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United States General Accounting Office

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Briefing Report to the Ranking Minority Member, Committee on Governmental Affairs, U.S. Senate

February 1995

HAZARDOUS WASTE

Compliance With Groundwater Monitoring Requirements at Land Disposal Facilities

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United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-259701

February 7, 1995

The Honorable John Glenn
Ranking Minority Member
Committee on Governmental Affairs
United States Senate

Dear Senator Glenn:

Groundwater is a major source of drinking water for many parts of the nation. If not properly constructed, land disposal facilities for hazardous waste may result in the leakage or release of pollutants and contaminants into the underlying groundwater. Through the enactment of the Resource Conservation and Recovery Act (RCRA) of 1976, the Congress sought to impose, among other things, control over land disposal facilities to minimize their potential adverse environmental impacts.

As part of its effort to implement the act, the Environmental Protection Agency (EPA) issued regulations generally requiring that owners/operators of land disposal facilities used to manage hazardous waste on or after November 19, 1980, install wells to monitor the groundwater under their facilities. The regulations' objectives were to immediately detect releases of hazardous waste. If a release is detected, owners/operators must assess the rate and extent of migration and the concentrations of hazardous waste in the groundwater and may be required to take corrective action to rectify any adverse environmental impact caused by the facility.

This briefing report responds to your request that we provide you with information on the implementation of EPA's groundwater monitoring requirements for hazardous waste land disposal facilities. Specifically, we are providing information on the number of (1) land disposal facilities subject to groundwater monitoring requirements and whether monitoring systems have been installed, (2) facilities where releases to the groundwater have occurred, (3) corrective actions that have been taken to prevent further groundwater contamination, and (4) citations that have been issued for groundwater monitoring violations. This briefing report summarizes the information we provided to your staff during a briefing on January 31, 1995.

To obtain data for the request, we surveyed EPA and state hazardous waste officials in March 1994. However, we did not independently confirm the information provided to us by the survey respondents. In summary, we

identified 1,209 hazardous waste land disposal facilities that must comply with EPA's groundwater monitoring requirements. For these facilities, respondents reported the following:

- At 976 facilities, or about 81 percent, all required monitoring systems are capable of immediately detecting if a release to the groundwater has occurred. Another 169 facilities, or about 14 percent, have some monitoring wells in place, but not all required systems are capable of immediately detecting a release. Only 54 facilities have no monitoring wells in place. We were unable to obtain complete data on the monitoring systems of the remaining 10 facilities.
- Releases have occurred at 890, or almost 74 percent, of the facilities. At 608, or about 68 percent, of these facilities, all groundwater monitoring systems are capable of determining the rate and extent of migration and the concentrations of hazardous waste in the groundwater. Of the remaining 282 facilities, 260, or about 29 percent, have some monitoring wells, but the systems may not be capable of fully assessing releases to the groundwater. However, not all facilities where releases have occurred are required to assess releases into the groundwater. At 15 other facilities, no wells have been installed. We were unable to obtain complete data on the capability of groundwater monitoring systems for seven facilities.
- Corrective action to prevent further groundwater contamination has been initiated at 606, or about 68 percent, of the 890 facilities where releases have occurred. Corrective action has not been initiated at 261 facilities where releases have occurred. Questionnaire respondents were unsure of the corrective status for the remaining 23 facilities.
- Groundwater monitoring violations have been cited at 650, or about 54 percent, of the 1,209 facilities since October 1, 1989. Sampling and analysis violations were the most frequent type of monitoring violation cited. As of September 30, 1993,[1] 211 of the 650 facilities were not in compliance with EPA's regulations.

Section 1 of this briefing report provides additional information on RCRA and the groundwater monitoring requirements. Section 2 discusses the universe of hazardous waste land disposal facilities subject to groundwater monitoring requirements and the extent to which these facilities have installed groundwater monitoring systems capable of immediately detecting a release of contaminants into the groundwater. Section 3 discusses facilities where releases have occurred, whether such facilities have groundwater monitoring systems that can assess those

[1]This briefing report contains the most recent information that was available at the time our survey was distributed.

releases, and the status of corrective action at those facilities. Section 4 discusses groundwater monitoring violations.

To identify hazardous waste land disposal facilities subject to EPA's groundwater monitoring regulations, we obtained data from the agency's Resource Conservation and Recovery Information System (RCRIS). RCRIS contains inspection, enforcement, and permit data on hazardous waste facilities nationwide. We then developed a questionnaire for the 1,427 land disposal facilities identified in RCRIS and mailed it to EPA regions and to states and territories authorized to administer their own RCRA programs. We asked the hazardous waste program officials who received the questionnaires to confirm whether each of the 1,427 facilities identified by RCRIS were subject to EPA's groundwater monitoring requirements and, if so, the status of each facility's compliance with those requirements. We also asked if the officials were aware of any additional facilities subject to these requirements.

Of the 1,427 questionnaires we distributed, 1,406, or almost 99 percent, were returned. Of these 1,406 questionnaires, 1,119, or about 80 percent, confirmed that the facility is subject to groundwater monitoring requirements. The respondents completed questionnaires for an additional 90 facilities that they cited as being subject to groundwater monitoring requirements. Thus, we obtained and subsequently analyzed groundwater monitoring information for a total of 1,209 facilities. Appendix I provides details on our scope and methodology, and appendix II contains the questionnaire. We performed our work from July 1993 to December 1994 in accordance with generally accepted government auditing standards.

We did not obtain written agency comments on a draft of this briefing report. However, we discussed a draft of the report with officials in EPA's Office of Enforcement and Compliance Assurance—including Branch Chiefs in the agency's Chemical, Commercial Services and Municipal Division and Regional Support Division—and Offices of Solid Waste and of Ground Water and Drinking Water. The officials generally concurred with the information presented in the briefing report. However, the officials suggested that we revise the report to clarify that the agency treats assessment monitoring and corrective action as one single approach to addressing groundwater contamination. We revised the report to include this and a few minor technical comments where appropriate.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this briefing report until 30 days after the date of this letter. At that time, we will send copies of the briefing report to the Administrator of EPA. We will also make copies available to others upon request.

Please contact me at (202) 512-6112 if you or your staff have any questions. Major contributors to this briefing report are listed in appendix III.

Sincerely yours,

Peter F. Guerrero
Director, Environmental
Protection Issues

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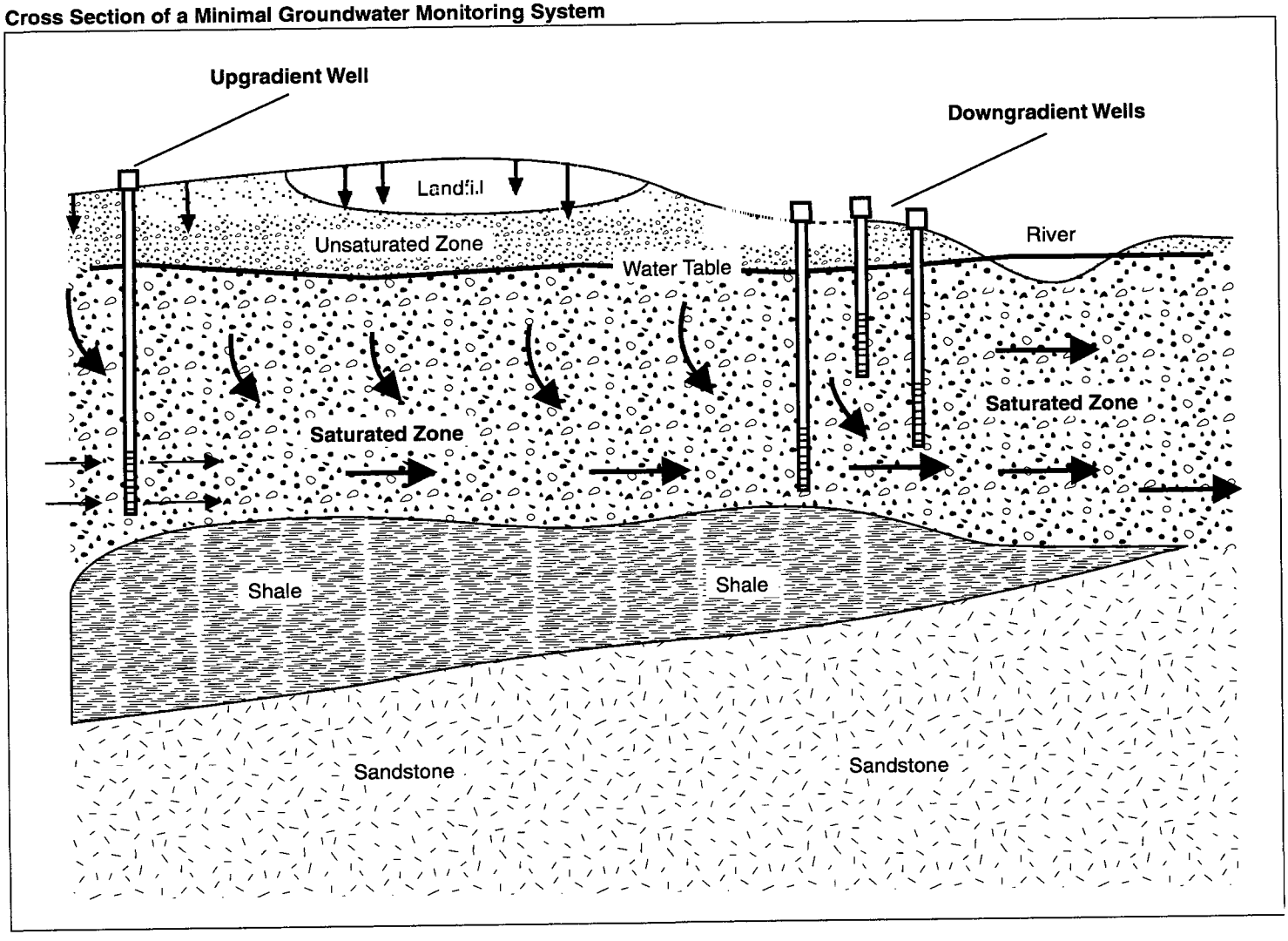
Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System

Groundwater Monitoring and RCRA

Cross Section of a Minimal Groundwater Monitoring System



Groundwater is the source of drinking water for about 50 percent of the nation's total population and nearly all of its rural population. Hazardous waste land disposal facilities present a direct contamination threat to groundwater because rain and snowmelt entering the soil can leach the hazardous constituents from such facilities and carry these contaminants to the groundwater. Depending upon the underlying terrain, the rate of groundwater flow, and the type and amount of constituents released from facilities, contaminated groundwater can easily migrate off-site and adversely affect groundwater users. Contaminated groundwater can cause cancer and other serious health problems, and clean-up of groundwater is costly and difficult, if not impossible, to achieve.

Groundwater monitoring is the principal means of detecting contamination at hazardous waste land disposal facilities. Groundwater monitoring systems normally consist of a number of wells placed in strategic locations and depths around a facility's disposal units.[1] Wells, which are referred to as "upgradient wells," are required to determine the quality of the groundwater before it reaches the facility, and additional wells, which are referred to as "downgradient wells," are needed to determine the groundwater quality after it passes under or by the facility. If the wells are properly located, comparison of data from upgradient and downgradient wells should indicate if contamination is occurring at the facility.

[1]A unit refers to a surface impoundment, waste pile, land treatment unit, or landfill. A facility may have more than one unit and/or several types of units.

GAO

RCRA

- Addresses the Problem of Hazardous Waste Disposal
- Requires Facility Permits
- Allows Facilities to Operate Under Interim Status

The Resource Conservation and Recovery Act (RCRA), an amendment of the Solid Waste Disposal Act of 1965, was enacted in 1976. One of RCRA's stated objectives is to ensure that hazardous waste management practices are conducted in a manner that protects human health and the environment. RCRA allows the Environmental Protection Agency (EPA) to authorize states to implement their own RCRA programs if the programs are determined to be equivalent to and consistent with EPA's and provide for adequate enforcement. Currently, 46 states, the District of Columbia, and Guam have received such authorization. EPA has responsibility for implementing RCRA in the remaining states.

Under RCRA, hazardous waste land disposal facilities are required to obtain permits in order to accept and dispose of hazardous waste or to close their operations. The Congress established an interim status period that allowed facilities in existence on November 19, 1980, who met certain conditions, to continue operating until their permit applications were approved or denied.

The Congress, concerned with EPA's limited progress in implementing the RCRA program, amended RCRA in 1984 to, among other things, require that all land disposal facilities certify compliance with the basic interim status program requirements and apply for an operating permit by November 1985. Facilities that failed to do so by November 8, 1985, lost interim status and were required to close within the next 14 months (by Jan. 1987). If these facilities did not remove all waste and contaminated soil, they must apply for a post-closure permit that describes, among other things, what corrective action will be taken to abate any contamination and how monitoring the facility for leakage for generally 30 years will occur.

GAO

RCRA Groundwater Monitoring Requirements

- Interim Status Requirements Issued on May 19, 1980
- Final Regulations Issued on July 26, 1982

EPA promulgated initial RCRA groundwater monitoring requirements on May 19, 1980,[2] in order to assess the impact of a facility on the groundwater beneath it. These requirements apply only to interim status facilities. All or part of the requirements may be waived if a facility can demonstrate that there is a low potential of migration of contaminants to water supply wells or to surface water. Under the requirements, by November 1981, owners/operators of existing land disposal facilities were

[2]40 C.F.R. part 265, subpart F.

to install a groundwater monitoring system consisting of a minimum of one upgradient well and three downgradient wells. The hydrogeology of the site,[3] however, may require that the owners/operators install more than one system. Once wells are installed, owners/operators are required to collect quarterly data for 1 year to establish background concentrations for selected chemicals. Routine detection monitoring is then required. In the event that a significant increase of contaminants is confirmed, owners/operators must implement a quality assessment program to determine what is contaminating the groundwater, the rate and extent of contaminant migration, and the concentrations of hazardous waste in the groundwater. If the assessment shows hazardous waste contamination, the owners/operators must continue assessing the groundwater until the facility is closed. Upon closure, monitoring is required unless the facility removes all waste and contaminated soil.

On July 26, 1982, EPA issued final groundwater monitoring regulations.[4] The regulations apply to land disposal units at hazardous waste facilities that received waste after this date. These units are referred to as "regulated units." The final regulations are similar to the interim status requirements and require a detection monitoring program and a compliance monitoring program. The regulations also establish a corrective action program. Detection monitoring is similar to the interim status detection monitoring requirement and is used to determine whether hazardous wastes are leaking at levels great enough to warrant compliance monitoring. Compliance monitoring is similar to the interim status assessment monitoring requirement and is used to determine whether groundwater contamination is occurring at a level requiring corrective action. Corrective action applies only to cleaning up or containing contamination resulting from releases at regulated units.[5]

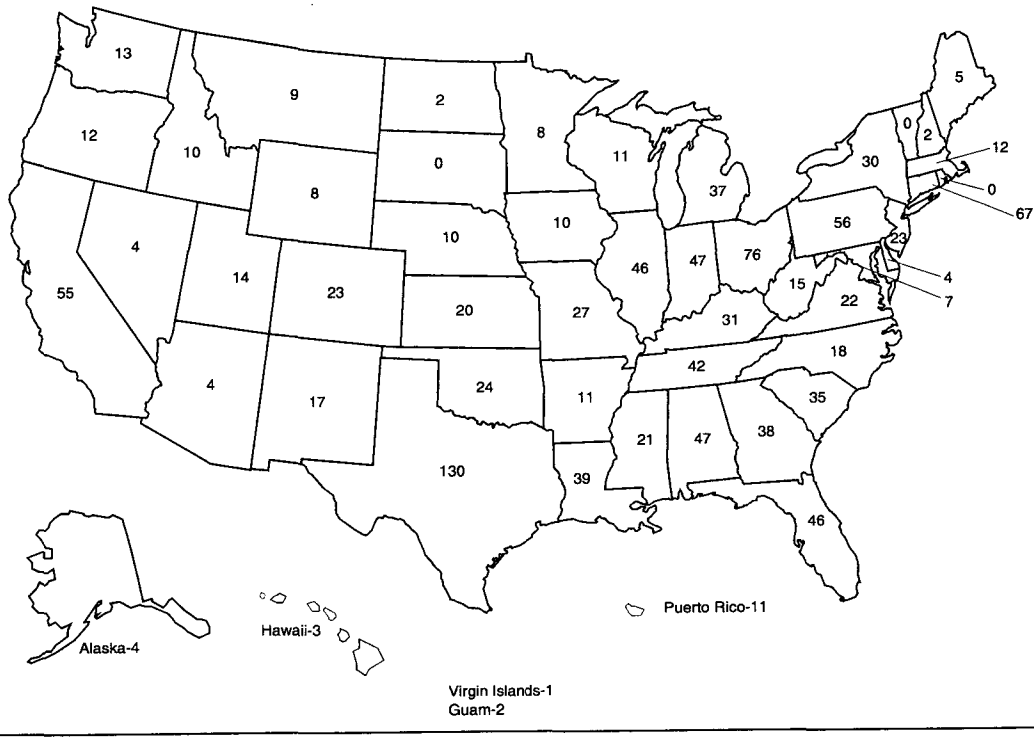
[3]Hydrogeology is the science dealing with the behavior of groundwater.

[4]40 C.F.R. part 264, subpart F.

[5]In general, if EPA discovers any contamination, it will evaluate the entire facility for additional contamination at both regulated units and those that stopped receiving waste before July 27, 1982. Depending on the source of the contamination, EPA can use several statutory and regulatory authorities to more comprehensively and efficiently address all contamination problems at a facility at the same time.

Number of Facilities Subject to Groundwater Monitoring Requirements and Detection Monitoring Capabilities

GAO Facilities Subject to Groundwater Monitoring Requirements



Number of Facilities Subject to Groundwater Monitoring Requirements

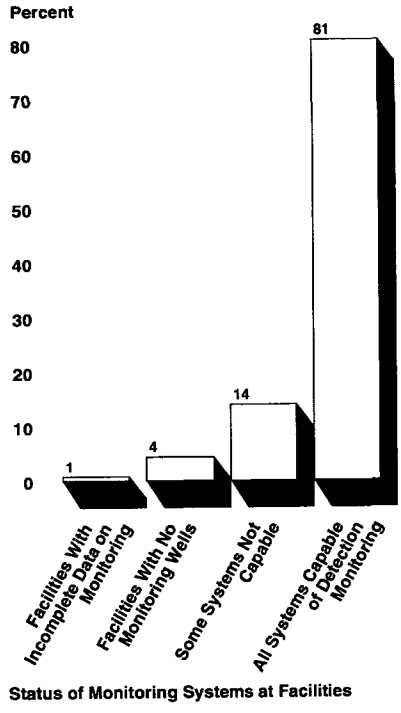
Through a survey of EPA and state hazardous waste officials, we identified 1,209 hazardous waste land disposal facilities nationwide that are subject to groundwater monitoring requirements as of March 1994. This number is comparable to the number of facilities found by the Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, in a 1985 groundwater monitoring survey.[1] The Subcommittee found that 1,246 facilities were subject to the groundwater monitoring requirements.

Texas and Ohio have the greatest number of facilities subject to the requirements (130 and 76, respectively), while Vermont, Rhode Island, and South Dakota have none. States and territories have, on average, 23 facilities subject to the requirements.

About 77 percent of the facilities require only one groundwater monitoring system in order to determine if a release has occurred. Due to hydrogeological conditions, the remainder of the facilities require from 2 to 17 systems.

[1]Groundwater Monitoring Survey, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, U.S. Government Printing Office, (Apr. 1985).

GAO Detection Monitoring Capabilities of Groundwater Monitoring Systems



Detection Monitoring Capabilities

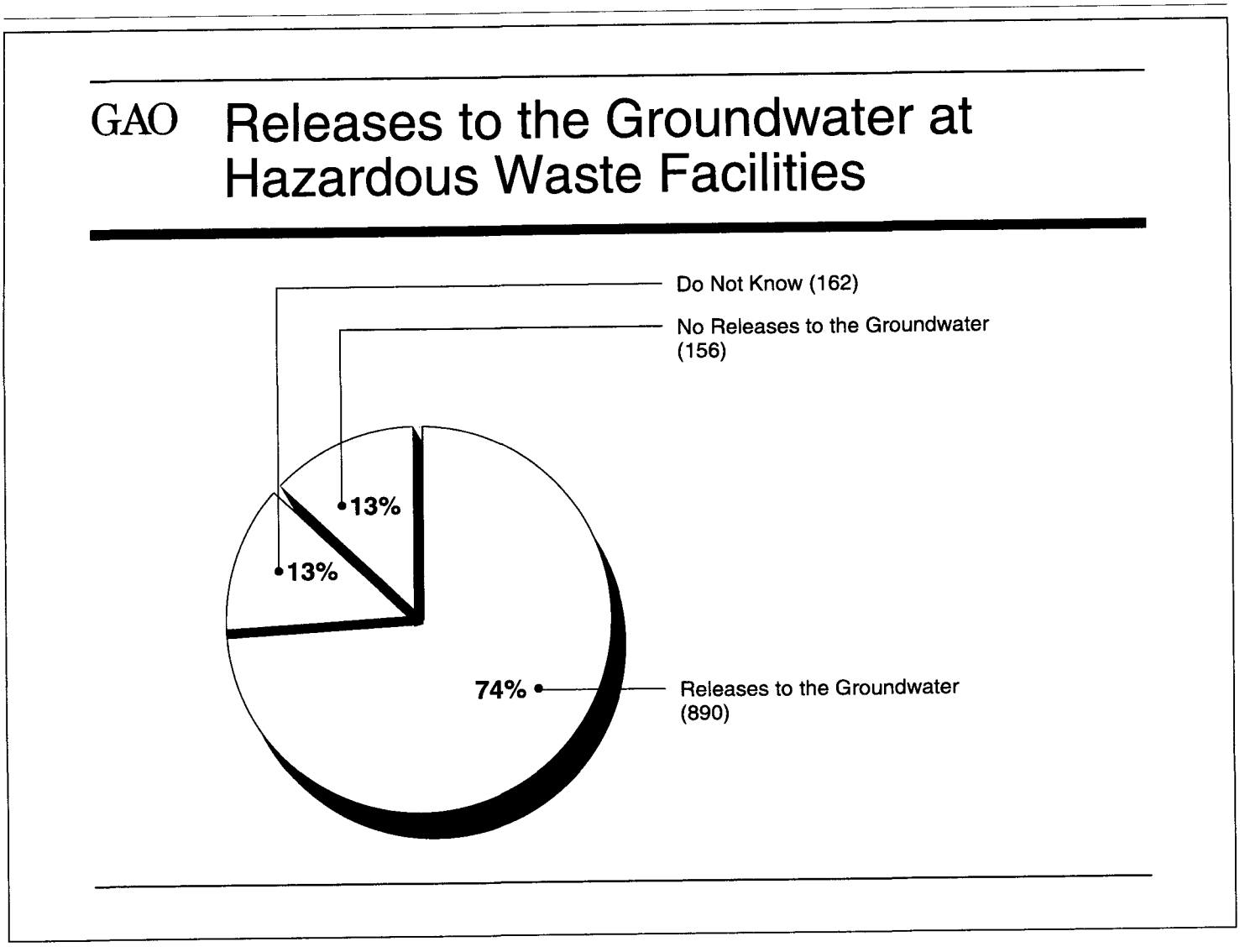
Respondents to our questionnaire reported that all required monitoring systems at 976, or about 81 percent, of the 1,209 facilities subject to groundwater monitoring requirements are capable of determining if a release has occurred to the groundwater. At 169 facilities, or about 14 percent, some monitoring wells are in place, but either (1) the groundwater monitoring system is not capable of immediately detecting if a release has occurred or (2) if more than one system is required, not all are capable of such detection. At the remaining 54 facilities, or about 4 percent, no wells are in place. The respondents did not provide complete data on the monitoring systems at 10, or less than 1 percent, of the facilities.

Detection Monitoring Capabilities, by State

State/Territory	No-Monitoring Wells	Some Systems Cannot Detect	All Systems Capable of Detection Monitoring	Facilities With Incomplete Data	Total Number of Facilities
Alaska		1	2	1	4
Alabama		2	45		47
Arkansas		4	7		11
Arizona		1	3		4
California	1	8	44	2	55
Colorado	2	3	17	1	23
Connecticut		7	60		67
Delaware			4		4
Florida	1		45		46
Georgia	1	5	32		38
Guam		1	1		2
Hawaii	1		2		3
Iowa	1	1	8		10
Idaho	1	3	5	1	10
Illinois	6	8	31	1	46
Indiana	5	19	22	1	47
Kansas	1	1	18		20
Kentucky	5	2	24		31
Louisiana		4	35		39
Massachusetts			12		12
Maryland			7		7
Maine			5		5
Michigan	2	4	31		37
Minnesota		1	7		8
Missouri			27		27
Mississippi		2	19		21
Montana			9		9
North Carolina		4	13	1	18
North Dakota			2		2
Nebraska	1		9		10
New Hampshire			2		2
New Jersey			23		23
New Mexico	3	1	13		17
Nevada		4			4
New York		2	27	1	30
Ohio	6	17	52	1	76
Oklahoma	2	5	17		24
Oregon		6	6		12
Pennsylvania		5	51		56
Puerto Rico		1	10		11
South Carolina		8	27		35
Tennessee	3	2	37		42
Texas	8	27	95		130
Utah		4	10		14
Virginia	2	3	17		22
Virgin Islands			1		1
Washington	1	1	11		13
Wisconsin			11		11
West Virginia	1	1	13		15
Wyoming		1	7		8
Total	**54**	**169**	**976**	**10**	**1209**

Monitoring system capabilities vary among the 47 states and 3 territories where the 1,209 hazardous waste land disposal facilities are located. All facilities in 10 states and 1 territory have groundwater monitoring systems fully capable of detecting releases. At least 75 percent of the facilities have such systems in 23 states and 1 territory. In another 12 states and 1 territory, 50 percent or more of the facilities have systems fully capable of detecting releases. Less than one-half of the facilities in the remaining two states are fully capable of detecting releases.

On the basis of the information the respondents provided for 47 states and 3 territories, 4 states (Illinois, Indiana, Ohio, and Texas) account for over one-third of the facilities nationwide that have either no monitoring wells or one or more monitoring systems that are not fully capable of detecting releases to the groundwater.

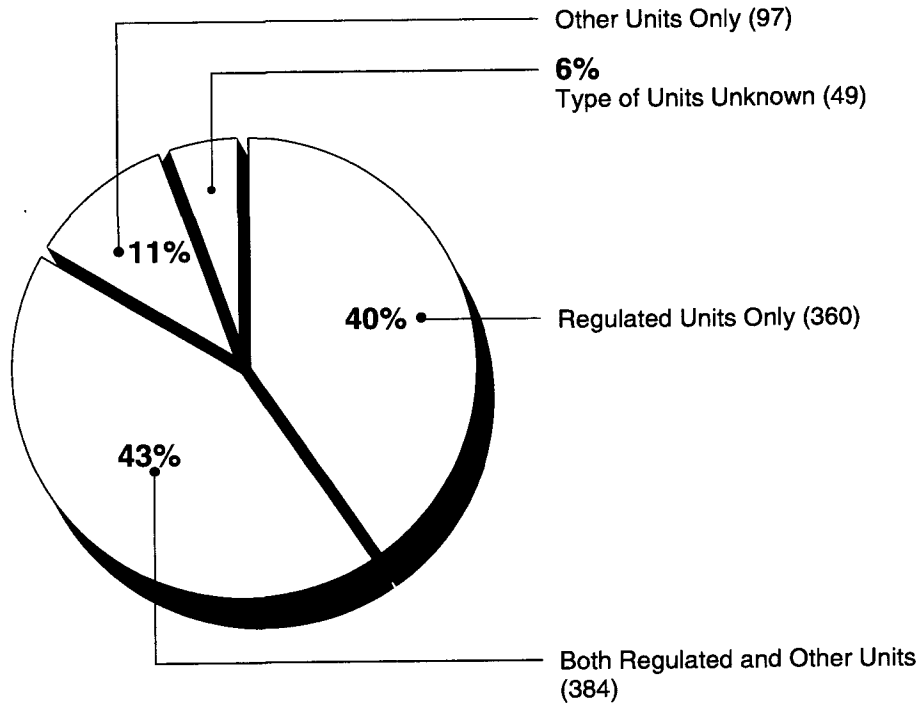

GAO
Releases to the Groundwater at Hazardous Waste Facilities
Do Not Know (162)
No Releases to the Groundwater (156)
13%
13%
74%
Releases to the Groundwater (890)

Releases to the Groundwater

The questionnaire respondents reported that most land disposal facilities have had a release of contaminants to the groundwater since they began receiving hazardous waste. Of the 1,209 facilities subject to the groundwater monitoring requirements, 890, or almost 74 percent, have had a release. Conversely, releases have not occurred at 156 (about 13 percent) of the facilities. The respondents were unsure whether 162 (about 13 percent) facilities have had a release, and information regarding releases was not provided for 1 facility.

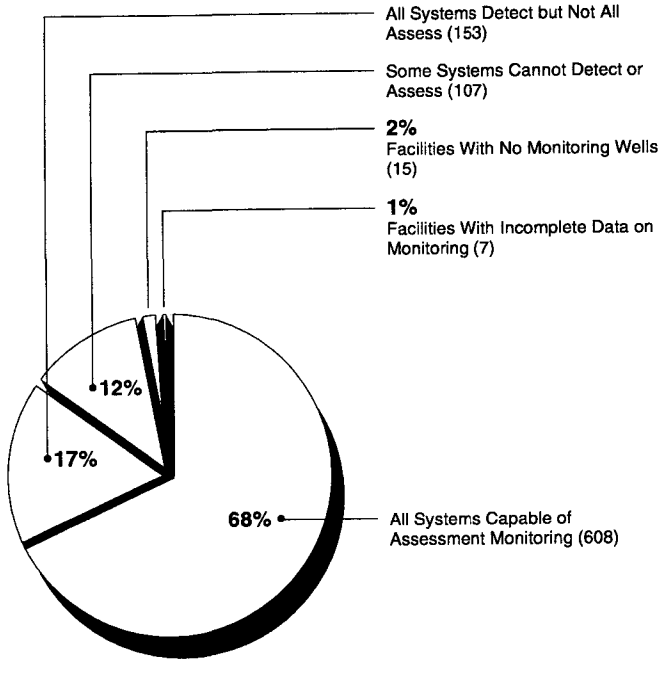
In the four states (Illinois, Indiana, Ohio, and Texas) that account for over one-third of the facilities nationwide that have either no monitoring wells or one or more monitoring systems not fully capable of detecting releases, the respondents reported that 59 percent of the facilities have had a release and 16 percent have not had a release. The respondents were unsure whether the remaining 25 percent have had a release.

GAO Types of Units Where Releases Have Occurred



Nationally, releases occurred from only regulated units—units that received waste after July 26, 1982—at 360 facilities. At 384 facilities, releases occurred from both regulated units and units that had stopped receiving waste prior to July 27, 1982. At 97 facilities, releases occurred from only those units that stopped receiving waste prior to July 27, 1982. The respondents were unsure what type of units had releases at the remaining 49 facilities.

GAO Assessment Monitoring Capabilities at Facilities With Releases



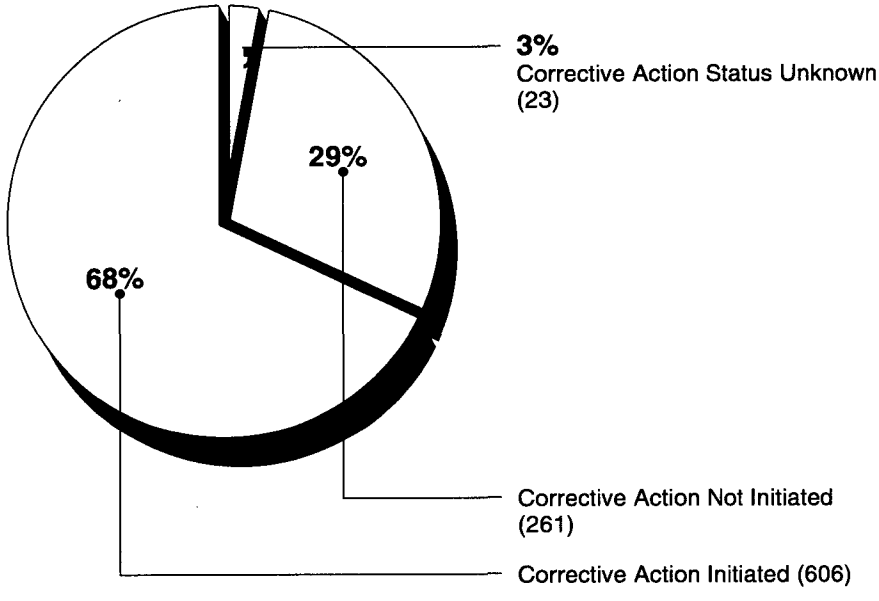
Assessment Monitoring Capabilities and Corrective Action

The questionnaire respondents reported that at the 890 facilities where releases have occurred, 608, or about 68 percent, have groundwater monitoring systems that are fully capable of assessing the rate and extent of migration and the concentrations of hazardous waste in the groundwater. Of the remaining facilities, 260 have some monitoring wells, but the systems may not be capable of fully assessing releases to the groundwater, if required.[1] Although 153 of these facilities (about 17 percent) have systems capable of determining if a release has occurred but not fully capable of assessing such releases, another 107 facilities (about 12 percent), have some systems that are not capable of detecting releases. Also, 15 facilities, or about 2 percent, have installed no monitoring wells. Finally, the respondents did not provide complete data on the status of groundwater monitoring systems for seven facilities (less than 1 percent).

[1]Not all groundwater monitoring systems at the 890 facilities where releases have occurred may be required to assess releases into the groundwater. A facility may have multiple land disposal units that require separate systems. However, a system need not be capable of assessment monitoring unless a release has occurred from a unit the system monitors. In addition, units that stopped receiving waste before November 19, 1980, are not subject to these groundwater monitoring requirements.

GAO

Corrective Actions at Facilities With Releases



The questionnaire respondents reported that owners/operators of 606 of the 890 facilities (about 68 percent) where releases have occurred have taken corrective action to remove and/or treat hazardous constituents to prevent further groundwater contamination. Conversely, 261, or about 29 percent, of the facilities have not initiated corrective action. The respondents were unsure about the corrective action status of the remaining 23 facilities.

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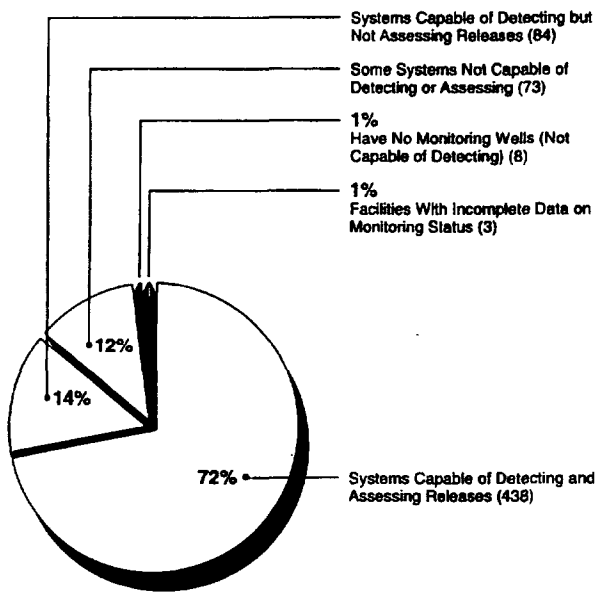
Groundwater Monitoring Capability

Facilities That Have Initiated Corrective Action

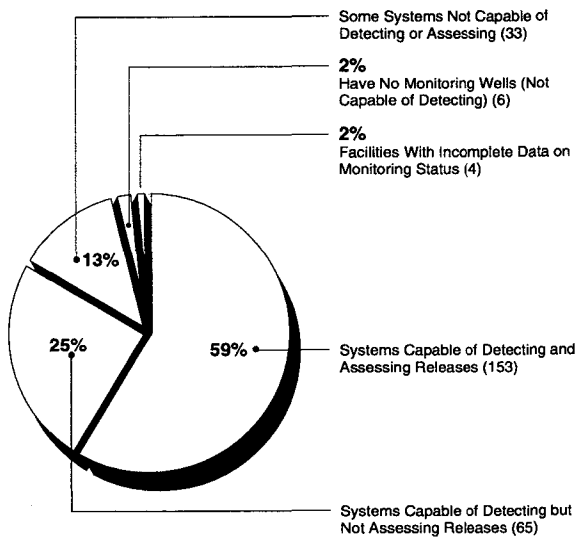


Of the 606 facilities that have initiated corrective action, 438, or about 72 percent, reportedly have systems capable of both detecting and assessing releases. Eighty-four facilities, or about 14 percent, have systems capable of detecting but not assessing releases.[2] Another 73 facilities, or about 12 percent, have some systems that are not capable of either detecting or assessing releases. Eight facilities, or about 1 percent, have installed no monitoring wells. The questionnaire respondents have incomplete data on the status of groundwater monitoring systems at the remaining three facilities, or about 1 percent.

[2]As noted earlier, all systems may not be required to assess releases.

GAO Groundwater Monitoring Capability

Facilities That Have Not Initiated Corrective Action



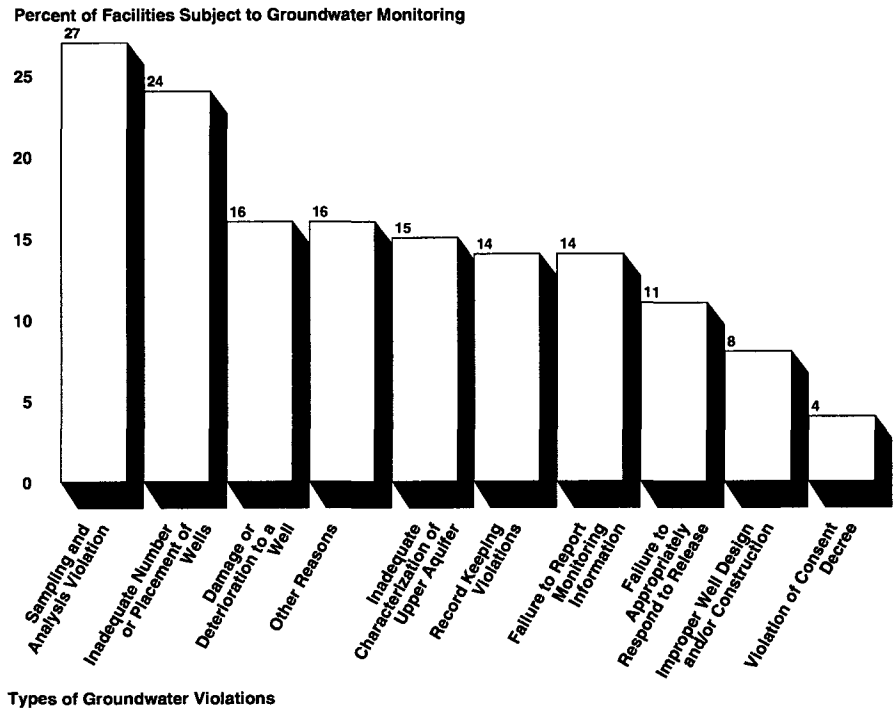
Note: Numbers do not add to 100 percent because of rounding.

Of the 261 facilities that have not initiated corrective action, 153, or about 59 percent, reportedly have systems capable of both detecting and assessing releases. In addition, 65 facilities, or about 25 percent, have systems capable of detecting but not assessing releases. Another 33 facilities, or about 13 percent, have some systems that are not capable of either detecting or assessing releases. Six facilities, or about 2 percent, have installed no monitoring wells. The questionnaire respondents have incomplete data on the status of groundwater monitoring systems at the remaining four facilities, or about 2 percent.

Groundwater Monitoring Violations

GAO

Frequency of Monitoring Violations Cited Since October 1, 1989



Violations Cited Since October 1989

Of the 1,209 facilities subject to groundwater monitoring requirements, 650, or about 54 percent, were cited for groundwater monitoring violations between October 1, 1989, and March 10, 1994. The most prevalent types of violations cited during this time period were (1) sampling and analysis violations and (2) inadequate number or placement of monitoring wells. Sampling and analysis violations were found at 328 facilities, or about 27 percent, while an inadequate number or placement of wells was found at 286 facilities, or about 24 percent.

Groundwater monitoring violations vary in their degree of seriousness. Failure to perform sampling and analysis is a serious violation because it may result in a failure to detect changes in groundwater quality. Likewise, having an inadequate groundwater monitoring system may allow hazardous waste to remain undetected until a large volume of waste or leachate has been released to the groundwater. Other violations, such as minor deviations from record keeping requirements, that do not impede compliance monitoring or enforcement efforts are less serious.

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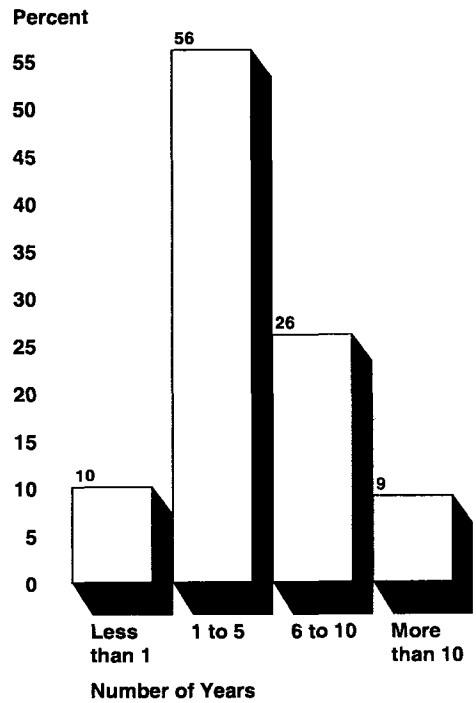
Length of Time Facilities Have Been Out of Compliance With Requirements



Note: Numbers do not add to 100 percent because of rounding.

Outstanding Groundwater Monitoring Violations as of September 30, 1993

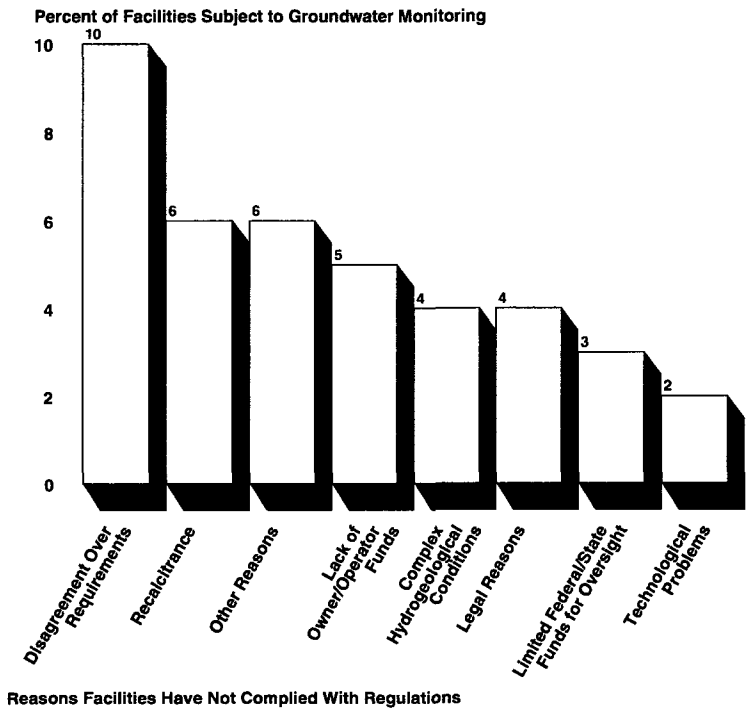
As of September 30, 1993, 211, or about 32 percent, of the 650 facilities that were cited for groundwater monitoring violations in the prior 4 years had outstanding Class I groundwater monitoring violations.[1] About 91 percent of these facilities have had outstanding violations for 1 or more years, while 9 percent have had outstanding violations for more than 10 years.

Of the 211 facilities, 116, or about 55 percent, are considered by questionnaire respondents to be "very likely" or "somewhat likely" to comply with the groundwater monitoring requirements. Another 24 facilities, or about 11 percent, are considered as likely as not to comply. In addition, 54 facilities, or about 26 percent, are considered "somewhat unlikely" or "very unlikely" to comply. The respondents were unsure whether 16 facilities, or nearly 8 percent, would return to compliance, and information was not provided for 1 facility.

[1]EPA classifies RCRA violations into one of two categories. A Class I violation is any deviation from EPA regulations, provision of compliance orders, consent degrees, or permit conditions that could result in a failure to (1) ensure hazardous waste is destined for and delivered to authorized treatment, storage, or disposal facilities; (2) prevent releases; (3) ensure early detection of releases; or (4) perform corrective action for releases. A Class II violation is any other violation of a RCRA requirement.

GAO

Reasons for Facilities' Noncompliance With Regulations



The reasons why facilities have not complied with groundwater monitoring requirements vary. The questionnaire respondents' most frequently cited reason was disagreement over technical/administrative requirements. Recalcitrance, or resistance to authority, was the second most frequent reason given. In addition, many of the respondents provided other reasons for noncompliance. Bankruptcy and a failure to understand the regulations were the two most frequently cited other reasons for noncompliance.

Table 4.1: Violation Status Based on Groundwater Monitoring Capability, as of September 30, 1993

Groundwater monitoring capability	Total number of facilities	Number and (percent) of facilities with violations	Number and (percent) of facilities out of compliance more than 5 years	Most frequently cited reason for noncompliance
No wells	54	22(41)	12(22)	Lack of funds
Some wells; all systems not capable of detection monitoring	169	66(39)	32(19)	Disagreement over requirements
All systems capable of detection monitoring but not assessment monitoring	194	55(28)	16(8)	Disagreement over requirements
All systems capable of detection and assessment monitoring	782	64(8)	11(1)	Disagreement over requirements
Total	1,199[a]	207(17)	72(6)	

[a]The questionnaire respondents did not provide data on the groundwater monitoring capabilities of 10 facilities; therefore, the facilities are not included in this table.

The number of facilities that have outstanding Class I groundwater monitoring violations,[2] the length of time they have been out of compliance, and the most frequently cited reason for their failure to comply varies depending on whether owners/operators have installed adequate groundwater monitoring systems. As expected, a higher percentage of facilities without monitoring wells had outstanding Class I violations and were out of compliance as of September 30, 1993. Lack of owner/operator funds was the most frequently cited reason for why these facilities were out of compliance.

[2]Additional facilities may have outstanding Class I monitoring violations. However, because our questionnaire only asked for information on facilities that had been notified of violations detected since October 1, 1989, information was not obtained on facilities notified of violations detected prior to that time.

Scope and Methodology

To determine the universe of hazardous waste land disposal facilities subject to groundwater monitoring, we obtained data from the Environmental Protection Agency's (EPA) Resource Conservation and Recovery Information System (RCRIS).[1] As of August 1993, RCRIS data indicated that 1,427 facilities were subject to monitoring requirements.

We developed a questionnaire and distributed it to EPA regions and authorized states and territories to obtain data on the extent of groundwater monitoring compliance for each of the 1,427 facilities. In instances where states and territories are not authorized to administer the Resource Conservation and Recovery Act (RCRA) program, we sent the questionnaire(s) to the respective EPA regional office. We asked respondents to confirm whether each facility is subject to groundwater monitoring requirements and requested that they complete questionnaires for any additional facilities not identified by RCRIS that are subject to the requirements. We also contacted three states that had no facilities among the 1,427 to confirm that no hazardous waste land disposal facilities in their respective states are subject to the requirements.

We received responses for 1,406, or almost 99 percent, of the 1,427 facilities. According to the respondents, 1,119, or about 80 percent, of these facilities are required to comply with EPA's groundwater monitoring requirements.[2] We also received questionnaires for an additional 90 facilities identified by the respondents as being subject to RCRA groundwater monitoring requirements that were not identified by RCRIS as being subject to the requirements. Therefore, the universe of facilities subject to the monitoring requirements is 1,209.

We determined whether facilities subject to groundwater monitoring requirements have monitoring systems in place and the capabilities of those systems. For example, we determined how many facilities have all required systems in place versus those that have only some or no systems in place. Of those that have some or all required systems in place, we compiled information on (1) how many were capable of immediately detecting releases and (2) how many were adequate to determine the rate and extent of migration and concentration of hazardous wastes in the groundwater. We then cross-tabulated this information with additional

[1]RCRIS contains inspection, enforcement, and permitting data on hazardous waste facilities.

[2]The reasons why 287 facilities are not subject to the requirements vary. Some facilities have no regulated land disposal units, while groundwater monitoring requirements have been waived for others. At other facilities, all hazardous waste and waste residues were removed from regulated units during the closure process.

questionnaire data on groundwater violations, environmental impact, and corrective action. We did not report on the data we obtained concerning the potential effects posed by releases to the groundwater (questions 20 and 21) because the responses received were subjective, and respondents based their assessment of potential effects on different criteria. As a result, we are unable to rely on respondents' answers to these questions in analyzing questionnaire data. We did not independently confirm the information provided to us by the respondents.

We performed our work from July 1993 to December 1994 in accordance with generally accepted government auditing standards.

Survey on the Adequacy of Groundwater Monitoring at Land Disposal Facilities

United States General Accounting Office

GAO

Survey on the Adequacy of Groundwater Monitoring at Land Disposal Facilities

INTRODUCTION

The U.S. General Accounting Office (GAO) is an agency that assists the Congress in evaluating federal programs. The purpose of this survey is to obtain data on the extent to which land disposal facilities comply with groundwater monitoring requirements contained in 40 C.F.R. part 264 and 265 (or state equivalent). This questionnaire is being sent to states and territories authorized to administer the Resource Conservation and Recovery Act (RCRA) program. For those states and territories that are not authorized to administer RCRA, the Environmental Protection Agency (EPA) regional office will receive this questionnaire.

Your cooperation in completing this questionnaire is vital to our study. The information collected through this survey along with other information will be summarized in our report to the Congress.

It is very important that each question is answered accurately. Accordingly, the questions should be completed by a person(s) in your agency who is most knowledgeable about the facility's groundwater monitoring system(s).

Please complete the questionnaire and return it no later than **April 18, 1994**. We have provided postage-paid business reply envelopes to facilitate the return of your questionnaire(s). In the event that the return envelope is misplaced, please send the completed questionnaire(s) to:

U.S. General Accounting Office
Attn: Deborah Ortega
1445 Ross Avenue, Suite 1500
Dallas, TX 75202

If you have any questions, please call Deborah Ortega or Mike Harmond toll free at 1-800-388-3289.

Please answer all questions in this questionnaire in terms of the specific land disposal facility identified on the label below.

**** PLACE LABEL HERE ****

SECTION I: GENERAL INFORMATION

1. Is this facility included on the National Priority List (NPL) under the Superfund program? *(Check one.)*

   1. ☐ Yes
   2. ☐ No

2. Is this facility currently subject to 40 C.F.R. part 264/265 Subpart F (or state equivalent) groundwater monitoring requirements? *(Check one.)*

   1. ☐ Yes ——→ ***skip to question 4***
   2. ☐ No ——→ ***continue to question 3***

3. Why is this facility currently not subject to 40 C.F.R. part 264/265 Subpart F (or state equivalent) groundwater monitoring requirements? *(Check one.)*

   1. ☐ No regulated land disposal units are located at the facility
   2. ☐ All hazardous waste and waste residues were removed from regulated land disposal units at the facility during the closure process in accordance with EPA standards
   3. ☐ Groundwater requirements have been waived for all regulated units at the facility
   4. ☐ Other (please explain)

   _____

   _____

STOP!! If you answered question 3, skip to section V, and return questionnaire in envelope provided. Thank you.

4. How many 40 C.F.R. part 265/264 Subpart F (or state equivalent) groundwater monitoring systems are currently required at the facility?

   _____

5. How many of the required systems you identified in question 4 have no groundwater monitoring wells in place? ***(If none, please write in zero "0".)***

   _____

6. How many of the required systems identified in question 4 can immediately detect if any release has occurred from a waste management area to the uppermost aquifer? ***(If none, please write in zero "0".)***

   _____

7. How many of the required systems identified in question 4 are adequate to determine the rate, extent of migration, and the concentration of hazardous wastes in the groundwater? ***(If none, please write in zero "0".)***

   _____

SECTION II: GROUNDWATER VIOLATIONS

8. Have any consent decrees been issued for this facility which relieve the owner/operator from complying with any Subpart F requirements contained in 40 CFR part 265/264 (or state equivalent)? *(Check one.)*

   1. ☐ Yes ⟶ ***please explain in the space provided below***

   _____

   _____

   _____

   _____

   _____

   2. ☐ No

9. Has this facility been notified in writing by either EPA or the state of any groundwater violations that were detected since October 1, 1989? *(Check one.)*

   1. ☐ Yes
   2. ☐ No ⟶ ***skip to question 17***

2

10. Based on your knowledge of this facility, what was the general nature of the groundwater violations identified in question 9? *(Check all that apply.)*

    1. ☐ Inadequate number or placement of wells
    2. ☐ Damage or deterioration to a well
    3. ☐ Sampling and analysis violation (e.g., failure to collect samples and/or failure to follow sampling & analysis procedures)
    4. ☐ Record keeping violations
    5. ☐ Failure to submit or report groundwater monitoring information to the appropriate state or federal authority
    6. ☐ Improper well design and/or construction
    7. ☐ Failure to appropriately respond to detection of a release
    8. ☐ Inadequate characterization of the upper most aquifer
    9. ☐ Violation of a consent decree
    10. ☐ Other (please explain)

    _____

    _____

Note: Please use the facility file and the following definition of Class I violations to answer questions 11 and 12.

Definition of Class I Violations: A deviation from regulations, compliance orders, or permits which could result in a failure to: assure hazardous waste is destined for and delivered to authorized treatment, storage and disposal facilities; prevent releases; assure early detection of releases; or perform corrective action for releases.

11. As of September 30, 1993, were there any outstanding Class I groundwater monitoring violations at this facility? *(Check one.)*

    1. ☐ Yes
    2. ☐ No ⟶ ***skip to question 17***

12. What were the total number of outstanding Class I groundwater monitoring violations cited at this facility as of September 30, 1993?

    _____

13. How long has this facility been out of compliance? *(Check one.)*

    1. ☐ Less than 1 year
    2. ☐ 1 to 5 years
    3. ☐ 6 to 10 years
    4. ☐ More than 10 years

14. What are the primary reasons this facility has not complied with EPA's (or state equivalent) groundwater monitoring regulations? *(Check all that apply.)*

    1. ☐ Recalcitrance
    2. ☐ Complex hydrogeological conditions
    3. ☐ Technological problems
    4. ☐ Disagreement over technical/administrative requirements
    5. ☐ Lack of owner/operator funds
    6. ☐ Limited federal/state funds do not allow for timely oversight of facility progress
    7. ☐ Legal reasons (e.g., enforcement order has been appealed)
    8. ☐ Other (please explain)

    _____

    _____

15. Is this facility on schedule to return to compliance? *(Check one.)*

    1. ☐ Yes
    2. ☐ No

3

16. In your opinion, what is the likelihood that this facility will comply with EPA's (or state equivalent) groundwater monitoring regulations? *(Check one.)*

    1. ☐ Very likely
    2. ☐ Somewhat likely
    3. ☐ As likely as unlikely
    4. ☐ Somewhat unlikely
    5. ☐ Very unlikely
    6. ☐ Don't know

SECTION III: ENVIRONMENTAL IMPACT

Note: The questions in this section refer to both regulated and unregulated units. Regulated units are defined in 40 C.F.R. part 264.90 as surface impoundments, waste piles, land treatment units, and landfills which received hazardous waste after July 26, 1982. Unregulated units are those units that ceased receiving hazardous waste prior to July 26, 1982.

17. Has there been any release(s) to the groundwater at this facility? *(Check one.)*

    1. ☐ Yes
    2. ☐ No ——→ ***skip to section V***
    3. ☐ Don't know ——→ ***skip to section V***

18. If you answered "yes" to question 17, has the release(s) spread off site? *(Check one.)*

    1. ☐ Yes
    2. ☐ No
    3. ☐ Don't know

19. What type of unit(s) did the release(s) occur from? *(Check one.)*

    1. ☐ Regulated unit(s)
    2. ☐ Unregulated solid waste management unit(s)
    3. ☐ Both regulated and unregulated unit(s)
    4. ☐ Don't know

20. In your opinion, what is this facility's potential to adversely effect human health or the environment (e.g., contaminate underground sources of drinking water or harm vegetation) as a result of a release from a ***regulated*** unit? *(Check one.)*

    1. ☐ Not applicable, release occurred from only unregulated unit(s)
    2. ☐ Low potential
    3. ☐ Medium potential
    4. ☐ High potential
    5. ☐ Don't know

21. In your opinion, what is this facility's potential to adversely effect human health or the environment (e.g., contaminate underground sources of drinking water or harm vegetation) as a result of a release from a ***unregulated*** unit? *(Check one.)*

    1. ☐ Not applicable, release occurred from only regulated unit(s)
    2. ☐ Low potential
    3. ☐ Medium potential
    4. ☐ High potential
    5. ☐ Don't know

SECTION IV: CORRECTIVE ACTION

22. Has corrective action been initiated at this facility? Corrective action refers to actions taken to remove and/or treat hazardous constituents to prevent further groundwater contamination. *(Check one.)*

    1. ☐ Yes
    2. ☐ No
    3. ☐ Don't know

SECTION V: CONCLUDING INFORMATION

If you have any additional comments or information you would like to provide us, please do so in the space below.

_____

_____

_____

_____

_____

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5

Please provide the following information about the person(s) who completed this questionnaire. This information will assist us if clarification of answers is necessary.

Name:_____

Title:_____

Address:_____

City/Zip:_____

Telephone:_____

Name:_____

Title:_____

Address:_____

City/Zip:_____

Telephone:_____

Name:_____

Title:_____

Address:_____

City/Zip:_____

Telephone:_____

Thank you for your cooperation and assistance! This concludes the questionnaire for this land disposal facility.

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Major Contributors to This Briefing Report

Environmental Protection Issues

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