	17	81	39
TN	CHARLESTON	35	18	84	46
TN	KINGSPORT	36	32	82	38
TX	DEER PARK	29	43	95	8
TX	PORT LAVACA	28	34	96	50
TX	CORPUS CHRISTI	.	.	.	.
TX	SAN ANTONIO	29	18	98	19
TX	TEXAS CITY	29	20	94	55
TX	ALVIN	29	15	95	12
TX	LONE STAR	.	.	.	.
TX	LONGVIEW	32	26	94	41
TX	FREEPORT	28	59	95	23
TX	PASADENA	29	44	95	10
TX	BISHOP	27	34	97	50
TX	SEGUIN	29	34	98	1
TX	VICTORIA	28	39	96	57
TX	BAY CITY	28	51	96	1
TX	SEADRIFT	28	31	96	46
TX	BORGER	35	41	101	21
TX	TEXAS CITY	29	25	94	58
TX	BAYTOWN	29	41	94	53
TX	OLD OCEAN	29	.	95	.
TX	ALVIN,	29	13	95	12
TX	DEER PARK	29	43	95	5
TX	INGLESIDE	27	52	97	14
TX	TYLER	32	25	95	21
TX	MIDLOTHIAN	97	2	32	26
TX	ROBSTOWN	27	43	97	38
TX	BORGER	35	42	101	22
TX	DEVERS	.	.	.	.
TX	SAN ANTONIO	29	19	98	39
TX	BEAUMONT	30	4	94	4
TX	FORT BLISS	.	.	.	.
TX	KARNOCK	32	40	94	9
TX	CHAMBERS CTY	.	.	.	.
UT	KNOWLES	.	.	.	.
VA	HOPEWELL	37	17	77	17
VA	RADFORD	37	12	80	32
WA	RICHLAND	46	45	119	15
WI	SPARTA	43	56	90	48
WV	SISTERSVILLE	39	29	81	5
WV	INSTITUTE	38	22	81	46
WV	NITRO	.	.	.	.
WV	WASHINGTON	39	16	81	40
WY	SINCLAIR	41	47	107	7

TABLE 10-116

Number of Hazardous Waste Landfill Facilities by State

STATE	Frequency	Percent
AK	1	0.8
AL	4	3.1
AR	2	1.5
AZ	1	0.8
CA	9	6.9
CO	2	1.5
CT	3	2.3
DE	1	0.8
ID	2	1.5
IL	5	3.8
IN	8	6.2
KS	3	2.3
KY	4	3.1
LA	9	6.9
MD	2	1.5
MI	4	3.1
MN	1	0.8
MO	3	2.3
MS	1	0.8
NJ	2	1.5
NM	2	1.5
NV	1	0.8
NY	5	3.8
OH	4	3.1
OK	1	0.8
OR	1	0.8
PA	3	2.3
SC	2	1.5
TN	2	1.5
TX	32	24.6
UT	1	0.8
VA	2	1.5
WA	1	0.8
WI	1	0.8
WV	4	3.1
WY	1	0.8

TABLE 10-117

Number of Hazardous Waste Landfill Facilities by Compact

COMPACT	Frequency	Percent
AP	10	7.7
C	15	11.5
CM	9	6.9
MW	21	16.2
NE	5	3.8
NW	6	4.6
NY	5	3.8
RM	6	4.6
SE	11	8.5
SW	10	7.7
TX	32	24.6

TABLE 10-118

Listing of Hazardous Waste Landfills - 1986 Data - By State
Facilities Accepting Off-site Wastes from Non-owner Generators

STATE	COUNTY/PARISH	TOWN	Latitude degrees	Latitude minutes	Longitude degrees	Longitude minutes
AL	SUMTER	EMELLE	32	47	88	18
CA	SOLANO	BENICIA	38	6	122	8
CA	IMPERIAL	WESTMORLAND	.	.	.	.
CA	SANTA BARBARA	CASMALIA	30	51	120	32
CA	CONTRA COSTA	MARTINEZ	38	1	122	4
CA	CONTRA COSTA	RICHMOND	.	.	.	.
CT	FAIRFIELD	DANBURY	.	.	.	.
CT	LITCHFIELD	TORRINGTON	.	.	.	.
ID	BINGHAM	GRAND VIEW	.	.	.	.
IL	PEORIA	PEORIA	43	30	89	20
IL	COOK	CALUMET CITY	41	39	87	34
IL	LAKE	ZION	.	.	.	.
IN	FULTON	ROCHESTER	41	7	86	25
IN	ALLEN	FORT WAYNE	41	2	850	3
LA	LIVINGSTON	LIVINGSTON	37	27	90	44
LA	E. BATON ROUGE	BATON ROUGE	30	34	91	13
MD	BALTIMORE	BALTIMORE	39	12	76	33
MI	WAYNE	BELLEVILLE	42	13	83	31
NV	NYE	BEATTY	36	46	116	41
NY	NIAGARA	MODEL CITY	43	13	78	58
NY	NIAGARA	NIAGARA FALLS	78	58	43	5
OH	LUCAS	OREGON	41	40	83	27
OH	CLERMONT	WILLIAMSBURG	39	7	84	2
OK	WOODS	WAYNOKA	36	25	98	48
OR	GILLIAM	ARLINGTON	45	20	120	15
SC	SUMTER	PINEWOOD	33	41	80	31
TX	GALVESTON	TEXAS CITY	29	20	94	55
TX	VICTORIA	VICTORIA	28	39	96	57
TX	HARRIS	DEER PARK	29	43	95	5
TX	NUECES	ROBSTOWN	27	43	97	38
UT	TOOELE	KNOWLES	.	.	.	.

TABLE 10-119

Number of Hazardous Waste Landfills Facilities by State
Facilities Accepting Off-site Wastes from Non-owner Generators

STATE	Frequency	Percent
AL	1	3.2
CA	5	16.1
CT	2	6.5
ID	1	3.2
IL	3	9.7
IN	2	6.5
LA	2	6.5
MD	1	3.2
MI	1	3.2
NV	1	3.2
NY	2	6.5
OH	2	6.5
OK	1	3.2
OR	1	3.2
SC	1	3.2
TX	4	12.9
UT	1	3.2

TABLE 10-120

Number of Hazardous Waste Landfills Facilities by Compact
Facilities Accepting Off-site Wastes from Non-owner Generators

COMPACT	Frequency	Percent
AP	1	3.2
C	3	9.7
CM	3	9.7
MW	5	16.1
NE	2	6.5
NW	3	9.7
NY	2	6.5
RM	1	3.2
SE	2	6.5
SW	5	16.1
TX	4	12.9

TABLE 10-121

Quantity of Waste Landfilled - Private vs. Commerical

			STATUS	
			Commercial	Private
Quantity				
	Solid (Tons)	N	27	79
		MIN	27	1
		MAX	603,556	142,224
		MEAN	82,245	8,234
		STD	125,113	23,871
	Liquid (Gallons)	N	3	4
		MIN	5,805,184	2,750
		MAX	38,613,046	756,000
		MEAN	23,254,517	199,277
		STD	16,503,562	371,411

TABLE 10-122

Facility Area - Private vs. Commerical

		STATUS	
		Commercial	Private
Facility Area (Acres)	N	30	91
	MIN	1	4
	MAX	3,000	93,000
	MEAN	448	4,184
	STD	675	12,467

TABLE 10-123

Facilities That Handle Mixed Radioactive Waste

OBS	STATE	TOWN	manage	Accept General	Accept Limited	Accept Onsite	Accept Owner	Commercial 92	Stored	Disposed	Treated
1	AZ	TUCSON	yes	no	no	yes	no	no	yes	no	no
2	CA	SAN JOAQUIN COUNTY	yes	no	no	yes	no	no	no	yes	no
3	CO	GOLDEN	yes	no	no	yes	no	no	yes	no	yes
4	ID	SCOVILLE	yes	no	no	yes	yes	no	yes	no	yes
5	IL	ARGONNE	yes	no	no	yes	no	no	yes	no	no
6	MD	ABERDEEN PROVING GROUND	yes	no	no	yes	no	no	yes	yes	no
7	SC	AIKEN	yes	no	no	yes	no	no	yes	yes	yes
8	WA	RICHLAND	yes	no	no	yes	yes	no	yes	yes	yes

TABLE 10-124

Commercial Facilities - Size and Neighboring Populations

OBS	STATE	TOWN	COMPACT	Onsite Incinerator	Facility Area (Acres)	Closest Property Line (ft)	Population Within One Mile	Closest Residence (ft)
1	AL	EMELLE	SE	yes	2400	300	0	6400
2	CA	BENICIA	SW	no	242	150	100	2900
3	CA	WESTMORLAND	SW	no	640	.	.	.
4	CA	CASMALIA	SW	no	252	30	5	5000
5	CA	MARTINEZ	SW	no	125	50	1500	1400
6	CA	RICHMOND	SW	.	28	.	.	.
7	CT	DANBURY	NE	no	1	.	.	.
8	CT	TORRINGTON	NE	no	.	.	.	.
9	ID	GRAND VIEW	NW	no	120	.	.	.
10	IL	PEORIA	CM	no	90	110	2500	250
11	IL	CALUMET CITY	CM	no	400	75	.	2000
12	IL	ZION	CM	no	49	.	.	.
13	IN	ROCHESTER	MW	no	62	25	60	500
14	IN	FORT WAYNE	MW	no	151	75	200	800
15	LA	LIVINGSTON	C	no	380	200	0	1500
16	LA	BATON ROUGE	C	yes	345	450	350	1200
17	MD	BALTIMORE	AP	no	41	50	0	6000
18	MI	BELLEVILLE	MW	no	406	70	4000	4000
19	NV	BEATTY	RM	no	33	50	0	64000
20	NY	MODEL CITY	NY	yes	706	75	20	2640
21	NY	NIAGARA FALLS	NY	no	385	100	1000	1000
22	OH	OREGON	MW	no	76	150	1000	1500
23	OH	WILLIAMSBURG	MW	no	211	60	250	1100
24	OK	WAYNOKA	C	no	560	200	0	9999
25	OR	ARLINGTON	NW	no	1300	100	4	850
26	SC	PINEWOOD	SE	no	279	100	50	1500
27	TX	TEXAS CITY	TX	yes	200	100	0	11000
28	TX	VICTORIA	TX	no	3000	300	2	4000
29	TX	DEER PARK	TX	yes	86	60	0	10000
30	TX	ROBSTOWN	TX	no	240	200	25	300
31	UT	KNOWLES	NW	no	640	.	.	.

TABLE 10-125

Facility Size by Compact

	Facility Area (Acres)				
	N	MIN	MAX	MEAN	STD
COMPACT					
AP	1	41	41	41	.
C	3	345	560	428	115
CM	3	49	400	180	192
MW	5	62	406	181	139
NE	1	1	1	1	.
NW	3	120	1,300	687	591
NY	2	385	706	546	227
RM	1	33	33	33	.
SE	2	279	2,400	1,340	1,500
SW	5	28	640	257	233
TX	4	86	3,000	882	1,414
ALL	30	1	3,000	448	675

TABLE 10-126

Landfill Unit Dimensions

COMPACT	STATE	TOWN	Area (acres)	Capacity	Units for Capacity	Depth (yd)
AP	MD	BALTIMORE	10	290000	Cubic Yards	5.9917
C	LA	LIVINGSTON	5	70000	Cubic Yards	2.8926
C	LA	BATON ROUGE	22	1200	Acre feet	.
C	OK	WAYNOKA	1	18337	Cubic Yards	3.7886
C	OK	WAYNOKA	2	33131	Cubic Yards	3.4226
C	OK	WAYNOKA	5	37000	Cubic Yards	1.5289
CM	IL	PEORIA	20	677000	Cubic Yards	6.9938
CM	IL	PEORIA	10	420000	Cubic Yards	8.6777
CM	IL	CALUMET CITY	24	2756228	Cubic Yards	23.7279
CM	IL	ZION	49	3500000	Cubic Yards	14.7580
MW	IN	ROCHESTER	40	1344	Acre feet	.
MW	IN	FORT WAYNE	14	750000	Cubic Yards	11.0685
MW	MI	BELLEVILLE	39	2225000	Cubic Yards	11.7875
MW	OH	OREGON	7	750000	Cubic Yards	22.1370
MW	OH	OREGON	7	700000	Cubic Yards	20.6612
MW	OH	WILLIAMSBURG	6	252960	Cubic Yards	8.7107
NE	CT	DANBURY	1	3000	Cubic Yards	0.6198
NE	CT	TORRINGTON	.	13	Acre feet	.
NW	ID	GRAND VIEW	4	345000	Cubic Yards	17.8202
NW	ID	GRAND VIEW	6	240000	Cubic Yards	8.2645
NW	ID	GRAND VIEW	18	1697000	Cubic Yards	19.4789
NW	OR	ARLINGTON	4	167	Acre feet	.
NW	OR	ARLINGTON	2	65	Acre feet	.
NW	OR	ARLINGTON	3	101	Acre feet	.
NW	OR	ARLINGTON	6	319	Acre feet	.
NW	OR	ARLINGTON	18	986	Acre feet	.
NW	UT	KNOWLES	5	125000	Cubic Yards	5.1653
NW	UT	KNOWLES	12	350000	Cubic Yards	6.0262
NW	UT	KNOWLES	6	150000	Cubic Yards	5.1653
NW	UT	KNOWLES	5	150000	Cubic Yards	6.1983
NW	UT	KNOWLES	1	38000	Cubic Yards	7.8512
NY	NY	MODEL CITY	26	1065000	Cubic Yards	8.4631
NY	NY	NIAGARA FALLS	13	400000	Cubic Yards	6.3573
RM	NV	BEATTY	8	515000	Cubic Yards	13.3006
SE	AL	EMELLE	.	.	.	.
SE	SC	PINEWOOD	46	2300000	Cubic Yards	10.3306
SW	CA	BENICIA	7	531	Acre feet	.
SW	CA	WESTMORLAND	7	200000	Cubic Yards	5.9032
SW	CA	WESTMORLAND	6	167000	Cubic Yards	5.7507
SW	CA	CASMALIA	4	155500	Cubic Yards	8.0320
SW	CA	CASMALIA	11	690600	Cubic Yards	12.9715
SW	CA	CASMALIA	5	433000	Cubic Yards	17.8926
SW	CA	CASMALIA	4	140000	Cubic Yards	7.2314
SW	CA	CASMALIA	2	138200	Cubic Yards	14.2769
SW	CA	MARTINEZ	125	8400000	Cubic Yards	13.8843
SW	CA	RICHMOND	12	218	Acre feet	.
TX	TX	TEXAS CITY	200	1600000	Cubic Yards	1.6529
TX	TX	VICTORIA	40	322000	Cubic Yards	1.6632
TX	TX	DEER PARK	25	2016000	Cubic Yards	16.6612
TX	TX	ROBSTOWN	3	53000	Cubic Yards	3.6501
TX	TX	ROBSTOWN	3	63000	Cubic Yards	4.3388

TABLE 10-127

Landfill Units - Area

	Area (acres)				
	N	MIN	MAX	MEAN	STD
STATE					
AL	0	.	.	.	.
CA	10	2	125	18	38
CT	1	1	1	1	.
ID	3	4	18	9	8
IL	4	10	49	26	17
IN	2	14	40	27	18
LA	2	5	22	14	12
MD	1	10	10	10	.
MI	1	39	39	39	.
NV	1	8	8	8	.
NY	2	13	26	20	9
OH	3	6	7	7	1
OK	3	1	5	3	2
OR	5	2	18	7	7
SC	1	46	46	46	.
TX	5	3	200	54	83
UT	5	1	12	6	4
COMPACT					
AP	1	10	10	10	.
C	5	1	22	7	9
CM	4	10	49	26	17
MW	6	6	40	19	16
NE	1	1	1	1	.
NW	13	1	18	7	6
NY	2	13	26	20	9
RM	1	8	8	8	.
SE	1	46	46	46	.
SW	10	2	125	18	38
TX	5	3	200	54	83
ALL	49	1	200	18	33

TABLE 10-128

Landfill Units - Capacity By State

	Capacity									
	Acre feet					Cubic Yards				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
CA	2.0E+00	2.2E+02	5.3E+02	3.7E+02	2.2E+02	8.0E+00	1.4E+05	8.4E+06	1.3E+06	2.9E+06
CT	1.0E+00	1.3E+01	1.3E+01	1.3E+01	.	1.0E+00	3.0E+03	3.0E+03	3.0E+03	.
ID	.	.	.	.	.	3.0E+00	2.4E+05	1.7E+06	7.6E+05	8.1E+05
IL	.	.	.	.	.	4.0E+00	4.2E+05	3.5E+06	1.8E+06	1.5E+06
IN	1.0E+00	1.3E+03	1.3E+03	1.3E+03	.	1.0E+00	7.5E+05	7.5E+05	7.5E+05	.
LA	1.0E+00	1.2E+03	1.2E+03	1.2E+03	.	1.0E+00	7.0E+04	7.0E+04	7.0E+04	.
[illegible]	.	.	.	.	.	1.0E+00	2.9E+05	2.9E+05	2.9E+05	.
MI	.	.	.	.	.	1.0E+00	2.2E+06	2.2E+06	2.2E+06	.
NV	.	.	.	.	.	1.0E+00	5.2E+05	5.2E+05	5.2E+05	.
NY	.	.	.	.	.	2.0E+00	4.0E+05	1.1E+06	7.3E+05	4.7E+05
OH	.	.	.	.	.	3.0E+00	2.5E+05	7.5E+05	5.7E+05	2.7E+05
OK	.	.	.	.	.	3.0E+00	1.6E+04	3.7E+04	2.9E+04	9.9E+03
OR	5.0E+00	6.5E+01	9.9E+02	3.3E+02	3.8E+02	.	.	.	.	.
SC	.	.	.	.	.	1.0E+00	2.3E+06	2.3E+06	2.3E+06	.
TX	.	.	.	.	.	5.0E+00	5.3E+04	2.0E+06	8.1E+05	9.3E+05
UT	.	.	.	.	.	5.0E+00	3.8E+04	3.5E+05	1.6E+05	1.1E+05
ALL	1.0E+01	1.3E+01	1.3E+03	4.9E+02	5.0E+02	4.0E+01	3.0E+03	8.4E+06	8.6E+05	1.5E+06

TABLE 10-129

Landfill Units - Capacity By Compact

	Capacity									
	Acre feet					Cubic Yards				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
COMPACT										
AP	.	.	.	.	.	1.0E+00	2.9E+05	2.9E+05	2.9E+05	.
C	1.0E+00	1.2E+03	1.2E+03	1.2E+03	.	4.0E+00	1.8E+04	7.0E+04	4.0E+04	2.2E+04
CM	.	.	.	.	.	4.0E+00	4.2E+05	3.5E+06	1.8E+06	1.5E+06
MW	1.0E+00	1.3E+03	1.3E+03	1.3E+03	.	5.0E+00	2.5E+05	2.2E+06	9.4E+05	7.5E+05
NE	1.0E+00	1.3E+01	1.3E+01	1.3E+01	.	1.0E+00	3.0E+03	3.0E+03	3.0E+03	.
NW	5.0E+00	6.5E+01	9.9E+02	3.3E+02	3.8E+02	8.0E+00	3.8E+04	1.7E+06	3.9E+05	5.4E+05
NY	.	.	.	.	.	2.0E+00	4.0E+05	1.1E+06	7.3E+05	4.7E+05
RM	.	.	.	.	.	1.0E+00	5.2E+05	5.2E+05	5.2E+05	.
SE	.	.	.	.	.	1.0E+00	2.3E+06	2.3E+06	2.3E+06	.
SW	2.0E+00	2.2E+02	5.3E+02	3.7E+02	2.2E+02	8.0E+00	1.4E+05	8.4E+06	1.3E+06	2.9E+06
TX	.	.	.	.	.	5.0E+00	5.3E+04	2.0E+06	8.1E+05	9.3E+05
ALL	1.0E+01	1.3E+01	1.3E+03	4.9E+02	5.0E+02	4.0E+01	3.0E+03	8.4E+06	8.6E+05	1.5E+06

TABLE 10-130

Landfill Units - Depth

	Depth (yd)				
	N	MIN	MAX	MEAN	STD
STATE					
AL	0.0	.	.	.	.
CA	8.0	5.8	17.9	10.7	4.6
CT	1.0	0.6	0.6	0.6	.
ID	3.0	8.3	19.5	15.2	6.1
IL	4.0	7.0	23.7	13.5	7.6
IN	1.0	11.1	11.1	11.1	.
LA	1.0	2.9	2.9	2.9	.
MD	1.0	6.0	6.0	6.0	.
MI	1.0	11.8	11.8	11.8	.
NV	1.0	13.3	13.3	13.3	.
NY	2.0	6.4	8.5	7.4	1.5
OH	3.0	8.7	22.1	17.2	7.4
OK	3.0	1.5	3.8	2.9	1.2
OR	0.0	.	.	.	.
SC	1.0	10.3	10.3	10.3	.
TX	5.0	1.7	16.7	5.6	6.3
UT	5.0	5.2	7.9	6.1	1.1
COMPACT					
AP	1.0	6.0	6.0	6.0	.
C	4.0	1.5	3.8	2.9	1.0
CM	4.0	7.0	23.7	13.5	7.6
MW	5.0	8.7	22.1	14.9	6.1
NE	1.0	0.6	0.6	0.6	.
NW	8.0	5.2	19.5	9.5	5.8
NY	2.0	6.4	8.5	7.4	1.5
RM	1.0	13.3	13.3	13.3	.
SE	1.0	10.3	10.3	10.3	.
SW	8.0	5.8	17.9	10.7	4.6
TX	5.0	1.7	16.7	5.6	6.3
ALL	40.0	0.6	23.7	9.4	6.1

TABLE 10-131

Liner Type

COMPACT	STATE	TOWN	Liner Type
AP	MD	BALTIMORE	Single Compacted Clay Liner
C	LA	LIVINGSTON	Other
C	LA	BATON ROUGE	Single Compacted Clay Liner
C	OK	WAYNOKA	Single Compacted Clay Liner
C	OK	WAYNOKA	Single Compacted Clay Liner
C	OK	WAYNOKA	T:Synthetic, B:Composite
CM	IL	PEORIA	Single Compacted Clay Liner
CM	IL	PEORIA	Single Composite Liner
CM	IL	CALUMET CITY	.
CM	IL	ZION	Single Compacted Clay Liner
MW	IN	ROCHESTER	T:Synthetic, B:Composite
MW	IN	FORT WAYNE	T:Composite, B:Composite
MW	MI	BELLEVILLE	T:Composite, B:Composite
MW	OH	OREGON	.
MW	OH	OREGON	T:Synthetic, B:3 ft clay
MW	OH	WILLIAMSBURG	T:Composite, B:Composite
NE	CT	DANBURY	Other
NE	CT	TORRINGTON	Other
NW	ID	GRAND VIEW	Other
NW	ID	GRAND VIEW	T:Synthetic, B:Composite
NW	ID	GRAND VIEW	T:Composite, B:Composite
NW	OR	ARLINGTON	Single Compacted Clay Liner
NW	OR	ARLINGTON	Other
NW	OR	ARLINGTON	Other
NW	OR	ARLINGTON	Other
NW	OR	ARLINGTON	T:Composite, B:Composite
NW	UT	KNOWLES	Other
NW	UT	KNOWLES	Other
NW	UT	KNOWLES	Other
NW	UT	KNOWLES	Other
NW	UT	KNOWLES	Other
NY	NY	MODEL CITY	Other
NY	NY	NIAGARA FALLS	.
RM	NV	BEATTY	.
SE	AL	EMELLE	.
SE	SC	PINEWOOD	T:Composite, B:Composite
SW	CA	BENICIA	Single Compacted Clay Liner
SW	CA	WESTMORLAND	T:Synthetic, B:Composite
SW	CA	WESTMORLAND	Other
SW	CA	CASMALIA	.
SW	CA	CASMALIA	.
SW	CA	CASMALIA	.
SW	CA	CASMALIA	.
SW	CA	CASMALIA	.
SW	CA	MARTINEZ	.
SW	CA	RICHMOND	.
TX	TX	TEXAS CITY	.
TX	TX	VICTORIA	T:Synthetic, B:Composite
TX	TX	DEER PARK	Single Compacted Clay Liner
TX	TX	ROBSTOWN	T:Synthetic, B:Composite
TX	TX	ROBSTOWN	T:Synthetic, B:Composite

TABLE 10-132

Final Cover Types

COMPACT	STATE	TOWN	Synthetic Cover	Earthen Cover	Other
AP	MD	BALTIMORE	Yes	Yes	Yes
C	LA	LIVINGSTON	Yes	Yes	No
C	LA	BATON ROUGE	No	Yes	No
C	OK	WAYNOKA	Yes	No	No
C	OK	WAYNOKA	Yes	No	No
C	OK	WAYNOKA	Yes	No	No
CM	IL	PEORIA	Yes	Yes	No
CM	IL	PEORIA	Yes	Yes	No
CM	IL	CALUMET CITY	Yes	No	No
CM	IL	ZION	Yes	Yes	No
MW	IN	ROCHESTER	Yes	Yes	No
MW	IN	FORT WAYNE	Yes	Yes	No
MW	MI	BELLEVILLE	Yes	Yes	No
MW	OH	OREGON	Yes	Yes	No
MW	OH	OREGON	Yes	Yes	No
MW	OH	WILLIAMSBURG	Yes	Yes	No
NE	CT	DANBURY	Yes	No	No
NE	CT	TORRINGTON	Yes	Yes	No
NW	ID	GRAND VIEW	Yes	Yes	Yes
NW	ID	GRAND VIEW	Yes	Yes	Yes
NW	ID	GRAND VIEW	Yes	Yes	Yes
NW	OR	ARLINGTON	Yes	No	No
NW	OR	ARLINGTON	Yes	No	No
NW	OR	ARLINGTON	Yes	No	No
NW	OR	ARLINGTON	Yes	No	No
NW	OR	ARLINGTON	Yes	No	No
NW	UT	KNOWLES	Yes	Yes	Yes
NW	UT	KNOWLES	Yes	Yes	Yes
NW	UT	KNOWLES	Yes	Yes	Yes
NW	UT	KNOWLES	Yes	Yes	Yes
NW	UT	KNOWLES	Yes	Yes	Yes
NY	NY	MODEL CITY	Yes	No	No
NY	NY	NIAGARA FALLS	No	No	Yes
RM	NV	BEATTY	No	No	Yes
SE	AL	EMELLE	No	No	Yes
SE	SC	PINEWOOD	Yes	Yes	No
SW	CA	BENICIA	No	No	Yes
SW	CA	WESTMORLAND	Yes	Yes	No
SW	CA	WESTMORLAND	Yes	Yes	No
SW	CA	CASMALIA	Yes	No	No
SW	CA	CASMALIA	Yes	No	No
SW	CA	CASMALIA	Yes	No	No
SW	CA	CASMALIA	Yes	No	No
SW	CA	CASMALIA	Yes	No	No
SW	CA	MARTINEZ	No	Yes	No
SW	CA	RICHMOND	No	Yes	No
TX	TX	TEXAS CITY	Yes	Yes	No
TX	TX	VICTORIA	Yes	Yes	No
TX	TX	DEER PARK	No	No	Yes
TX	TX	ROBSTOWN	Yes	Yes	Yes
TX	TX	ROBSTOWN	Yes	Yes	Yes

TABLE 10-133

Air Monitoring and Pollution Controls

COMPACT	STATE	TOWN	Air Emissions Monitored	Vented Gas Collection	Daily Earth Cover	Synthetic Cover	Wind Screen	None	Other
AP	MD	BALTIMORE	No	No	No	No	No	Yes	No
C	LA	LIVINGSTON	Yes	No	Yes	No	No	No	No
C	LA	BATON ROUGE	.	No	No	No	No	No	Yes
C	OK	WAYNOKA	Yes	No	No	No	No	Yes	No
C	OK	WAYNOKA	Yes	No	No	No	No	Yes	No
C	OK	WAYNOKA	Yes	No	No	No	No	Yes	No
CM	IL	PEORIA	No	No	Yes	Yes	No	No	No
CM	IL	PEORIA	No	No	Yes	Yes	No	No	No
CM	IL	CALUMET CITY	No	No	Yes	Yes	No	No	No
CM	IL	ZION	Yes	No	Yes	No	No	No	No
MW	IN	ROCHESTER	No	No	No	No	Yes	No	No
MW	IN	FORT WAYNE	No	No	Yes	No	No	No	Yes
MW	MI	BELLEVILLE	Yes	Yes	Yes	Yes	No	No	No
MW	OH	OREGON	Yes	No	Yes	Yes	No	No	No
MW	OH	OREGON	Yes	No	Yes	Yes	No	No	No
MW	OH	WILLIAMSBURG	No	No	Yes	Yes	No	No	No
NE	CT	DANBURY	No	No	No	No	No	Yes	No
NE	CT	TORRINGTON	No	No	No	No	No	Yes	No
NW	ID	GRAND VIEW	Yes	No	Yes	No	No	No	No
NW	ID	GRAND VIEW	Yes	No	Yes	No	No	No	No
NW	ID	GRAND VIEW	No	No	No	No	No	No	Yes
NW	OR	ARLINGTON	No	No	Yes	No	No	No	No
NW	OR	ARLINGTON	No	No	Yes	No	No	No	No
NW	OR	ARLINGTON	No	No	Yes	No	No	No	No
NW	OR	ARLINGTON	No	No	Yes	No	No	No	No
NW	OR	ARLINGTON	No	No	Yes	No	No	No	No
NW	UT	KNOWLES	No	No	No	No	No	Yes	No
NW	UT	KNOWLES	No	No	No	No	No	Yes	No
NW	UT	KNOWLES	No	No	No	No	No	Yes	No
NW	UT	KNOWLES	No	No	No	No	No	Yes	No
NW	UT	KNOWLES	No	No	No	No	No	Yes	No
NY	NY	MODEL CITY	Yes	No	Yes	No	No	No	No
NY	NY	NIAGARA FALLS	Yes	No	Yes	No	No	No	Yes
RM	NV	BEATTY	Yes	No	Yes	No	No	No	Yes
SE	AL	EMELLE	No	No	Yes	No	No	No	No
SE	SC	PINEWOOD	No	No	No	No	No	Yes	No
SW	CA	BENICIA	Yes	No	No	No	No	Yes	No
SW	CA	WESTMORLAND	Yes	No	Yes	No	No	No	No
SW	CA	WESTMORLAND	Yes	No	Yes	No	No	No	No
SW	CA	CASMALIA	Yes	No	Yes	No	No	No	No
SW	CA	CASMALIA	Yes	No	Yes	No	No	No	No
SW	CA	CASMALIA	Yes	No	Yes	No	No	No	No
SW	CA	CASMALIA	Yes	No	Yes	No	No	No	No
SW	CA	CASMALIA	Yes	No	Yes	No	No	No	No
SW	CA	MARTINEZ	Yes	Yes	No	No	No	No	No
SW	CA	RICHMOND	No	No	No	No	No	Yes	No
TX	TX	TEXAS CITY	No	No	No	No	No	No	Yes
TX	TX	VICTORIA	No	No	Yes	Yes	No	No	No
TX	TX	DEER PARK	No	No	No	No	No	No	Yes
TX	TX	ROBSTOWN	Yes	No	Yes	No	No	No	Yes
TX	TX	ROBSTOWN	Yes	No	Yes	No	No	No	Yes

TABLE 10-134

General Geohydrological Information

OBS	STATE	TOWN	COMPACT	100-Year Floodplain	Wetland	Karst Terrain	Above Seasonal High Water Table
1	MD	BALTIMORE	AP	No	No	No	Yes
2	LA	LIVINGSTON	C	Yes	No	No	No
3	LA	BATON ROUGE	C	No	No	No	No
4	OK	WAYNOKA	C	No	No	No	Yes
5	IL	PEORIA	CM	No	No	No	Yes
6	IL	CALUMET CITY	CM	No	No	No	Yes
7	IL	ZION	CM	.	.	.	.
8	IN	ROCHESTER	MW	No	No	No	Yes
9	IN	FORT WAYNE	MW	No	No	No	.
10	MI	BELLEVILLE	MW	No	No	No	Yes
11	OH	OREGON	MW	No	No	No	Yes
12	OH	WILLIAMSBURG	MW	No	No	No	No
13	CT	DANBURY	NE	.	.	.	.
14	CT	TORRINGTON	NE	.	.	.	.
15	ID	GRAND VIEW	NW	.	.	.	.
16	OR	ARLINGTON	NW	No	No	No	.
17	UT	KNOWLES	NW	.	.	.	.
18	NY	MODEL CITY	NY	No	No	No	No
19	NY	NIAGARA FALLS	NY	No	No	No	Yes
20	NV	BEATTY	RM	No	No	No	Yes
21	AL	EMELLE	SE	No	No	No	No
22	SC	PINEWOOD	SE	No	No	.	Yes
23	CA	BENICIA	SW	No	No	No	Yes
24	CA	WESTMORLAND	SW	.	.	.	.
25	CA	CASMALIA	SW	No	No	No	Yes
26	CA	MARTINEZ	SW	No	No	No	No
27	CA	RICHMOND	SW	.	.	.	.
28	TX	TEXAS CITY	TX	Yes	No	No	No
29	TX	VICTORIA	TX	No	No	No	Yes
30	TX	DEER PARK	TX	No	No	No	No
31	TX	ROBSTOWN	TX	No	No	No	Yes

TABLE 10-135

Facilities Above High Water Table - Soil Type and Depth

OBS	COMPACT	STATE	TOWN	Predominant Soil Type Between Waste and	Predominant Soil Type in Aquifer	Depth Between Waste and Aquifer (ft)
1	AP	MD	BALTIMORE	Clay	.	3
2	C	OK	WAYNOKA	Silty Clay	Silty Clay	20
3	CM	IL	PEORIA	Silty Clay	Silt	112
4	CM	IL	CALUMET CITY	Clay	Sandy Gravel	25
5	MW	IN	ROCHESTER	Silty Clay	Silt	20
6	MW	MI	BELLEVILLE	Clay	Silty Clay	25
7	MW	OH	OREGON	Clay	Other	10
8	NY	NY	NIAGARA FALLS	Clay	.	10
9	RM	NV	BEATTY	Silty Sand	Silt	250
10	SE	SC	PINEWOOD	Other	Silt	10
11	SW	CA	BENICIA	Other	.	35
12	SW	CA	CASMALIA	Other	.	100
13	TX	TX	VICTORIA	Clay	Silt	12
14	TX	TX	ROBSTOWN	Other	Silty Clay	.

TABLE 10-136

Facilities Above High Water Table - Soil Type and Depth Distribution

	Depth Between Waste and Aquifer (ft)				
	N	MIN	MAX	MEAN	STD
STATE					
CA	2	35	100	68	46
IL	2	25	112	69	62
IN	1	20	20	20	.
MD	1	3	3	3	.
MI	1	25	25	25	.
NV	1	250	250	250	.
NY	1	10	10	10	.
OH	1	10	10	10	.
OK	1	20	20	20	.
SC	1	10	10	10	.
TX	1	12	12	12	.
COMPACT					
AP	1	3	3	3	.
C	1	20	20	20	.
CM	2	25	112	69	62
MW	3	10	25	18	8
NY	1	10	10	10	.
RM	1	250	250	250	.
SE	1	10	10	10	.
SW	2	35	100	68	46
TX	1	12	12	12	.
ALL	13	3	250	49	70

TABLE 10-137

Upper Aquifer Characteritics

OBS	COMPACT	STATE	TOWN	Permeability (cm/sec)	Porosity (%)	Hydraulic Gradient (%)	Thickness (ft)	Horizontal Flow Rate (ft/yr)
1	AP	MD	BALTIMORE	0.000700	20	1.00	40	44.000
2	C	LA	LIVINGSTON	0.000029	38	0.10	12	0.300
3	C	LA	BATON ROUGE	0.000100	15	1.00	6	3.000
4	C	OK	WAYNOKA	.	.	.	.	.
5	CM	IL	PEORIA	0.003000	30	2.00	35	9.000
6	CM	IL	CALUMET CITY	0.000100	10	0.20	10	2.000
7	CM	IL	ZION	.	.	.	.	.
8	MW	IN	ROCHESTER	0.002153	20	.	175	3.000
9	MW	IN	FORT WAYNE	.	.	.	.	.
10	MW	MI	BELLEVILLE	0.001000	10	0.10	50	11.000
11	MW	OH	OREGON	0.000000	.	.	.	28.000
12	MW	OH	WILLIAMSBURG	0.013000	30	0.02	2	58.000
13	NE	CT	DANBURY	.	.	.	.	.
14	NE	CT	TORRINGTON	.	.	.	.	.
15	NW	ID	GRAND VIEW	.	.	.	.	.
16	NW	OR	ARLINGTON	0.000500	30	4.00	27	6.000
17	NW	UT	KNOWLES	.	.	.	.	.
18	NY	NY	MODEL CITY	0.000030	30	0.68	10	0.600
19	NY	NY	NIAGARA FALLS	.	.	.	.	.
20	RM	NV	BEATTY	0.000100	35	2.30	40	6.000
21	SE	AL	EMELLE	0.000100	.	0.05	100	0.050
22	SE	SC	PINEWOOD	.	.	.	.	.
23	SW	CA	BENICIA	0.000020	20	25.00	50	25.000
24	SW	CA	WESTMORLAND	.	.	.	.	.
25	SW	CA	CASMALIA	0.000000	45	0.06	45	1.000
26	SW	CA	MARTINEZ	.	.	.	.	.
27	SW	CA	RICHMOND	.	.	.	.	.
28	TX	TX	TEXAS CITY	0.000002	40	0.10	7	0.001
29	TX	TX	VICTORIA	.	30	4.00	50	10.000
30	TX	TX	DEER PARK	0.000470	30	0.39	20	6.320
31	TX	TX	ROBSTOWN	0.000100	35	1.00	20	3.000

TABLE 10-138

Upper Aquifer - Permeability

	Permeability (cm/sec)				
	N	MIN	MAX	MEAN	STD
STATE					
AL	1.0E+00	1.0E-04	1.0E-04	1.0E-04	.
CA	2.0E+00	1.0E-07	2.0E-05	1.0E-05	1.4E-05
CT	0.0E+00	.	.	.	.
ID	0.0E+00	.	.	.	.
IL	2.0E+00	1.0E-04	3.0E-03	1.6E-03	2.1E-03
IN	1.0E+00	2.2E-03	2.2E-03	2.2E-03	.
LA	2.0E+00	2.9E-05	1.0E-04	6.4E-05	5.0E-05
MD	1.0E+00	7.0E-04	7.0E-04	7.0E-04	.
MI	1.0E+00	1.0E-03	1.0E-03	1.0E-03	.
NV	1.0E+00	1.0E-04	1.0E-04	1.0E-04	.
NY	1.0E+00	3.0E-05	3.0E-05	3.0E-05	.
OH	2.0E+00	6.0E-08	1.3E-02	6.5E-03	9.2E-03
OK	0.0E+00	.	.	.	.
OR	1.0E+00	5.0E-04	5.0E-04	5.0E-04	.
SC	0.0E+00	.	.	.	.
TX	3.0E+00	1.6E-06	4.7E-04	1.9E-04	2.5E-04
UT	0.0E+00	.	.	.	.
COMPACT					
AP	1.0E+00	7.0E-04	7.0E-04	7.0E-04	.
C	2.0E+00	2.9E-05	1.0E-04	6.4E-05	5.0E-05
CM	2.0E+00	1.0E-04	3.0E-03	1.6E-03	2.1E-03
MW	4.0E+00	6.0E-08	1.3E-02	4.0E-03	6.0E-03
NE	0.0E+00	.	.	.	.
NW	1.0E+00	5.0E-04	5.0E-04	5.0E-04	.
NY	1.0E+00	3.0E-05	3.0E-05	3.0E-05	.
RM	1.0E+00	1.0E-04	1.0E-04	1.0E-04	.
SE	1.0E+00	1.0E-04	1.0E-04	1.0E-04	.
SW	2.0E+00	1.0E-07	2.0E-05	1.0E-05	1.4E-05
TX	3.0E+00	1.6E-06	4.7E-04	1.9E-04	2.5E-04
ALL	1.8E+01	6.0E-08	1.3E-02	1.2E-03	3.1E-03

TABLE 10-139

Upper Aquifer - Porosity, Hydraulic Gradient, and Flow Rate

	Porosity (%)					Hydraulic Gradient (%)					Horizontal Flow Rate (ft/yr)				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE															
AL	0.00	.	.	.	.	1.00	0.05	0.05	0.05	.	1.00	0.05	0.05	0.05	.
CA	2.00	20.00	45.00	32.50	17.68	2.00	0.06	25.00	12.53	17.64	2.00	1.00	25.00	13.00	16.97
CT	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
ID	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
IL	2.00	10.00	30.00	20.00	14.14	2.00	0.20	2.00	1.10	1.27	2.00	2.00	9.00	5.50	4.95
IN	1.00	20.00	20.00	20.00	.	0.00	.	.	.	.	1.00	3.00	3.00	3.00	.
LA	2.00	15.00	38.00	26.50	16.26	2.00	0.10	1.00	0.55	0.64	2.00	0.30	3.00	1.65	1.91
MD	1.00	20.00	20.00	20.00	.	1.00	1.00	1.00	1.00	.	1.00	44.00	44.00	44.00	.
MI	1.00	10.00	10.00	10.00	.	1.00	0.10	0.10	0.10	.	1.00	11.00	11.00	11.00	.
NV	1.00	35.00	35.00	35.00	.	1.00	2.30	2.30	2.30	.	1.00	6.00	6.00	6.00	.
NY	1.00	30.00	30.00	30.00	.	1.00	0.68	0.68	0.68	.	1.00	0.60	0.60	0.60	.
OH	1.00	30.00	30.00	30.00	.	1.00	0.02	0.02	0.02	.	2.00	28.00	58.00	43.00	21.21
OK	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
OR	1.00	30.00	30.00	30.00	.	1.00	4.00	4.00	4.00	.	1.00	6.00	6.00	6.00	.
SC	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
TX	4.00	30.00	40.00	33.75	4.79	4.00	0.10	4.00	1.37	1.79	4.00	0.00	10.00	4.83	4.31
UT	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
COMPACT															
AP	1.00	20.00	20.00	20.00	.	1.00	1.00	1.00	1.00	.	1.00	44.00	44.00	44.00	.
C	2.00	15.00	38.00	26.50	16.26	2.00	0.10	1.00	0.55	0.64	2.00	0.30	3.00	1.65	1.91
CM	2.00	10.00	30.00	20.00	14.14	2.00	0.20	2.00	1.10	1.27	2.00	2.00	9.00	5.50	4.95
MW	3.00	10.00	30.00	20.00	10.00	2.00	0.02	0.10	0.06	0.06	4.00	3.00	58.00	25.00	24.34
NE	0.00	.	.	.	.	0.00	.	.	.	.	0.00	.	.	.	.
NW	1.00	30.00	30.00	30.00	.	1.00	4.00	4.00	4.00	.	1.00	6.00	6.00	6.00	.
NY	1.00	30.00	30.00	30.00	.	1.00	0.68	0.68	0.68	.	1.00	0.60	0.60	0.60	.
RM	1.00	35.00	35.00	35.00	.	1.00	.30	2.30	2.30	.	1.00	6.00	6.00	6.00	.
SE	0.00	.	.	.	.	1.00	0.05	0.05	0.05	.	1.00	0.05	0.05	0.05	.
SW	2.00	20.00	45.00	32.50	17.68	2.00	0.06	25.00	12.53	17.64	2.00	1.00	25.00	13.00	16.97
TX	4.00	30.00	40.00	33.75	4.79	4.00	0.10	4.00	1.37	1.79	4.00	0.00	10.00	4.83	4.31
ALL	17.00	10.00	45.00	27.53	10.19	17.00	0.02	25.00	2.47	5.95	19.00	0.00	58.00	11.38	16.15

TABLE 10-140

Percentage of Facilities Reporting Water Bodies Within One Mile

Water Body	Percentage
Private Well	21
Public Well	4
River/ Stream	65
Lake/ Reservoir	21

TABLE 10-141

Distances (ft)

OBS	COMPACT	STATE	TOWN	Unit to Property Boundary	Unit to Residence	Unit to Private Well	Unit to Public Well	Unit to River/Stream	Unit to Lake/Reservoir
1	AP	MD	BALTIMORE	50	6000	.	.	200	.
2	C	LA	LIVINGSTON	200	1500	1500	.	5280	.
3	C	LA	BATON ROUGE	450	1200	.	.	5000	.
4	C	OK	WAYNOKA	200	9999	.	.	.	.
5	CM	IL	PEORIA	110	250	.	.	1000	.
6	CM	IL	CALUMET CITY	75	2000	.	.	75	.
7	CM	IL	ZION	.	.	.	.	.	.
8	MW	IN	ROCHESTER	25	500	1000	.	.	1500
9	MW	IN	FORT WAYNE	75	800	2000	.	650	.
10	MW	MI	BELLEVILLE	70	4000	.	.	3200	6500
11	MW	OH	OREGON	150	1500	.	.	5000	.
12	MW	OH	WILLIAMSBURG	60	1100	.	.	40	.
13	NE	CT	DANBURY	.	.	.	.	.	.
14	NE	CT	TORRINGTON	.	.	.	.	.	.
15	NW	ID	GRAND VIEW	.	.	.	.	.	.
16	NW	OR	ARLINGTON	100	850	.	.	.	.
17	NW	UT	KNOWLES	.	.	.	.	.	.
18	NY	NY	MODEL CITY	75	2640	.	.	1000	.
19	NY	NY	NIAGARA FALLS	100	1000	.	.	.	.
20	RM	NV	BEATTY	50	64000	.	.	5000	.
21	SE	AL	EMELLE	300	6400	.	.	2640	1060
22	SE	SC	PINEWOOD	100	1500	.	.	.	300
23	SW	CA	BENICIA	150	2900	4000	.	.	.
24	SW	CA	WESTMORLAND	.	.	.	.	.	.
25	SW	CA	CASMALIA	30	5000	.	.	.	.
26	SW	CA	MARTINEZ	50	1400	.	.	1500	.
27	SW	CA	RICHMOND	.	.	.	.	.	.
28	TX	TX	TEXAS CITY	100	11000	.	.	.	.
29	TX	TX	VICTORIA	300	4000	4000	50	1000	.
30	TX	TX	DEER PARK	60	10000	.	.	50	.
31	TX	TX	ROBSTOWN	200	300	1000	.	.	.

TABLE 10-142

Distance to Nearest Property Boundary and Residence

	Unit to Property Boundary					Unit to Residence				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AL	1	300	300	300	.	1	6,400	6,400	6,400	.
CA	3	30	150	77	64	3	1,400	5,000	3,100	1,808
CT	0	.	.	.	.	0	.	.	.	.
ID	0	.	.	.	.	0	.	.	.	.
IL	2	75	110	93	25	2	250	2,000	1,125	1,237
IN	2	25	75	50	35	2	500	800	650	212
LA	2	200	450	325	177	2	1,200	1,500	1,350	212
MD	1	50	50	50	.	1	6,000	6,000	6,000	.
MI	1	70	70	70	.	1	4,000	4,000	4,000	.
NV	1	50	50	50	.	1	64,000	64,000	64,000	.
NY	2	75	100	88	18	2	1,000	2,640	1,820	1,160
OH	2	60	150	105	64	2	1,100	1,500	1,300	283
OK	1	200	200	200	.	1	9,999	9,999	9,999	.
OR	1	100	100	100	.	1	850	850	850	.
SC	1	100	100	100	.	1	1,500	1,500	1,500	.
TX	4	60	300	165	108	4	300	11,000	6,325	5,068
UT	0	.	.	.	.	0	.	.	.	.
COMPACT										
AP	1	50	50	50	.	1	6,000	6,000	6,000	.
C	3	200	450	283	144	3	1,200	9,999	4,233	4,996
CM	2	75	110	93	25	2	250	2,000	1,125	1,237
MW	5	25	150	76	46	5	500	4,000	1,580	1,402
NE	0	.	.	.	.	0	.	.	.	.
NW	1	100	100	100	.	1	850	850	850	.
NY	2	75	100	88	18	2	1,000	2,640	1,820	1,160
RM	1	50	50	50	.	1	64,000	64,000	64,000	.
SE	2	100	300	200	141	2	1,500	6,400	3,950	3,465
SW	3	30	150	77	64	3	1,400	5,000	3,100	1,808
TX	4	60	300	165	108	4	300	11,000	6,325	5,068
ALL	24	25	450	128	103	24	250	64,000	5,827	12,802

TABLE 10-143

Distance to Nearest Private and Public Well

	Unit to Private Well					Unit to Public Well				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AL	0	.	.	.	.	0	.	.	.	.
CA	1	4,000	4,000	4,000	.	0	.	.	.	.
CT	0	.	.	.	.	0	.	.	.	.
ID	0	.	.	.	.	0	.	.	.	.
IL	0	.	.	.	.	0	.	.	.	.
IN	2	1,000	2,000	1,500	707	0	.	.	.	.
LA	1	1,500	1,500	1,500	.	0	.	.	.	.
MD	0	.	.	.	.	0	.	.	.	.
MI	0	.	.	.	.	0	.	.	.	.
NV	0	.	.	.	.	0	.	.	.	.
NY	0	.	.	.	.	0	.	.	.	.
OH	0	.	.	.	.	0	.	.	.	.
OK	0	.	.	.	.	0	.	.	.	.
OR	0	.	.	.	.	0	.	.	.	.
SC	0	.	.	.	.	0	.	.	.	.
TX	2	1,000	4,000	2,500	2,121	1	50	50	50	.
UT	0	.	.	.	.	0	.	.	.	.
COMPACT										
AP	0	.	.	.	.	0	.	.	.	.
C	1	1,500	1,500	1,500	.	0	.	.	.	.
CM	0	.	.	.	.	0	.	.	.	.
MW	2	1,000	2,000	1,500	707	0	.	.	.	.
NE	0	.	.	.	.	0	.	.	.	.
NW	0	.	.	.	.	0	.	.	.	.
NY	0	.	.	.	.	0	.	.	.	.
RM	0	.	.	.	.	0	.	.	.	.
SE	0	.	.	.	.	0	.	.	.	.
SW	1	4,000	4,000	4,000	.	0	.	.	.	.
TX	2	1,000	4,000	2,500	2,121	1	50	50	50	.
ALL	6	1,000	4,000	2,250	1,405	1	50	50	50	.

TABLE 10-144

Distance to Nearest River/Stream and Lake/Reservoir (ft)

	Unit to River/Stream					Unit to Lake/Reservoir				
	N	MIN	MAX	MEAN	STD	N	MIN	MAX	MEAN	STD
STATE										
AL	1	2,640	2,640	2,640	.	1	1,060	1,060	1,060	.
CA	1	1,500	1,500	1,500	.	0	.	.	.	.
CT	0	.	.	.	.	0	.	.	.	.
ID	0	.	.	.	.	0	.	.	.	.
IL	2	75	1,000	538	654	0	.	.	.	.
IN	1	650	650	650	.	1	1,500	1,500	1,500	.
LA	2	5,000	5,280	5,140	198	0	.	.	.	.
MD	1	200	200	200	.	0	.	.	.	.
MI	1	3,200	3,200	3,200	.	1	6,500	6,500	6,500	.
NV	1	5,000	5,000	5,000	.	0	.	.	.	.
NY	1	1,000	1,000	1,000	.	0	.	.	.	.
OH	2	40	5,000	2,520	3,507	0	.	.	.	.
OK	0	.	.	.	.	0	.	.	.	.
OR	0	.	.	.	.	0	.	.	.	.
SC	0	.	.	.	.	1	300	300	300	.
TX	2	50	1,000	525	672	0	.	.	.	.
UT	0	.	.	.	.	0	.	.	.	.
COMPACT										
AP	1	200	200	200	.	0	.	.	.	.
C	2	5,000	5,280	5,140	198	0	.	.	.	.
CM	2	75	1,000	538	654	0	.	.	.	.
MW	4	40	5,000	2,223	2,303	2	1,500	6,500	4,000	3,536
NE	0	.	.	.	.	0	.	.	.	.
NW	0	.	.	.	.	0	.	.	.	.
NY	1	1,000	1,000	1,000	.	0	.	.	.	.
RM	1	5,000	5,000	5,000	.	0	.	.	.	.
SE	1	2,640	2,640	2,640	.	2	300	1,060	680	537
SW	1	1,500	1,500	1,500	.	0	.	.	.	.
TX	2	50	1,000	525	672	0	.	.	.	.
ALL	15	40	5,280	2,109	2,054	4	300	6,500	2,340	2,817

TABLE 10-145

Populations

OBS	COMPACT	STATE	TOWN	Within One Mile of Site	Using Private Well	Using Public Well	Using River/Stream for Drinking Water	Using Lake/Reservoir for Drinking Water
1	AP	MD	BALTIMORE	0	.	.	.	.
2	C	LA	LIVINGSTON	0	5	.	.	.
3	C	LA	BATON ROUGE	350	.	.	.	.
4	C	OK	WAYNOKA	0	.	.	.	.
5	CM	IL	PEORIA	2500	.	.	.	.
6	CM	IL	CALUMET CITY	.	.	.	.	.
7	CM	IL	ZION	.	.	.	.	.
8	MW	IN	ROCHESTER	60	30	3000	.	.
9	MW	IN	FORT WAYNE	200	4	.	.	.
10	MW	MI	BELLEVILLE	4000	.	.	.	.
11	MW	OH	OREGON	1000	.	.	.	.
12	MW	OH	WILLIAMSBURG	250	.	.	.	.
13	NE	CT	DANBURY	.	.	.	.	.
14	NE	CT	TORRINGTON	.	.	.	.	.
15	NW	ID	GRAND VIEW	.	.	.	.	.
16	NW	OR	ARLINGTON	4	.	.	.	.
17	NW	UT	KNOWLES	.	.	.	.	.
18	NY	NY	MODEL CITY	20	.	.	.	.
19	NY	NY	NIAGARA FALLS	1000	.	.	.	.
20	RM	NV	BEATTY	0	.	.	.	.
21	SE	AL	EMELLE	0	.	.	.	.
22	SE	SC	PINEWOOD	50	.	.	.	.
23	SW	CA	BENICIA	100	14	.	.	.
24	SW	CA	WESTMORLAND	.	.	.	.	.
25	SW	CA	CASMALIA	5	.	.	.	.
26	SW	CA	MARTINEZ	1500	.	.	.	.
27	SW	CA	RICHMOND	.	.	.	.	.
28	TX	TX	TEXAS CITY	0	.	.	.	.
29	TX	TX	VICTORIA	2	1	1400	10000	.
30	TX	TX	DEER PARK	0	.	.	.	.
31	TX	TX	ROBSTOWN	25	.	.	.	.

TABLE 10-146

Population Within One Mile of Site

	Within One Mile of Site				
	N	MIN	MAX	MEAN	STD
STATE					
AL	1	0	0	0	.
CA	3	5	1,500	535	837
CT	0	.	.	.	.
ID	0	.	.	.	.
IL	1	2,500	2,500	2,500	.
IN	2	60	200	130	99
LA	2	0	350	175	247
MD	1	0	0	0	.
MI	1	4,000	4,000	4,000	.
NV	1	0	0	0	.
NY	2	20	1,000	510	693
OH	2	250	1,000	625	530
OK	1	0	0	0	.
OR	1	4	4	4	.
SC	1	50	50	50	.
TX	4	0	25	7	12
UT	0	.	.	.	.
COMPACT					
AP	1	0	0	0	.
C	3	0	350	117	202
CM	1	2,500	2,500	2,500	.
MW	5	60	4,000	1,102	1,661
NE	0	.	.	.	.
NW	1	4	4	4	.
NY	2	20	1,000	510	693
RM	1	0	0	0	.
SE	2	0	50	25	35
SW	3	5	1,500	535	837
TX	4	0	25	7	12
ALL	23	0	4,000	481	987

TABLE 10-147

Groundwater Monitoring - Upgradient Wells

COMPACT	STATE	TOWN	Groundwater Monitoring	Upgradient Wells Number	Upgradient Wells Average Depth (ft)	Upgradient Wells Sampling Events/Year	Upgradient Wells No. of Samples Per Event	Upgradient Wells Maximum Years Sampled
AP	MD	BALTIMORE	Yes	1	47	4	4	5
C	LA	LIVINGSTON	Yes	6	39	4	15	8
C	LA	BATON ROUGE	Yes	11	68	2	1	7
C	OK	WAYNOKA	Yes	12	20	4	5	10
CM	IL	PEORIA	Yes	3	.	4	2	6
CM	IL	CALUMET CITY	Yes	3	85	4	1	5
CM	IL	ZION	.	.	.	.	.	.
MW	IN	ROCHESTER	Yes	4	65	4	1	5
MW	IN	FORT WAYNE	Yes	6	25	4	20	6
MW	MI	BELLEVILLE	Yes	5	90	4	6	4
MW	OH	OREGON	Yes	5	89	1	1	3
MW	OH	WILLIAMSBURG	Yes	30	40	4	1	9
NE	CT	DANBURY	.	.	.	.	.	.
NE	CT	TORRINGTON	.	.	.	.	.	.
NW	ID	GRAND VIEW	.	.	.	.	.	.
NW	OR	ARLINGTON	Yes	4	195	12	1	.
NW	UT	KNOWLES	.	.	.	.	.	.
NY	NY	MODEL CITY	Yes	8	45	4	4	6
NY	NY	NIAGARA FALLS	Yes	.	.	.	.	.
RM	NV	BEATTY	Yes	1	325	12	4	4
SE	AL	EMELLE	Yes	1	700	2	9	5
SE	SC	PINEWOOD	Yes	3	.	6	.	.
SW	CA	BENICIA	Yes	6	40	4	1	3
SW	CA	WESTMORLAND	.	.	.	.	.	.
SW	CA	CASMALIA	Yes	1	200	4	14	5
SW	CA	MARTINEZ	Yes	37	40	4	1	10
SW	CA	RICHMOND	.	.	.	.	.	.
TX	TX	TEXAS CITY	Yes	5	50	4	1	8
TX	TX	VICTORIA	Yes	30	100	4	.	12
TX	TX	DEER PARK	Yes	14	50	.	10	10
TX	TX	ROBSTOWN	Yes	2	35	12	4	7

TABLE 10-148. Distribution of Groundwater Monitoring - Upgradient Wells - by State

		STATE														
		AL	CA	IL	IN	LA	MD	MI	NV	NY	OH	OK	OR	SC	TX	ALL
Number	N	1	3	2	2	2	1	1	1	1	2	1	1	1	4	23
	MEAN	1	15	3	5	9	1	5	1	8	18	12	4	3	13	9
	MIN	1	1	3	4	6	1	5	1	8	5	12	4	3	2	1
	MAX	1	37	3	6	11	1	5	1	8	30	12	4	3	30	37
	STD	.	20	0	1	4	.	.	.	.	18	.	.	.	13	10
Average Depth (ft)	N	1	3	1	2	2	1	1	1	1	2	1	1	0	4	21
	MEAN	700	93	85	45	54	47	90	325	45	65	20	195	.	59	112
	MIN	700	40	85	25	39	47	90	325	45	40	20	195	.	35	20
	MAX	700	200	85	65	68	47	90	325	45	89	20	195	.	100	700
	STD	.	92	.	28	21	.	.	.	.	35	.	.	.	28	153
Sampling Episodes Per Year	N	1	3	2	2	2	1	1	1	1	2	1	1	1	3	22
	MEAN	2	4	4	4	3	4	4	12	4	3	4	12	6	7	5
	MIN	2	4	4	4	2	4	4	12	4	1	4	12	6	4	1
	MAX	2	4	4	4	4	4	4	12	4	4	4	12	6	12	12
	STD	.	0	0	0	1	.	.	.	.	2	.	.	.	5	3
Number of Samples Per Well	N	1	3	2	2	2	1	1	1	1	2	1	1	0	3	21
	MEAN	9	5	2	11	8	4	6	4	4	1	5	1	.	5	5
	MIN	9	1	1	1	1	4	6	4	4	1	5	1	.	1	1
	MAX	9	14	2	20	15	4	6	4	4	1	5	1	.	10	20
	STD	.	8	1	13	10	.	.	.	.	0	.	.	.	5	5
Maximum No. of Years Sampled	N	1	3	2	2	2	1	1	1	1	2	1	0	0	4	21
	MEAN	5	6	6	6	8	5	4	4	6	6	10	.	.	9	7
	MIN	5	3	5	5	7	5	4	4	6	3	10	.	.	7	3
	MAX	5	10	6	6	8	5	4	4	6	9	10	.	.	12	12
	STD	.	4	1	1	1	.	.	.	.	4	.	.	.	2	3

TABLE 10-149 Distribution of Groundwater Monitoring - Upgradient Wells - by Compact

		COMPACT										
		AP	C	CM	MW	NW	NY	RM	SE	SW	TX	ALL
Number	N	1	3	2	5	1	1	1	2	3	4	23
	MEAN	1	10	3	10	4	8	1	2	15	13	9
	MIN	1	6	3	4	4	8	1	1	1	2	1
	MAX	1	12	3	30	4	8	1	3	37	30	37
	STD	.	3	0	11	.	.	.	1	20	13	10
Average Depth (ft)	N	1	3	1	5	1	1	1	1	3	4	21
	MEAN	47	42	85	62	195	45	325	700	93	59	112
	MIN	47	20	85	25	195	45	325	700	40	35	20
	MAX	47	68	85	90	195	45	325	700	200	100	700
	STD	.	24	.	29	.	.	.	.	92	28	153
Sampling Episodes Per Year	N	1	3	2	5	1	1	1	2	3	3	22
	MEAN	4	3	4	3	12	4	12	4	4	7	5
	MIN	4	2	4	1	12	4	12	2	4	4	1
	MAX	4	4	4	4	12	4	12	6	4	12	12
	STD	.	1	0	1	.	.	.	3	0	5	3
Number of Samples Per Well	N	1	3	2	5	1	1	1	1	3	3	21
	MEAN	4	7	2	6	1	4	4	9	5	5	5
	MIN	4	1	1	1	1	4	4	9	1	1	1
	MAX	4	15	2	20	1	4	4	9	14	10	20
	STD	.	7	1	8	.	.	.	.	8	5	5
Maximum No. of Years Sampled	N	1	3	2	5	0	1	1	1	3	4	21
	MEAN	5	8	6	5	.	6	4	5	6	9	7
	MIN	5	7	5	3	.	6	4	5	3	7	3
	MAX	5	10	6	9	.	6	4	5	10	12	12
	STD	.	2	1	2	.	.	.	.	4	2	3

TABLE 10-159

Groundwater Monitoring - Downgradient Wells

COMPACT	STATE	TOWN	Groundwater Monitoring	Downgradient Wells Number	Downgradient Wells Average Depth (ft)	Downgradient Wells Sampling Events/Year	Downgradient Wells No. of Samples Per Event	Downgradient Wells Maximum Years Sampled
AP	MD	BALTIMORE	Yes	3	35	4	4	5
C	LA	LIVINGSTON	Yes	52	39	4	15	8
C	LA	BATON ROUGE	Yes	29	61	2	1	7
C	OK	WAYNOKA	Yes	32	20	4	5	10
CM	IL	PEORIA	Yes	13	.	4	4	6
CM	IL	CALUMET CITY	Yes	14	78	4	1	5
CM	IL	ZION	.	.	.	.	.	.
MW	IN	ROCHESTER	Yes	12	65	4	1	5
MW	IN	FORT WAYNE	Yes	11	25	4	20	6
MW	MI	BELLEVILLE	Yes	16	90	4	6	4
MW	OH	OREGON	Yes	10	100	3	2	3
MW	OH	WILLIAMSBURG	Yes	100	40	4	1	9
NE	CT	DANBURY	.	.	.	.	.	.
NE	CT	TORRINGTON	.	.	.	.	.	.
NW	ID	GRAND VIEW	.	.	.	.	.	.
NW	OR	ARLINGTON	Yes	47	289	12	1	.
NW	UT	KNOWLES	.	.	.	.	.	.
NY	NY	MODEL CITY	Yes	150	45	4	4	6
NY	NY	NIAGARA FALLS	Yes	.	.	.	.	.
RM	NV	BEATTY	Yes	3	325	12	4	4
SE	AL	EMELLE	Yes	3	700	2	9	5
SE	SC	PINEWOOD	Yes	26	.	6	.	.
SW	CA	BENICIA	Yes	74	40	4	1	8
SW	CA	WESTMORLAND	.	.	.	.	.	.
SW	CA	CASMALIA	Yes	22	75	4	14	14
SW	CA	MARTINEZ	Yes	.	.	.	.	.
SW	CA	RICHMOND	.	.	.	.	.	.
TX	TX	TEXAS CITY	Yes	29	50	4	1	8
TX	TX	VICTORIA	Yes	95	100	4	.	12
TX	TX	DEER PARK	Yes	53	50	.	10	8
TX	TX	ROBSTOWN	Yes	94	35	12	4	7

TABLE 10-151. Distribution of Groundwater Monitoring - Downgradient Wells - by State

		STATE														
		AL	CA	IL	IN	LA	MD	MI	NV	NY	OH	OK	OR	SC	TX	ALL
Number	N	1	2	2	2	2	1	1	1	1	2	1	1	1	4	22
	MEAN	3	48	14	12	41	3	16	3	150	55	32	47	26	68	40
	MIN	3	22	13	11	29	3	16	3	150	10	32	47	26	29	3
	MAX	3	74	14	12	52	3	16	3	150	100	32	47	26	95	150
	STD	.	37	1	1	16	.	.	.	.	64	.	.	.	32	39
Average Depth (ft)	N	1	2	1	2	2	1	1	1	1	2	1	1	0	4	20
	MEAN	700	58	78	45	50	35	90	325	45	70	20	289	.	59	113
	MIN	700	40	78	25	39	35	90	325	45	40	20	289	.	35	20
	MAX	700	75	78	65	61	35	90	325	45	100	20	289	.	100	700
	STD	.	25	.	28	16	.	.	.	.	42	.	.	.	28	160
Sampling Episodes Per Year	N	1	2	2	2	2	1	1	1	1	2	1	1	1	3	21
	MEAN	2	4	4	4	3	4	4	12	4	4	4	12	6	7	5
	MIN	2	4	4	4	2	4	4	12	4	3	4	12	6	4	2
	MAX	2	4	4	4	4	4	4	12	4	4	4	12	6	12	12
	STD	.	0	0	0	1	.	.	.	.	1	.	.	.	5	3
Number of Samples Per Well	N	1	2	2	2	2	1	1	1	1	2	1	1	0	3	20
	MEAN	9	8	3	11	[illegible]	4	6	4	4	2	5	1	.	5	5
	MIN	9	1	1	1	1	4	6	4	4	1	5	1	.	1	1
	MAX	9	14	4	20	15	4	6	4	4	2	5	1	.	10	20
	STD	.	9	2	13	10	.	.	.	.	1	.	.	.	5	5
Maximum No. of Years Sampled	N	1	2	2	2	2	1	1	1	1	2	1	0	0	4	20
	MEAN	5	11	6	6	8	5	4	4	6	6	10	.	.	9	7
	MIN	5	8	5	5	7	5	4	4	6	3	10	.	.	7	3
	MAX	5	14	6	6	8	5	4	4	6	9	10	.	.	12	14
	STD	.	4	1	1	1	.	.	.	.	4	.	.	.	2	3

TABLE 10-152. Distribution of Groundwater Monitoring - Downgradient Wells - by Compact

		COMPACT										
		AP	C	CM	MW	NW	NY	RM	SE	SW	TX	ALL
Number	N	1	3	2	5	1	1	1	2	2	4	22
	MEAN	3	38	14	30	47	150	3	15	48	68	40
	MIN	3	29	13	10	47	150	3	3	22	29	3
	MAX	3	52	14	100	47	150	3	26	74	95	150
	STD	.	13	1	39	.	.	.	16	37	32	39
Average Depth (ft)	N	1	3	1	5	1	1	1	1	2	4	20
	MEAN	35	40	78	64	289	45	325	700	58	59	113
	MIN	35	20	78	25	289	45	325	700	40	35	20
	MAX	35	61	78	100	289	45	325	700	75	100	700
	STD	.	21	.	32	.	.	.	.	25	28	160
Sampling Episodes Per Year	N	1	3	2	5	1	1	1	2	2	3	21
	MEAN	4	3	4	4	12	4	12	4	4	7	5
	MIN	4	2	4	3	12	4	12	2	4	4	2
	MAX	4	4	4	4	12	4	12	6	4	12	12
	STD	.	1	0	0	.	.	.	3	0	5	3
Number of Samples Per Well	N	1	3	2	5	1	1	1	1	2	3	20
	MEAN	4	7	3	6	1	4	4	9	8	5	5
	MIN	4	1	1	1	1	4	4	9	1	1	1
	MAX	4	15	4	20	1	4	4	9	14	10	20
	STD	.	7	2	8	.	.	.	.	9	5	5
Maximum No. of Years Sampled	N	1	3	2	5	0	1	1	1	2	4	20
	MEAN	5	8	6	5	.	6	4	5	11	9	7
	MIN	5	7	5	3	.	6	4	5	8	7	3
	MAX	5	10	6	9	.	6	4	5	14	12	14
	STD	.	2	1	2	.	.	.	.	4	2	3

TABLE 10-153
Surface Water Monitoring

COMPACT	STATE	TOWN	Direct Discharge to Surface Water	Surface Water Monitored	Each NPDES Outfall	Downstream NPDES Outfall	Upstream NPDES Outfall	Other	Number of Times Per Year Monitored
AP	MD	BALTIMORE	No	Yes	Yes	No	No	No	4
C	LA	LIVINGSTON	No	Yes	Yes	No	No	No	.
C	LA	BATON ROUGE	Yes	Yes	Yes	No	No	No	.
C	OK	WAYNOKA	No	Yes	No	No	Yes	No	.
CM	IL	PEORIA	No	Yes	No	No	No	Yes	.
CM	IL	CALUMET CITY	Yes	Yes	Yes	No	No	No	52
CM	IL	ZION	.	.	.	.	.	.	.
MW	IN	ROCHESTER	No	Yes	Yes	No	No	No	52
MW	IN	FORT WAYNE	No	Yes	No	No	No	Yes	4
MW	MI	BELLEVILLE	No	Yes	No	No	No	Yes	4
MW	OH	OREGON	No	No	No	No	No	No	.
MW	OH	WILLIAMSBURG	Yes	Yes	No	No	No	Yes	12
NE	CT	DANBURY	.	.	.	.	.	.	.
NE	CT	TORRINGTON	.	.	.	.	.	.	.
NW	ID	GRAND VIEW	.	.	.	.	.	.	.
NW	OR	ARLINGTON	No	No	No	No	No	No	.
NW	UT	KNOWLES	.	.	.	.	.	.	.
NY	NY	MODEL CITY	Yes	Yes	Yes	No	No	No	12
NY	NY	NIAGARA FALLS	No	Yes	Yes	No	Yes	No	12
RM	NV	BEATTY	No	No	No	No	No	No	.
SE	AL	EMELLE	No	Yes	No	No	No	Yes	4
SE	SC	PINEWOOD	No	No	No	No	No	No	.
SW	CA	BENICIA	Yes	Yes	Yes	No	Yes	Yes	.
SW	CA	WESTMORLAND	.	.	.	.	.	.	.
SW	CA	CASMALIA	No	No	No	No	No	No	.
SW	CA	MARTINEZ	No	No	No	No	No	No	.
SW	CA	RICHMOND	.	.	.	.	.	.	.
TX	TX	TEXAS CITY	No	Yes	No	No	Yes	No	.
TX	TX	VICTORIA	Yes	Yes	Yes	No	No	No	365
TX	TX	DEER PARK	Yes	Yes	Yes	No	No	No	104
TX	TX	ROBSTOWN	No	No	No	No	No	No	.

TABLE 10-154

Number of Employees by Facility

OBS	STATE	TOWN	COMPACT	Total	Hazardous Waste Operations	Support Operations	Contractors
1	AL	EMELLE	SE	387	182	205	0
2	CA	BENICIA	SW	35	24	11	0
3	CA	WESTMORLAND	SW	10	6	4	0
4	CA	CASMALIA	SW	41	30	11	0
5	CA	MARTINEZ	SW	30	8	2	0
6	CA	RICHMOND	SW	12	4	3	0
7	CT	DANBURY	NE	7	2	2	0
8	CT	TORRINGTON	NE	.	.	.	.
9	ID	GRAND VIEW	NW	42	19	13	0
10	IL	PEORIA	CM	28	16	9	0
11	IL	CALUMET CITY	CM	20	11	9	0
12	IL	ZION	CM	6	1	5	3
13	IN	ROCHESTER	MW	10	9	1	10
14	IN	FORT WAYNE	MW	30	9	21	0
15	LA	LIVINGSTON	C	120	24	96	0
16	LA	BATON ROUGE	C	143	59	84	0
17	MD	BALTIMORE	AP	4	4	0	0
18	MI	BELLEVILLE	MW	60	45	20	8
19	NV	BEATTY	RM	23	17	6	0
20	NY	MODEL CITY	NY	139	70	69	0
21	NY	NIAGARA FALLS	NY	105	18	63	24
22	OH	OREGON	MW	92	25	53	8
23	OH	WILLIAMSBURG	MW	99	26	73	0
24	OK	WAYNOKA	C	30	20	10	0
25	OR	ARLINGTON	NW	86	12	74	0
26	SC	PINEWOOD	SE	100	53	27	20
27	TX	TEXAS CITY	TX	5	3	2	0
28	TX	VICTORIA	TX	1500	200	50	25
29	TX	DEER PARK	TX	165	125	40	0
30	TX	ROBSTOWN	TX	25	4	21	0
31	UT	KNOWLES	NW	30	16	14	0

TABLE 10-155

Landfill Facilities - Number of Employees

		COMPACT											
		AP	C	CM	MW	NE	NW	NY	RM	SE	SW	TX	ALL
Total	N	1	3	3	5	1	3	2	1	2	5	4	30
	MIN	4	30	6	10	7	30	105	23	100	10	5	4
	MAX	4	143	28	99	7	86	139	23	387	41	1,500	1,500
	MEAN	4	98	18	58	7	53	122	23	244	26	424	113
	STD	.	60	11	38	.	29	24	.	203	14	721	273
Hazardous Waste Operations	N	1	3	3	5	1	3	2	1	2	5	4	30
	MIN	4	20	1	9	2	12	18	17	53	4	3	1
	MAX	4	59	16	45	2	19	70	17	182	30	200	200
	MEAN	4	34	9	23	2	16	44	17	118	14	83	35
	STD	.	21	8	15	.	4	37	.	91	12	97	50
Support Operations	N	1	3	3	5	1	3	2	1	2	5	4	30
	MIN	0	10	5	1	2	13	63	6	27	2	2	0
	MAX	0	96	9	73	2	74	69	6	205	11	50	205
	MEAN	0	63	8	34	2	34	66	6	116	6	28	33
	STD	.	47	2	29	.	35	4	.	126	4	21	43
Contractors	N	1	3	3	5	1	3	2	1	2	5	4	30
	MIN	0	0	0	0	0	0	0	0	0	0	0	0
	MAX	0	0	3	10	0	0	24	0	20	0	25	25
	MEAN	0	0	1	5	0	0	12	0	10	0	6	3
	STD	.	0	2	5	.	0	17	.	14	0	13	7

TABLE 10-156

Population of Counties with Hazardous Waste Landfills Accepting Off-site Wastes from Non-owner Generators

STATE	COUNTY/PARISH	POPULATION
AL	SUMTER	16,908
CA	SOLANO	235,203
CA	IMPERIAL	92,110
CA	SANTA BARBARA	298,994
CA	CONTRA COSTA	656,331
CT	FAIRFIELD	807,143
CT	LITCHFIELD	156,769
ID	BINGHAM	36,489
IL	PEORIA	200,466
IL	COOK	5,253,628
IL	LAKE	440,387
IN	FULTON	19,335
IN	ALLEN	294,335
LA	LIVINGSTON	58,806
LA	E. BATON ROUGE	366,191
MD	BALTIMORE	655,615
MI	WAYNE	2,337,843
NV	NYE	9,048
NY	NIAGARA	227,354
OH	LUCAS	471,741
OH	CLERMONT	128,483
OK	WOODS	10,923
OR	GILLIAM	2,057
SC	SUMTER	88,243
TX	GALVESTON	195,738
TX	VICTORIA	68,807
TX	HARRIS	2,409,547
TX	NUECES	268,215
UT	TOOELE	26,033

TABLE 10-157

TYPICAL TRANSPORTATION DISTANCE TO
HAZARDOUS WASTE LANDFILLS IN THE U.S.
BY COMPACT

COMPACT REGIONS	NUMBER OF LANDFILLS	AREA (sq. mi.)	SQUARE MILES PER COMBUSTOR	TYPICAL DISTANCE STRAIGHT LINE (MILES)	TYPICAL DISTANCE TRANSPORTATION (MILES)*
Northwest	3	1,078,196	359,399	239	478
Rocky Mountains	1	434,054	434,054	263	526
Southwestern	5	420,524	84,105	116	231
Central	3	330,527	110,176	132	265
Midwest	5	402,569	80,514	113	226
Central Midwest	3	96,755	32,252	72	143
Southeast	2	383,661	191,831	175	349
Northeast	2	12,805	6,403	32	64
Appalachian	1	82,045	82,045	114	229
Unaffiliated States:					
Dist. of Columbia	0	63	NA	NA	NA
Maine	0	33,265	NA	NA	NA
Massachusetts	0	8,284	NA	NA	NA
New Hampshire	0	9,279	NA	NA	NA
New York	2	49,108	24,554	63	125
Rhode Island	0	1,212	NA	NA	NA
Texas	4	266,807	66,702	103	206
Vermont	0	9,614	NA	NA	NA

* Assumes a factor of 2.0 to convert straight line distance to transportation distance.

11.0 CHARACTERIZATION OF REFERENCE TREATMENT AND DISPOSAL FACILITIES

The IMPACTS-BRC model (code) is described in detail in two U.S. NRC documents (NRC90 and NRC92). This section focuses on differences between existing facilities and practices reviewed in Section 10 and the assumptions used in the IMPACTS-BRC code. Section 10 provides information that may be substituted for the default parameters built into the IMPACTS-BRC code.

11.1 Reference Treatment Facilities

11.1.1 On-site Incineration

Table 11-1 lists the parameters for on-site incineration. The NRC code assumes the facility to be a small incinerator for pathogens. The code's manual does not specify the feed rate for this facility, but it is modeled on facilities with a feed rate of 100 to 500 lb/hr. This parameter appears to be adequate.

A mass reduction factor of 2 is used if the user does not supply a value. A mass reduction factor of 3 would be more appropriate.

The code assumes no incremental worker exposure for an on-site incinerator because the facility would be licensed to handle radioactive materials. Worker safety is assumed to be covered under a radiation safety program. If waste were processed, however, incinerator operators would have to be trained to handle radioactive material. A typical hospital incinerator operates about 4 hours a day and 5 days a week.

Doses to individuals off site are calculated in the NRC code based on a ground-level release at a distance of 100 meters from the incinerator. The ground-level release is an appropriately conservative assumption, given the stack heights of six feet in the survey data. The closest individual, on the other hand, is likely to be standing on the sidewalk outside of the hospital or research facility at a distance likely to be closer to 10 meters than 100 meters.

Population densities surrounding the incinerator site default to the generic regional estimates if the user does not supply values.

For an urban site in the northeast, the code assumes a population density of 2,280 persons per square mile at the 50-mile radius. The upper bound for the exposed population would be represented by the scenario where the incinerator site is

TABLE 11-1

Comparison Of On-site Incinerator Parameters

	IMPACTS-BRC		Survey Values		
Parameter	Input	Value	Typical	Minimum	Maximum
Feed Rate (lbs/hr)		100-500	150	1	2,700
Stack Height (ft)	HYTI	0	78	6	365
(m)		0	24	2	111
Mass Reduction Factor	OSWR	2	3		
Operating Parameters		5 days/week 4 hours/day			
Nearest Exposed Member of Population (m)	DISTI	100	10		
Population Density NE Site	PDS(1-6)	228			68,105
50-Mile Radius (persons/sq. mi.)	TPOP	2,280			68,105 (Manhattan)

Source: NRC90 and NRC92.

in New York City, a location with several biomedical waste generators. The average population density for Manhattan is 68,105 persons per square mile, while that for Brooklyn is 32,967 persons per square mile (CEN90). In other words, the estimated population may be off by a factor of 14 or more.

11.1.2 Off-site Incineration at a Municipal Facility

Table 11-2 compares some of the IMPACTS-BRC parameters and assumptions with the actual data on municipal incinerators provided in various surveys. The size and stack height ought to be reduced to 200 tons/day and 140 feet, respectively. The mass reduction factor ought to be increased to 3.

The release rate of 10 pounds per ton needs to be checked against the standards in 40 CFR 60, Subpart E. Particulate matter emissions from the stack are limited to 0.08 grains/dry cubic feet at standard conditions (gr/dscf) (CFR89). The code's model incinerator has a 500 ton/day capacity. This would result in 5,000 pounds per day being released from the stack. Assuming the 0.08 gr/dscf limit is appropriate, the limit converts to 1.14^{-5} lb/dscf. (There are 7,000 grains per pound.) The volumetric flow at the limit to generate 2,000 lb of particulate matter would have to be 4.37×10^{8} dscf/day or 3.05×10^{5} dscfm. The volume flow rate for a model 500 ton/day plant is 9.62×10^{4} (EPA89). The code's model incinerator, then, has a volume flow rate about 3 times higher than the most comparable EPA model incinerator.

The code assumes 30 people are employed at the incineration site. EPA89 estimates about 16 people for a 900 ton/day refuse-derived fuel facility.

Some municipal incinerators are located in highly populated areas such as Brooklyn, New York. The population density for this county is 32,167 persons/square mile, compared to the 228 persons/square mile used in the NRC code.

Transportation distances to the incinerator are off by almost an order of magnitude. The average distance is 88 miles and ranges from 6 to 306 miles, depending on the state, while the NRC code uses a value of 10 miles.

TABLE 11-2

Comparison Of Municipal Incinerator Parameters

	IMPACTS-BRC		Survey Values		
Parameter	Input	Value	Typical	Minimum	Maximum
Feed Rate (tons/day)		500	200	5	3,300
Stack Height (ft)	HYTI	200	140	25	365
Mass Reduction Factor	OSWR	2	3	2	13
Release Rate		10 lb/ton			0.08 gr/dscf
Personnel Requirements		30	16 (for 900 ton/day refuse-derived fuel facility)		
Population Density NE Site	PDS(1-6)	228			32,167 (Brooklyn)
50-Mile Radius (persons/sq. mi.)	TPOP	2,208			32,167 (Brooklyn)
Transportation Distance (Miles)	TDIS	10	88	6	306

Sources: NRC90 and NRC92.

11.1.3 Off-site Incineration at a Hazardous Waste Facility

Table 11-3 compares the parameters for hazardous waste incinerators. The code's model unit is larger than the typical unit, but it is still within the range in the survey data. The EPA survey did not request information on stack height, so no comparison can made about this parameter.

The mass reduction factor used in the NRC code is 21.7, in part because of the assumed 60 percent liquid volume of the waste. An examination of Table 10-26 shows that the proportions of liquids and solids in the influent vary widely. Since the volume of hazardous liquids is assumed to be small, a more conservative estimate would be a mass reduction factor of 13 for a fluidized-bed combustor (see Table 10-5).

The code assumes that 13 people are employed at the incinerator, while the EPA survey indicates that 31 people typically work in hazardous waste operations at the facilities.

Table 11-4 lists the extremes of the population distribution within a mile of the hazardous waste incinerator. The maximum value seen in the survey is 20,000 individuals, while the median value is 250 people. The population within a 50-mile radius of the site may also require an upward adjustment from the value used in the code. One of the "commercial" incinerators is in Cook County, Illinois, with a population of 5.3 million, compared to the 1 million persons estimated for the northeastern site.

Transportation distances to the incinerator are too small. Because so few facilities take waste from outside generators, transportation distances of about 250 miles are typical. The average distance ranges from 63 miles to 800 miles, depending on the state.

11.2 Reference Disposal Facility

11.2.1 Municipal Solid Waste Landfills

Table 11-5 lists some of the operating characteristics of municipal solid waste landfills. They are generally larger and shallower than the model facility used in the NRC code, with a size of 40 acres and a depth of 8 feet. The waste:cover ratio used in the code is frequently seen in the survey data, so this parameter is deemed appropriate.

The reference landfill in the code disposes of 17,468 MT/year and operates for 280 days a year. This translates into about 62 tons/day. EPA88 states that, as a general rule, one

TABLE 11-3

Comparison Of Hazardous Waste Incinerator Parameters

	IMPACTS-BRC		Survey Values		
Parameter	Input	Value	Typical	Minimum	Maximum
Feed Rate (tons/day)		100	44	.7	144
Stack Height (ft)	HYTI	200	--	--	--
Mass Reduction Factor	OSWR	21.7	13	7	13
Personnel Requirements		13	31	3	2,000
Nearest Individual (feet)		984	2,685	120	10,000
Population 50-Mile Radius	PDS(6) TPOP	27,158 to 10 million	143,968 (Sullivan Co, TN)	9,270 (Carroll Co, KY)	53 (Cook Co, IL)
Transportation Distance (Miles)	TDIS	100	250	63	800

Sources: NRC90 and NRC92.

TABLE 11-4

Population Near Hazardous Waste Incinerators

Data Source	Population	
	Within 5 Miles	Within 1 Mile
IMPACTS-BRC		
NE	3,440	
SE	2,024	
SW	59	
Survey Data		
Minimum		0
Maximum		20,000
Median		250

Source: NRC90 and NRC92.

TABLE 11-5

Comparison Of Municipal Solid Waste Landfill Parameters

	IMPACTS-BRC		Survey Values		
Parameter	Input	Value	Typical	Minimum	Maximum
Size (acres)		25	40	1	5,250
Depth (feet)		24	8		
Waste:Cover Ratio		4:1	4:1, 3:1	1:1	10:1
Personnel		10	1 employee per 70 tons/day		

Source: NRC90 and NRC92.

employee is needed per 70 tons per day received. The code assumes a staff of 10 employees. Accordingly, the number of employees at the model facility may need to be updated.

Many of the user-allowed inputs are derived parameters. For example, the user may enter various ground water travel times:

- DTTM: travel time between the sectors of the facility
- TTM(1): travel time to intruder well
- TTM(2): travel time to population well
- TTM(3): travel time to surface water

The travel time between the sectors of the facility would increase by 60 percent if the size of the reference facility were changed from 25 to 40 acres. Table 11-6 summarizes the distances upon which the travel times are based. In some regards, the code is conservative in that it assumes a private well (intruder well), a public well (population well), and a source of surface drinking water within a mile of the site for the northeast and southeast reference sites. The survey data indicate that 55 percent of the facilities have no wells within a mile of the site, and only 5 percent have surface water bodies that are used for drinking water sources within a mile of the site.

Travel time is also dependent on the ground water flow rate. There is a 5 order-of-magnitude range in the values reported in the survey. The values used for reference sites, however, are very close to the median value seen in the survey data.

Table 11-7 identifies the worst-case scenario with respect to population exposures. There is one site where a population of 250,000 is served by a water source within a mile of the site. This, however, is 1 out of 1,011 sites or the .999 tail of the distribution. If county populations are used as an indication of the populations within a 50-mile radius, the upper bound may be 5 to 7 million people (Cook County, Illinois and Los Angeles County, California).

Transportation distances need adjusting. IMPACTS-BRC uses a 10-mile distance to the Subtitle D disposal facility. If the waste is incinerated, incineration is assumed to occur at the landfill site. This is not the case at the majority of the sites in the survey. First, typical transportation distances to the landfill range from 10 to 63 miles (depending on the region). The upper bound for this parameter is the case of New York waste being sent to New Mexico for disposal. Second, if incineration is an option, we must add transportation to the incineration site to obtain the total distance.

TABLE 11-6

Comparison Of Distances For Municipal Waste Landfills

	IMPACTS-BRC		Survey Values		
Distance to (ft)	Input	Value	Typical*	Minimum	Maximum
Private Well	NW	56	1,850	2	>5,280
	SE	56			
	SW	56			
Public Well	NE	1,640	2,357	220	>5,280
	SE	1,640			
	SW	9,242			
Surface Water	NE	3,281	1,989	50	>5,280
	SE	3,281			
	SE	----			
Groundwater Speed (ft/yr)	NE	3.3	16	.01	73,000
	SE	16			
	SW	33			

*When they exist within a mile of the site.

Source: NRC90 and NRC92.

TABLE 11-7

Population Using Water Sources Near Municipal Solid Waste Landfills

Data Source	Population	
	Within 5 Miles	Within 1 Mile
IMPACTS-BRC		
NE	3,440	
SE	2,024	
SW	59	
Survey Data		
Minimum		0
Maximum		250,000*

*Population served by a river or stream within 1-mile of a site.

Source: NRC90 and NRC92.

This could add anywhere from 30 to 200 miles to transportation distances.

There is a flag in the code to identify when leachate overflow impacts should be calculated. About 20 percent of the planned units in the 1986 survey were to have leachate collection systems. The 1991 regulations concerning municipal solid waste landfills requires leachate collection systems for new units and lateral expansions. There are two exceptions: an alternate design that meets performance standard and approved by an approved state is used, or the site qualifies for the small community exemption (less than 20 tons per day) in arid (less than 25 inches of rainfall a year) or remote areas where there is no reasonable alternative (EPA91, 50988). Most landfill units, then, will be designed to avoid "bathtub" effects. The code's IOFL parameter should be set to "1" in most cases, with Suboption 1, in IOFL, being the most likely scenario.

11.2.2 Hazardous Waste Landfills

Table 11-8 lists the general parameters for a hazardous waste landfill. The size of the average facility is about 3 times that in the code's reference landfill. The depth is appropriate. The number of employees at the reference site is 58, while the survey data indicate that 19 people are typically employed in hazardous waste operations, with another 14 people in support operations.

Table 11-9 summarizes the distances upon which the travel times are based. In some regards, the NRC code is conservative in that it assumes a private well (intruder well), a public well (population well), and a source of surface drinking water within a mile of the site for the northeast and southeast reference sites. The survey data indicate that only 21 percent of the facilities have wells within a mile of the site and 65 percent have surface water bodies that are used for drinking water sources within a mile of the site.

On the other hand, the survey data identify a worst-case scenario with respect to population exposures. There is one site where a population of 10,000 is served by a water source within a mile of the site. Table 11-10 summarizes the population within 1 mile of the site. The maximum value seen in the survey exceeds the value used in the NRC code for populations within 5 miles of the site. The code uses a 100-mile distance to the Subtitle C disposal facility. If the waste were incinerated, incineration is assumed to occur at the landfill site. This is not the case for the majority of the sites included in the survey.

TABLE 11-8

Comparison Of Hazardous Waste Landfills

	IMPACTS-BRC	Survey Values		
Parameter	Input Value	Typical	Minimum	Maximum
Size (acres)	150	450	1	3,000
Depth (feet)	25	28	2	70
Personnel	58	19	1	200

Source: NRC90 and NRC92.

TABLE 11-9

Comparison Of Distances For Hazardous Waste Landfill

	IMPACTS-BRC		Survey Values		
Distance to (ft)	Input	Value	Typical*	Minimum	Maximum
Private Well	NE	149	2,250	1,000	>5,280
	SE	149			
	SW	149			
Public Well	NE	1,640	50		very rare
	SE	1,640			
	SW	9,214			
Surface Water	NE	3,281	2,109	40	>5,280
	SE	3,281			
	SW	----			

*When they exist within a mile of the site.

Source: NRC90 and NRC92.

TABLE 11-10

Population Near Hazardous Waste Landfills

Data Source	Population	
	Within 5 Miles	Within 1 Mile
IMPACTS-BRC		
NE	3,440	
SE	2,024	
SW	59	
Survey Data		
Minimum		0
Maximum		4,000
Median		60

Source: NRC90 and NRC92.

First, typical transportation distances to the hazardous waste landfill range from 64 to 526 miles (depending on the region). In most instances, the typical transportation distance is about 250 miles. Second, if incineration were an option, the transportation to the incinerator would need to be considered in estimating the overall distance. This could add anywhere from 63 to 828 miles to the total transportation distance.

The NRC code provides a flag (IOFL) to identify when leachate overflows should be included. Regulations mandate the use of leachate collection systems at hazardous waste landfills. Accordingly, the flag should be set to "1" in all cases and the results of Suboption 2 (the "bathtub" effect) should be ignored.

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RTI91a Diskette containing 5 SAS data sets (control.ssd, aglbl.ssd, bglbl.ssd, gaglbl2.ssd, and binuse.ssd) for hazardous waste incinerators, prepared by H. Mark Hudson, Research Triangle Institute, Research Triangle Park, NC, under Purchase Order No. 110790-2RTI for SC&A, Inc., and received at Eastern Research Group, Inc., on 10 January 1991. Available through RTI.

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11. ABSTRACT (200 words or less)
This report describes the physical, chemical, and radiological properties of Class A low-level radioactive waste using data contained in the Manifest Information Management System (MIMS). Other sources of information include reports prepared by the NRC, DOE, low-level waste Compacts and States, and trade industries. The database characterizes low-level waste shipped for disposal from 1986 to 1990. A computer program was developed to analyze the data, with the results summarized in tables, histograms, and cumulative distribution curves presenting radionuclide concentration distributions in Class A waste as a function of waste streams, waste generators, and by regions.

The report also provides information characterizing the methods and facilities used to treat and dispose of non-radioactive waste, including industrial, municipal, and hazardous waste regulated under Subparts C and D of RCRA. The information includes a list of disposal options, the geographical locations of such facilities, and a description of such processing and disposal facilities.

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