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BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

The Problem Of Disposing Of Nuclear Low-Level Waste: Where Do We Go From Here?

A problem has developed in nuclear waste disposal. As late as 1975, six commercial low-level nuclear waste burial sites were licensed to operate in the United States. Now only three sites remain--one each in Washington, Nevada, and South Carolina. Of these, two were temporarily shut down during the past year and the third has restricted the annual volume of waste it will receive.

These recent closings have raised the specter that medical services that use radioactive materials may have to be stopped or seriously cut back for lack of space to dispose of the low-level waste. About 25 percent of low-level waste comes from institutions, many of which use radioactive isotopes to treat or diagnose illness. Other sources of low-level waste such as nuclear powerplants and industrial users were similarly affected by a lack of disposal space.

This report explains that the Nuclear Regulatory Commission can alleviate the present disposal problem by addressing several basic questions, including what exactly is low-level nuclear waste. But there can be no long-term solutions until the Department of Energy develops a national plan for low-level waste disposal.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report discusses the problem of disposing of low-level nuclear waste. We made this review because of the dwindling number of active disposal sites and the potential effects that inadequate disposal capacity could have on the operation of organizations that generate low-level waste. After initiating this review, the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, subsequently requested that we review the recent problems associated with low-level waste disposal.

We are sending copies of the report to the Secretary of Energy and the Chairman, Nuclear Regulatory Commission.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

THE PROBLEM OF DISPOSING OF NUCLEAR LOW-LEVEL WASTE: WHERE DO WE GO FROM HERE?

D I G E S T

While the Nation has wrestled with the problems of permanently disposing of high-level nuclear waste and storing spent nuclear fuel, a problem in disposing of low-level nuclear waste has also developed. As late as 1975, six commercial low-level waste burial sites were licensed to operate in the United States. Only three sites remain open--one each in Washington, Nevada, and South Carolina. Of these, two were temporarily shut down during the past year and the third has restricted the annual volume of waste it will receive.

The recent site closings have raised the specter that medical services that use radioactive materials may have to be stopped or seriously cut back for lack of space to dispose of this waste. About 25 percent of the volume of low-level waste comes from institutions many of which use radioactive isotopes to treat or diagnose illness. Some institutions claimed that in 1979 they were within 2 weeks of stopping their nuclear medical research services had not the two closed sites reopened. Other sources of low-level waste such as nuclear powerplants and industrial users were similarly affected by a lack of disposal space.
(See p. 1.)

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After initiating this review, the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, subsequently requested GAO to review the recent problems associated with the burial of low-level waste. The Chairman asked, on November 7, 1979, that GAO identify the relevant problems, determine who is responsible for resolving them, and evaluate the progress the Government agencies have made to correct them.

EMD-80-68

ORIGIN OF LOW-LEVEL RADIOACTIVE WASTE

Low-level waste may contain a certain amount of man-made radioactive material or only be suspected of radioactive contamination. Liquid and gaseous low-level wastes are usually treated, diluted, or held for radioactive decay and then released to the environment. Solid wastes, including sludges and solidified liquids, are disposed of in shallow-land burial sites.

Low-level radioactive waste that has been disposed of at burial sites comes from several different sources: institutions, such as hospitals and universities (25 percent); industry (24 percent); commercial power reactors (43 percent); and Federal Government installations (8 percent). All 50 States and the District of Columbia generate both institutional and industrial waste, 24 States generate commercial power reactor waste, and 14 States generate Government waste. (See pp. 1 to 3.)

HISTORY OF LOW-LEVEL RADIOACTIVE WASTE BURIAL

Six commercial burial sites have been licensed to operate in the United States. Beginning in the 1970s, however, these six sites began having problems. The first to close, in March 1975, was the West Valley, New York site due to radioactive contaminated water seeping out of the caps of two burial trenches. The Maxey Flats, Kentucky site ceased operating in December 1977 after the Kentucky legislature imposed a 10-cents-a-pound excise tax as a contingency against unforeseen problems. The tax discouraged use of the site. Burial capacity at the Sheffield, Illinois site was exhausted in early 1978, and in March 1979 the site closed when the operator withdrew its application to expand the site. (See p. 3.)

In July 1979 the Governor of Nevada ordered the temporary shut-down of the Beatty nuclear burial site after reports

of two incidents involving a fire on a truck carrying radioactive medical waste into the burial site and a truck from a Michigan nuclear powerplant arriving at the site leaking contaminated liquids. In October 1979, the Governor of Washington learned of similar deficiencies in shipments bound for the Hanford burial site and ordered the site temporarily shut down. The matter became more severe when, later in October, the Governor of Nevada again temporarily closed the Beatty site after waste drums were unearthed on the burial site but outside the fenced area. (See p. 4.)

With the Hanford site closed and the Beatty site in doubt, only the Barnwell site in South Carolina was unaffected as a commercial low-level waste burial ground. This, however, was only temporary. On October 31, 1979, the Governor of South Carolina ordered Barnwell to scale down the amount of waste it would accept so that by October 1981 it would bury half as much annually as it did in 1979. (See p. 4.)

The Governors of Nevada, South Carolina, and Washington have stated that packaging and shipping problems must be corrected. More importantly, they feel it is not appropriate for the citizens of their three States to shoulder the burden of disposing of the commercial low-level wastes from all States. They have urged the other States to develop regional sites adequate to handle the wastes generated in each region. Implicit in their remarks and actions is the possibility that unless the regional imbalance in low-level waste disposal is relieved, the three States may unilaterally decide to close their sites or restrict disposal. (See p. 5.)

ADDRESSING SEVERAL BASIC QUESTIONS WILL ALLEVIATE THE PRESENT DISPOSAL PROBLEM

In response to the Governors' concerns, the Nuclear Regulatory Commission--which

has the responsibility for licensing and regulating the disposal of commercially-generated low-level waste--proposed a sequence of steps to increase disposal capacity. The Commission plans to assign high priority to applications for increased storage capacity and waste volume reduction operations, and provide technical assistance to State governments to formulate storage requirements. These steps, however, do not address the basic causes of the problem.

Addressing several basic questions, in GAO's view, will alleviate the present low-level waste disposal problem. Most of these questions are not new, and in fact, the Commission is reviewing most of them now. The problem is that these reviews have been underway for several years. (See p. 7.)

What is low-level waste?

An adequate definition of low-level waste does not exist; therefore, shallow-land burial is being used both for material that could be disposed of more simply and less expensively, and for material that warrants more restrictive disposal. Because the definition of low-level waste has a direct effect on the volume of low-level waste and available capacity, an effective disposal system cannot exist without an adequate definition of low-level waste. (See pp. 7 to 9.)

Who are the generators of low-level waste and how much waste do they generate?

The Commission and most States know the shippers of low-level waste but not the generators or the amount of low-level waste being generated. Without this information an effective inspection and enforcement program cannot be established. In addition, adequate waste projection estimates cannot be developed. Such estimates are important in determining the need for additional disposal capacity and

deciding whether to license new disposal sites. (See pp. 9 and 10.)

Can the volume of low-level waste be reduced?

A comprehensive program could drastically cut the amount of low-level waste going to shallow-land burial sites. In the past, the Commission has been reluctant to undertake such a program. Using available volume reduction techniques and hardware could conserve valuable burial site land mass and extend the useful life of the currently dedicated burial acreage. Volume reduction techniques could also eliminate proliferation of low-level burial sites. (See pp. 10 and 11.)

Is illegal dumping of low-level waste occurring?

Without a method to track waste from the point of generation to the point of disposal, it is highly probable that illegal dumping occurs. The incentive is growing for generators of low-level waste to illegally dump their waste. The cost for transportation has doubled in the past few years and, with the temporary closing of two burial sites, some generators might have had to dump their waste to sustain normal operations. (See pp. 11 to 13.)

CERTAIN ISSUES SHOULD BE RESOLVED BEFORE DEVELOPING NEW SHALLOW-LAND BURIAL SITES

The Commission can alleviate--on the short term--the present disposal problem if it acts promptly on the GAO recommendations relating to the preceding questions. (See pp. 17 and 18.) Moreover such action will be necessary to determine the best long-term solution to the low-level waste disposal problem.

In the long term, there is an imbalance between the location of waste generators and commercial burial sites. It is for

this reason that the Commission asked each of the 50 States to develop new shallow-land burial sites. In GAO's view, however, it is premature for the States to unilaterally develop new burial sites while important issues remain unresolved. This is not to say that momentum on all fronts should not continue to relieve the regional imbalance. Rather, the actual development of new shallow-land burial sites should be done in concert with a rational scheme agreed to by all parties involved. (See pp. 28 to 29.)

Therefore, GAO recommends that the Chairman of the Commission not license any new shallow-land burial sites while the Department of Energy is developing a national low-level waste plan. The President specifically gave the Department the responsibility for developing this plan which is to include information from other Federal agencies, State governments, and interested parties. According to the President, the plan must be completed by 1981.

In working on this plan, the Secretary of Energy should

--agree with other Federal agencies and parties on the number, type, and general location of waste disposal sites needed on a regional basis;

--define the Federal versus State responsibility for low-level waste disposal;

--evaluate the feasibility of using existing Department facilities for disposal of commercial low-level waste;

--investigate the possibility, in conjunction with the Commission, of reopening the closed commercial sites; and

--have the Department act as a Federal focal point over low-level waste matters other than licensing and regulation which is the responsibility of the Commission and the Agreement States.

AGENCY COMMENTS

In commenting on the report, officials from the Environmental Protection Agency and the Department of Transportation said they were in basic agreement with the thrust of the report. Commission officials also posed no major objections to the recommendations in chapter 2 and said some improvement to their low-level waste program was in order. However, officials from the Commission and the Department disagreed with GAO's recommendation that new shallow-land burial sites should not be licensed while the Department is developing a national low-level waste management plan. Their disagreement is based on their belief that developing new shallow-land burial sites would disrupt State momentum. GAO continues to believe, however, that it is premature for States to develop new sites before important issues are resolved. (See pp. 29 and 30.)

Contents

ABBREVIATIONS

AEC	Atomic Energy Commission
DOE	Department of Energy
EPA	Environmental Protection Agency
GAO	General Accounting Office
NRC	Nuclear Regulatory Commission

CHAPTER 1

INTRODUCTION

A problem has developed in nuclear waste disposal. While the Nation has wrestled with the problems of permanently disposing of high-level nuclear waste and storing spent nuclear fuel, the lack of space for disposing of low-level nuclear waste has also surfaced. As late as 1975, six commercial low-level waste burial sites were licensed to operate in the United States. Only three sites remain open--one each in Washington, Nevada, and South Carolina. Of these, two were temporarily shut down during the past year and the third has restricted the annual volume of waste it will receive.

The recent site closings have raised the specter that medical services that use radioactive materials may have to be stopped or seriously cut back for lack of space to dispose of the waste. About 25 percent of the volume of low-level waste comes from institutions many of which use radioactive isotopes to treat or diagnose illness. Some institutions claimed that in 1979 they were within 2 weeks of stopping their nuclear medical research services had not the two closed sites reopened. Other sources of low-level waste such as nuclear powerplants and industrial users were similarly affected by a lack of disposal space.

After initiating this review, the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, subsequently requested us to review the recent problems associated with the burial of low-level waste. The Subcommittee Chairman asked, on November 7, 1979, that we identify the relevant problems, determine who is responsible for resolving them, and evaluate the progress the appropriate Government agencies have made to correct them.

ORIGIN OF RADIOACTIVE WASTE

All operations that produce or use nuclear materials generate radioactive wastes. Waste consists of radioactive species of almost all chemical elements; some contain naturally-occurring radioactive materials and others contain man-made radioactive materials. The wastes exist as gases, liquids, and solids. For all their variety, radioactive wastes have one thing in common--as long as they remain radioactive, they will be potentially hazardous. This potential hazard results from the fact that exposure to and/or intake of radioactive material can cause biological damage.

Three major classes of radioactive wastes exist: high-level, transuranic, and low-level. High-level waste is either intact fuel assemblies that are discarded after having served their useful life in a nuclear reactor (spent fuel) or the portion of wastes generated in reprocessing of spent fuel that contains virtually all the fission products not removed during reprocessing. These wastes are being considered for disposal in geologic repositories or by other technical options designed to provide long-term isolation of the wastes from the biosphere.

Transuranic waste results predominantly from reprocessing spent fuel and fabricating plutonium to produce nuclear weapons. Transuranic waste is currently defined as material containing more than 10 nanocuries of transuranic activity per gram of material. This waste would be disposed of in a manner similar to that used for high-level waste disposal.

Low-level waste may contain less than 10 nanocuries of transuranic contaminants per gram of material or only be suspected of radioactive contamination. These wastes are disposed of according to the type and/or concentration of radioactivity. The liquid and gaseous types are usually treated, diluted, or held for radioactive decay and then released into the environment. 1/

A great deal of solid low-level waste that is buried consists of dry waste materials with low levels of radioactivity. Examples of these wastes are paper trash, packing material, protective clothing, broken glassware, plastic sheeting and tubing, defective or obsolete equipment, building rubble, and some nuclear reactor equipment that has become radioactive.

The low-level radioactive waste that has been disposed of at burial sites has come from several different sources: institutions, such as hospitals and universities (25 percent); industry (24 percent); commercial power reactors (43 percent); and Federal Government installations (8 percent). 2/ All 50 States and the District of Columbia generate both

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1/In our report entitled "Need For Greater Regulatory Oversight of Commercial Low-Level Radioactive Waste (EMD-78-101, August 16, 1978), we discussed the problems associated with treating these waste types prior to their release at nuclear powerplants.

2/This is based upon 1978 estimates developed by the Department of Energy (DOE).

institutional and industrial waste, 24 States generate commercial power reactor waste, and 14 States generate Government waste. Of the top 10 States that generate low-level waste, only South Carolina has an operating burial site; the others (New York, California, Illinois, North Carolina, Pennsylvania, Florida, Massachusetts, Connecticut, and Michigan) ship their waste to another State for disposal.

HISTORY OF LOW-LEVEL RADIOACTIVE WASTE BURIAL

Before 1960, low-level wastes were buried at Atomic Energy Commission (AEC) sites regardless of whether they were generated in AEC facilities or the then minor commercial activities. When it became apparent that commercial activities would generate low-level wastes in significant quantities, AEC announced in 1960 that its land burial sites at the Idaho National Engineering Laboratory and the Oak Ridge National Laboratory would be used to dispose of low-level commercial wastes pending the designation of regional commercial waste sites. The commercial sites were to be on Federal or State land and be operated by private firms under AEC or Agreement State 1/ licenses. In 1962 AEC licensed the first commercial site, at Beatty, Nevada; it is now licensed by the State of Nevada which is an Agreement State. Five additional commercial sites were licensed over the next 9 years: Maxey Flats, Kentucky, in 1963; West Valley, New York, in 1963; Hanford, Washington, in 1965; Sheffield, Illinois, in 1967; and Barnwell, South Carolina, in 1971.

The six licensed commercial burial sites began having problems in the 1970s. The first to close, in March 1975, was the West Valley site due to radioactive contaminated water seeping out of the caps of two burial trenches. The Maxey Flats site ceased operating in December 1977 after the Kentucky legislature imposed a 10-cents-a-pound excise tax as a contingency against unforeseen problems. The tax discouraged use of the site. Burial capacity at the Sheffield site was exhausted in early 1978, and in March 1979 the site closed when the operator withdrew its application to expand the site.

1/Twenty-six State governments have entered into agreements with the Nuclear Regulatory Commission (NRC) to assume responsibility for regulating licensed users of certain radioactive materials.

In July 1979 the Governor of Nevada ordered the shut-down of the Beatty nuclear burial site after two incidents were reported in 2 months. The first incident involved a fire on a truck carrying radioactive medical waste into the burial site. The second incident was discovered when a truck bringing supposedly dehydrated waste from a Michigan nuclear powerplant arrived at the site leaking contaminated liquids.

After shutting the site, the Governor of Nevada, jointly with the Governors of Washington and South Carolina, wrote to NRC in July 1979 demanding that the rules governing shipments of commercially generated low-level nuclear waste be enforced. They pointed out the serious and repeated disregard for existing rules and NRC's total lack of corrective measures. The Governors requested, and immediately received, assurances that a program would be set up to combat shipping and packaging problems. On the basis of this program the Governor reopened the Beatty site in late July 1979.

Despite NRC's assurances, the Governor of Washington learned of similar deficiencies in shipments bound for the Hanford burial site and, in October 1979, ordered the site to be shut down. Included in the deficiencies were reports that one load of radiopharmaceutical cobalt was leaking; one load of contaminated steel scrap was losing some of its cardboard packing; and one load of depleted uranium had been delivered on an overweight truck. The matter became more severe when, also in October, the Governor of Nevada again temporarily closed the Beatty site after waste drums were unearthed on the burial site but outside the fenced area.

With the Hanford site closed and the Beatty site in doubt, only the Barnwell site in South Carolina was unaffected as a commercial low-level waste burial ground. This, however, was only temporary. On October 31, 1979, the Governor of South Carolina ordered Barnwell to scale down the amount of waste it would accept so that by October 1981 it would bury half as much annually as it did in 1979. Because Barnwell had been receiving about 85 percent of the low-level radioactive waste generated in the United States, this restriction was as significant as the closing of the other two sites.

Following assurances of appropriate action by Federal regulatory agencies, the Hanford site reopened in late November 1979. The Beatty site also resumed operations in late November after the Nevada Health Department ruled that the site did not present a health and safety threat.

The Governors of Nevada, South Carolina, and Washington have stated that packaging and shipping problems must be corrected. More importantly, they feel it is not appropriate for the citizens of their three States to shoulder the burden of disposing of the commercial low-level wastes from all States. They have urged the other States to develop regional sites adequate to handle the wastes generated in each region. Implicit in their remarks and actions is the possibility that unless the regional imbalance in low-level waste disposal is relieved, the three States may unilaterally decide to close their sites or restrict disposal.

SCOPE OF REVIEW

We focused this review on the crisis that has developed in disposing of low-level nuclear waste being generated daily and the actions taken by the responsible Federal agencies in response to that crisis. (See ch. 2.) Generally, this involved evaluating the activities of NRC which has the responsibility for licensing and regulating the disposal of commercially-generated low-level waste. Other agencies, however, interface with NRC's work. For instance, the Environmental Protection Agency (EPA) is in charge of establishing generally applicable environmental criteria and standards for low-level waste disposal while DOE performs research and development to advance low-level waste management technology. The Department of Transportation is also involved through regulating both the low-level waste shippers and carriers who are engaged in interstate commerce.

On the longer term, we evaluated whether there is an overall need for additional disposal capacity and what must be done nationally should a need exist. (See ch. 3.) This principally involved evaluating the efforts of DOE to develop a national plan for low-level waste management.

We made our review at

--DOE headquarters, Germantown, Maryland;

--DOE operations offices at Oak Ridge, Tennessee, and Idaho Falls, Idaho;

--NRC headquarters, Bethesda, Maryland;

--commercial disposal sites at Richland, Washington, and Barnwell, South Carolina; and

--EPA headquarters, Washington, D.C.

We interviewed the Governors of Washington and South Carolina, and a representative of the Governor of Nevada to determine the continued availability of the commercial low-level waste sites in those States. We discussed with State officials in Illinois, Pennsylvania, New York, Kentucky, and Massachusetts, the current low-level waste disposal problem and any plans by these States to develop their own low-level waste burial sites.

We interviewed NRC and State regulatory officials, DOE officials and contractor personnel, and commercial disposal site licensees. We reviewed records on the selection, operation, and regulation of disposal sites. We also held discussions with the U.S. Geological Survey, Department of Transportation and EPA officials.

CHAPTER 2

ADDRESSING SEVERAL BASIC QUESTIONS WILL ALLEVIATE THE PRESENT DISPOSAL PROBLEM

Low-level radioactive waste has often been described as the forgotten stepchild of nuclear power. To a large extent, this description is true because the current confusion surrounding the disposal of this waste is a product of inaction and neglect.

NRC has recently proposed a sequence of steps to increase disposal capacity. Specifically, NRC plans to assign high priority to applications for increased storage capacity and waste volume reduction operations, and provide technical assistance to State governments to formulate storage requirements. These steps, however, do not address the basic causes of the problem.

Addressing several basic questions will alleviate the present low-level waste disposal problem. These questions include:

--What is low-level radioactive waste?

--Who are the generators of low-level waste and how much waste do they generate?

--Can the generation and volume of low-level waste be reduced?

--Is illegal dumping of low-level waste occurring?

--Is low-level waste being properly packaged and transported?

--Are there acceptable options to disposal at commercial burial sites?

Most of these questions are not new, and in fact, NRC is reviewing most of them now. The problem is that these reviews have been underway for several years.

WHAT IS LOW-LEVEL RADIOACTIVE WASTE?

A: An adequate definition of low-level waste does not exist; therefore, shallow-land burial is being used both for material that could be disposed of more simply and less expensively, and for material that warrants more restrictive disposal.

Low-level waste is generally considered to be any radioactive waste that isn't high-level or transuranic waste. Therefore, low-level waste covers a wide variety of things from minimally contaminated material and suspect waste, to highly contaminated material that remains radioactive for a long period of time. Because the definition of low-level waste has a direct effect on the volume of low-level waste and available capacity, an effective disposal system cannot exist without an adequate definition of low-level waste.

When NRC began its program for regulating the disposal of radioactive waste, it recognized that a simple, workable classification system was needed to define low-level waste. This system would indicate the type of low-level waste suitable for shallow-land burial and for alternatives to burial. Initially, NRC expected to publish a proposed classification system for public comment in the spring of 1978. Now, according to NRC, that schedule has slipped to sometime in 1980 because of the lack of resources devoted to low-level waste management.

Because of the absence of this classification system, wastes are being treated as low-level even though their radioactive nature may not warrant this treatment. For example, many medical institutions have complained about paying high costs to dispose of waste that should not be classified as low-level waste. Much of the institutional waste decays very rapidly. In an NRC survey of institutional radioactive waste, it was shown that approximately 97.8 percent of the radioactive material in the waste buried in 1975 had half-lives of less than or equal to 60 days. This means that the waste may decay to a negligible level after a short period of time and may be disposed of as normal trash.

An EPA official said that much of the waste that comes from hospitals and medical institutions doesn't need shallow-land burial and that burial in a sanitary landfill--a much simpler and less expensive operation--would be appropriate. This official also said that it would require no more than 2 to 3 months for the EPA, NRC, and DOE staffs to establish this category of low-level waste; however, no Federal action has been taken.

Of greater concern is the practice of burying waste high in radioactivity in shallow-land burial. For example, shallow-land burial is the disposal method for radioactive spent resins from nuclear powerplants. However, a DOE official said that some data suggests that this type of waste and others should not be disposed of by shallow-land burial. NRC has already moved in this direction by having such an

exclusion in its proposed licensing criteria for disposal of low-level waste into a disposal facility sited on land.

In these draft regulations, NRC suggests burying some low-level radioactive waste at an intermediate depth (deeper than shallow-land burial). Even though NRC plans to require this in the future, this type of waste continues to be buried in shallow-land burial sites.

WHO ARE THE GENERATORS OF LOW-LEVEL WASTE AND HOW MUCH WASTE DO THEY GENERATE?

A: Based upon our review, NRC and most States know the shippers of low-level waste but not the generators or the amount of low-level waste being generated.

If NRC does not know who all of the generators of low-level waste are and how much waste they are generating, an effective inspection and enforcement program cannot be established. In addition, adequate waste projection estimates cannot be developed. Such estimates are important in determining the need for additional disposal capacity and deciding whether to license new disposal sites.

Before 1979 NRC's primary source of information on low-level waste generation was the amount of waste received at the commercial burial sites. By reviewing site records, NRC could determine who was shipping low-level waste to these commercial sites but not necessarily know who was generating the waste. When the Governors of Nevada, South Carolina, and Washington complained of repeated low-level waste packaging problems, NRC agreed to inspect both the source and the shippers of the waste. First, however, NRC had to determine who those source generators were.

In August 1979, NRC sent a bulletin to about 4,400 of its licensees asking them to take certain action and to provide answers to three major questions. One question related to the volume of low-level radioactive waste shipped to the three commercial burial sites.

NRC required licensees to respond within 45 days. As of March 1, 1980, only about 3,200 (about 72 percent) had responded. From these responses, some 34 percent indicated that they were generators of low-level waste. Compared with the total population of 4,400 licensees, NRC has so far determined that about one in four, or about 1,100 licensees

are generators. NRC is now following up with those licensees that have yet to respond to the bulletin.

However, based on our review, we believe NRC is far from knowing who the waste generators are. The bulletin, as written, asked licensees to respond to the three major questions if they "shipped" low-level waste to a commercial burial site. This wording could have led to some licensees not responding if they generated low-level waste but had the waste collected and shipped by someone else. Also, some generators have their own on-site burial ground or incinerators to burn their low-level waste. These possibilities were not factored into the questions asked of licensees; therefore, even if all generators had answered the questions, the total amount of waste being generated might still be unknown.

We contacted an NRC official about the bulletin and he admitted that it was confusing. He said the bulletin primarily required general responses when more specific responses were needed. He also said the NRC Commissioners were concerned about the lack of responses.

NRC also sent a bulletin to each of the 26 Agreement States asking them to distribute it to their licensees. The bulletin for distribution by the Agreement States did not ask licensees any questions on the shipment of low-level waste. During our review, we contacted some of the Agreement States to determine to what extent they had tried on their own to determine who the generators were and how much waste they were generating. We found that only a few States knew specifically all the generators of low-level waste within their State.

CAN THE GENERATION AND VOLUME OF LOW-LEVEL WASTE BE REDUCED?

A: Yes, a comprehensive program could drastically cut the amount of low-level waste going to shallow-land burial sites.

Using available volume reduction techniques and hardware could conserve valuable burial site land mass and extend the useful life of the currently dedicated burial acreage. Volume reduction techniques could also minimize proliferation of low-level burial sites.

Presently, NRC has no program to reduce the volume of low-level waste. According to one NRC official, some consideration is being given to launching a volume reduction campaign. In the next month or two, this official said, a plan may be prepared and submitted to the NRC Commissioners

for review and approval. In that plan, NRC may call on all low-level waste generators to reduce volume by 50 percent.

During our review, we found there are methods for reducing both the generation and the volume of low-level waste. For example, improved administrative control can prevent the introduction of materials to a radiation area. The unpacking of supplies and equipment in a non-radiation area will prevent the packing container from later becoming contaminated. Also, high use items such as plastic shoe covers could be surveyed and possibly reused. Although it may be difficult to attach precise numbers to the volume reduction realized by these actions, there clearly is a savings.

Segregation of waste is an administrative control that could be used. In an NRC study of medical and educational waste, it was found that much of the waste was contaminated with radionuclides that had a very short half-life. A National Institute of Health official said it was difficult to understand why such waste was shipped considering that it decays so rapidly. This material could have been stored temporarily and disposed of as non-radioactive waste.

Waste compaction is also a valuable option. Since April 1977, a compactor-baler has been used to reduce the volume of buried, non-retrievable waste at the Los Alamos Scientific Laboratory. 1/ Results of this operation to date indicate a volume reduction ratio of 5 to 1.

In responding to a report we issued in 1978, NRC said at that time it did not have a policy on volume reduction because it felt that volume reduction was an operational and economic consideration of each individual licensee rather than a public safety issue. However, with today's crisis in low-level waste disposal, a major volume reduction policy is now needed.

IS ILLEGAL DUMPING OF LOW-LEVEL WASTE OCCURRING?

A: Without a method to track waste from the point of generation to the point of disposal, it is highly probable that illegal dumping occurs.

1/Other national laboratories have also used waste compaction with considerable success.

The incentive is growing for generators of low-level waste to illegally dump their waste. The cost for transportation has doubled in the past few years and, with the temporary closing of two burial sites, some generators might have had to dump their waste to sustain normal operations. As reports of dumping appear in the press, public opposition to low-level waste disposal will likely continue. This opposition affects the operation of existing burial sites and the development of additional disposal capacity.

Currently, NRC does not have a method to guard against illegal dumping. An NRC official told us that when NRC receives a report or hears of illegal dumping, naturally it investigates the matter. Otherwise, NRC attempts to keep abreast of unauthorized activities through its normal inspection and enforcement effort. For material licensees, this may involve one inspection every 5 years during which NRC reviews the licensees' radiological safety and health program, management organization, plus allegations of illegal dumping.

However, NRC does not require licensees to report the amount of low-level waste generated and the amount disposed of through various means. These means could include shipment to a commercial burial site, incineration, burial onsite, or disposal in a sanitary sewage system. Thus, NRC has no way of checking to see that a licensee has disposed of his low-level waste properly.

In this regard, many sources have confirmed that illegal dumping could or has occurred but no source offered the name of a specific company that has dumped its low-level waste. For instance, when the Hanford waste site was temporarily closed in October 1979, an official at Harvard University sent a memo to all of its users of radioactive material warning them about dumping. The memo said users are reminded that liquid waste must not be emptied into drains. We contacted this university official and he said that the high cost for disposal and the closing of the Hanford site encouraged users to dump the waste down the drain.

Further, one State regulatory official said that, when the Beatty and Hanford sites temporarily closed, there were incidents of dumping of low-level waste in the trash at some hospitals within the State. This view, he said, was based on reports and discussions he has had with hospital personnel. This official said these incidents were the probable result of waste backing up at the generating source. He also said the crisis situation at that time encouraged illegal dumping.

Without a method to track wastes, it is possible for illegal dumping to occur over a long period of time without being noticed. When the two commercial sites--Hanford and Beatty--temporarily closed in 1979, NRC officials said they suspected illegal dumping was occurring. More effective control of the disposal of low-level waste would help gain the confidence of other States and the general public as a whole. Public acceptance of low-level waste disposal is a key element to providing adequate disposal capacity now and in the future.

IS LOW-LEVEL WASTE BEING PROPERLY PACKAGED AND TRANSPORTED?

A: Probably not because the scope of the packaging and transportation problem is not known nor does a comprehensive inspection and enforcement program exist to insure compliance.

The continued availability of the three existing commercial burial sites may well rest on how well NRC and the Department of Transportation assure the proper packaging and transportation of low-level waste. This area has been neglected in the past and was the basis for the two western sites shutting down in 1979. Even before that, NRC had been warned of the repeated noncompliance with radioactive waste transportation regulations. When the two waste sites were shut down, over half of the Nation's disposal capacity was cut off.

Before the Beatty, Nevada site temporarily closed in July 1979, NRC and the Department of Transportation relied mainly on the integrity of shippers and carriers to comply with regulations governing the safety of radioactive materials' transportation. The Department did very little inspection and enforcement of vehicles carrying low-level waste. The packaging of low-level waste was a low-priority area at NRC and NRC didn't enforce departmental regulations.

After the Governors of Nevada, South Carolina, and Washington complained about sloppy waste shipments, NRC took several steps to improve the packaging and transportation of low-level waste. These steps included amending its regulations to inspect and enforce departmental packaging and transportation regulations and modifying its inspection program to increase inspections at its licensee and burial sites.

The Department's Federal Highway Administration decided to place particular emphasis in fiscal year 1980 on monitoring the equipment and practices shippers used to transport radioactive waste. In addition, the Department agreed to work with the three States with low-level waste sites to improve surveillance.

Overall, the NRC and Department's actions will help but much of their work in this area remains fragmented and in need of improvement. For instance, both NRC and the Department have data on routine inspections but neither has compiled information that pertains to the packaging and transportation of low-level waste. During our review we found that neither NRC nor the Department has done an independent assessment of the scope of the packaging and transportation problem.

Also, NRC and the Department's inspection efforts have not focused on the repeat offenders. NRC provided the Department with a list of its licensees, but this list did not prioritize which ones should be inspected first because NRC does not have the necessary information. Efforts are now underway in this area but only for violators since late 1979.

Finally, our review found that the enforcement program of Agreement States was not comparable to that of NRC's because only 2 of the 26 States--New York and Louisiana--have adopted civil penalty authority. If all these States had such authority, it could serve as an intermediate enforcement tool between the two actions that are now available--a written notice of noncompliance and injunction authority. We believe civil penalty authority would encourage better compliance from a licensee, like a hospital, because it is very unlikely that a nuclear medical program would ever be shut down and because a written notice may not be strong enough to get a hospital to comply.

ARE THERE ACCEPTABLE OPTIONS TO DISPOSAL AT COMMERCIAL BURIAL SITES?

A: Two viable options might be burial on-site and incineration but certain questions exist about both practices.

If most of the low-level waste generated can be disposed of by other means, the useful life of existing commercial burial sites can be prolonged. This also minimizes the need to ship low-level waste over great distances.

Current NRC regulations permit certain types of low-level waste to be disposed of in ways other than shipment to a commercially-licensed facility. These other ways include releasing the waste into a sanitary sewage system; burying it in soil at the site where the waste is generated; and incinerating it. 1/ The first two options do not require prior notification or approval by NRC before disposal while the last option requires an NRC license.

Disposal into a sanitary sewage system is only allowed for material that is readily soluble or dispersible in water. Also, the gross quantity of material released must not exceed one curie per year. Nevertheless, on page 12, we discuss the possibilities of illegal dumping of liquid low-level waste by pouring it into sanitary sewage systems.

During our review, we attempted to get a list of all licensees that bury low-level waste on-site. According to three different NRC officials, such a list does not exist because a license is not required for that action. Licensees simply do it and then NRC inspects them afterwards. One NRC official suggested that if someone called each of NRC's five regional offices, maybe the memory of the NRC inspectors could be jogged into remembering the location of all the burial sites.

Currently NRC is trying to amend its regulations to require a license before burial. While the notice of proposed rulemaking to accomplish this was published in December 1978, the regulation has not been finalized yet. One NRC official said the new regulation is needed because if you don't know where the burial sites are, you can't know that the licensees are doing things correctly.

We agree with this and believe other changes to the regulation may be in order. For one, the proposed regulation does not require licensees that already bury on-site to identify themselves to NRC. If this is not done, NRC may have a difficult time following up with these licensees to insure that proper burial practices were followed in the past. For another, the method of burial on-site must be questioned itself.

Currently, the regulation requires burial to a depth of only 4 feet while burial at the three existing commercial burial sites ranges from depths of 5 to 8 feet. In

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1/These regulations are 10 CFR Parts 20.303, 20.304, and 20.305, respectively.

speaking with an NRC official about this, he could offer no technical basis for the differences in depths. He said that when the regulation was formulated in the 1960s, it was probably determined that if someone put up a fence, a person would dig down 2 or 3 feet to put in the fence posts. Therefore, you would want the burial ground at a lower depth.

Also, the regulation does not require any permanent marker at the burial site. One NRC official said someone could bury on-site, then shut down operations and move away without anyone knowing if and where low-level radioactive waste had been buried on the premises. These reasons suggest that a reevaluation of on-site burial is in order.

During our review, we also attempted to obtain from NRC a list of all licensees that incinerate a portion of their low-level waste. Based upon one published NRC report, 61 institutions of all types are involved in waste incineration. After a 2-week search of their files, NRC responded to our request by providing us a list of 20 institutions that incinerate their waste.

Even the lower number (20) surprised DOE officials that are actively engaged in demonstrating that incineration can be safely and effectively used to reduce low-level waste at each of its national laboratories. Also, DOE has, under contract, a study with the University of Maryland to demonstrate incineration for application in institutions. When DOE officials heard that many institutions are already incinerating their waste on a practical basis, they conceded that someone could seriously question their demonstration contract with the University of Maryland.

From our review of incineration, it appears that DOE's demonstration project may be necessary because of the problems that exist in monitoring the radioactive gases released out of the stack. This point was mentioned by a DOE task force working to develop a national low-level waste plan. If true, NRC may need to take a serious look at all of its licenses for incineration, whatever that number might be.

CONCLUSIONS

The current problems with low-level waste disposal have been caused by an inadequate waste management program. The burial of commercial low-level waste has been ongoing since the late 1950s and now more than 20 years later, the Federal Government does not have final criteria and standards for low-level waste disposal. As a result, there are problems with low-level waste disposal that range from a lack of a definition of what is low-level waste to burying certain

types of low-level waste in shallow-land burial that are very questionable. These problems must be resolved immediately to alleviate the present disposal situation.

Our review has shown that there is no overall control on the disposal of low-level waste. We have found that NRC does not know who all the generators of low-level waste are or how they are disposing of their waste. There is no system in place that shows complete accountability from the time of generation until the time of disposal.

Since 1957, some generators of low-level waste have been allowed to bury their waste on-site without a specific license. We tried to get a list of these generators from NRC and found that such a list does not exist. Therefore, no one knows where all of these small unlicensed waste sites are or what is being buried in them. Similar problems exist with incineration.

Currently, NRC does not know the scope of the packaging and transportation problem and improvements to its regulatory program are needed to insure compliance. NRC also should encourage Agreement States to adopt civil penalty authority. Only 2 of 26 Agreement States currently have such authority.

Volume reduction could drastically reduce the amount of low-level waste being shipped to commercial burial sites. We believe a volume reduction campaign by NRC could reduce the need for additional sites. In the past, NRC has been reluctant to undertake such a campaign.

RECOMMENDATIONS TO THE CHAIRMAN, NUCLEAR REGULATORY COMMISSION

We recommend that the Chairman, NRC:

--Give top priority to defining low-level waste by establishing categories based upon requirements for safe disposal.

--Determine who the generators of low-level waste are in both the Agreement and Non-Agreement States and how much waste each licensee is generating.

--Establish a volume reduction policy for all commercial generators of radioactive waste that addresses both administrative and technological methods that have been proven as viable alternatives. This

policy should apply to Agreement State licensees as well since this is a national issue.

--Establish a method to track waste from the point of generation to the point of disposal. In addition, encourage the Agreement States to adopt a comparable method to increase regulatory oversight on a national basis.

--Evaluate how large or how small the packaging and transportation problem is and adjust the inspection and enforcement program accordingly to insure compliance.

--Encourage the Agreement States to adopt civil penalty authority.

--Reevaluate the current practice of burial on-site and incineration to determine if these are safe methods for disposing of low-level waste and whether or not these practices are in compliance with radiation safety rules and regulatory requirements. This should apply to Agreement States as well.

AGENCY COMMENTS

In commenting on this report, NRC officials posed no major objections to the recommendations contained in this chapter and said some improvement to their low-level waste program was in order. (For a more complete discussion of NRC and DOE comments on this report, see pp. 29 and 30.)

CHAPTER 3

CERTAIN ISSUES SHOULD BE RESOLVED BEFORE DEVELOPING NEW SHALLOW-LAND BURIAL SITES

NRC can alleviate--on the short-term--the present disposal problem if it acts promptly on the recommendations in the previous chapter. Such action is necessary irrespective of any steps that must be taken to address future low-level waste disposal needs.

In the long term, there is a regional imbalance between the location of waste generators and commercial burial sites. It is for this reason that NRC has asked each of the 50 States to develop new shallow-land burial sites. In our view, however, it is premature for the States to unilaterally develop new burial sites while important issues remain unresolved. This is not to say that momentum on all fronts should not continue to relieve the regional imbalance. Rather, the actual development of new shallow-land burial sites should be done in concert with a rational scheme agreed to by all parties involved.

This chapter elaborates on this point and discusses issues we believe must be addressed. They include:

--determining the disposal capacity needed on a regional basis;

--defining Federal versus State responsibility for low-level waste disposal;

--using existing waste burial sites; and

--establishing a Federal focal point over low-level waste matters.

AGREEMENT ON THE DISPOSAL CAPACITY NEEDED ON A REGIONAL BASIS SHOULD BE REACHED

The President's Interagency Review Group on Nuclear Waste Management 1/ recommended that DOE and NRC jointly develop waste projection estimates by 1979 and determine

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1/Established by the President, this group highlighted in its March 1979 report the need to develop a national nuclear waste management policy and integrated program.

the number, type, and general location of land disposal sites by 1980. Rather than do this, however, DOE and NRC have prepared independent and uncoordinated estimates and studies. As a result, disagreement exists on the exact number of additional regional disposal sites that are economically feasible.

NRC provided us an internal study showing that the United States will need five new disposal sites by 1987. This study divided the country into nine areas, and the five new sites were to serve one or two of these areas to minimize coordination difficulties. Each site was to have a 20 million cubic foot capacity and a 20-year service life.

In February 1980 DOE performed a rudimentary analysis of the number, type, and general location of shallow-land burial sites needed. This analysis is based on several factors. First, it considers the effects of the Governor of South Carolina's recent action to limit the annual volume of waste accepted by Barnwell. Second, it assumes that in 1982 the Hanford facility will be lost as a national disposal site as required by recently proposed legislation in the State of Washington.1/ Third, it divides the country into the northwest, southwest, south, northeast, and midwest regions. Fourth, it defines a shallow-land burial site to have an operational life of 40 years and an annual disposal capacity of about 2.1 million cubic feet. The results of the analysis follow:

Number of shallow-land burial sites required

Years	Northwest	Southwest	South	Northeast	Midwest	Total
1980	.25	.25	.50	.75	.50	2.25
1982	.25	.25	.75	.75	.50	2.50
1984	.25	.50	1.00	1.00	.75	3.50
1986	.50	.50	1.25	1.25	1.00	4.50
1988	.50	.75	1.50	1.50	1.00	5.25
1990	.50	.75	1.75	1.75	1.25	6.00

The DOE official who prepared the analysis stated that neither financial feasibility nor tradeoffs of transportation costs in deciding on the number of regions were considered in the study. He also conceded that not all of the sites needed would be for shallow-land burial. Some sites could be secure sanitary landfills or intermediate depth burial sites.

1/In March 1980, the State legislature adjourned without acting on this legislation.

One disposal site operator told us that additonal sites are necessary, but another operator indicated that more sites would not be economically feasible. The Executive Vice-President of Chem-Nuclear Systems, Inc. stated that 5 to 8 sites nationwide would be economically feasible, with about 10 sites by the year 2000. The President of Nuclear Engineering Company, which operates the Nevada and Washington disposal sites, said that the economics do not dictate opening new sites, although a regional imbalance exists in the Eastern United States.

Federal agencies and industry have not reached agreement on the number of disposal sites needed. DOE advocates 2 to 6 sites through 1990, NRC says 5 by 1987, and a industry representative indicated 10 sites by the year 2000. A DOE official attributed the differences in number of sites needed to different assumptions about the capacity and operating life of needed sites and different estimates of future waste volumes. The Nuclear Engineering Company has raised the question of financial feasibility for these facilities. DOE has not considered financial feasibility in its analysis of the type and number of facilities needed. A DOE official also told us that a tradeoff analysis of transportation costs versus the number of regions required has not been done. Considering this, progress toward determining the number, type, and general location of regional disposal sites has been lacking, and a thoughtful study including all factors is needed. This study must also recognize that if NRC acts on the questions raised in chapter 2, this will help resolve the need to develop additional facilities.

FEDERAL VERSUS STATE RESPONSIBILITY FOR LOW-LEVEL WASTE DISPOSAL SHOULD BE DEFINED

DOE and NRC see the imbalance between locations of waste generators and disposal sites as a problem that the States can best handle. Some States agree, but others desire a Federal solution. States agreeing to help solve the problem believe that public opinion probably would impede any effort on their part to unilaterally establish regional disposal sites. Considering this, progress toward developing additional capacity may only be possible if responsibility is clearly fixed.

The Governors of Nevada, South Carolina, and Washington each testified before the House Committee on Science and Technology, Subcommittee on Energy Research and Production, that the low-level waste problem was a State matter. Because

of the Governors' testimony, DOE officials retreated from their initial plan to find a Federal solution to the low-level problem. That plan would have included looking at the 10 Federal regions in the country, identifying several candidate sites, and requiring the Governors in each region to select one of the candidate sites for future operation. DOE has assumed a wait-and-see posture to see if the States can resolve the problem. If they cannot, DOE officials said Federal preemption could be exercised but only as a last resort.

The Governor of Washington told us that the States can do a better job of regulating low-level waste disposal than the Federal Government. According to her, the commercial sector and every State generates low-level waste. For this reason, disposal of low-level waste should be a State problem and concern. The Federal Government, she said, should address itself to the safe and permanent disposal of high-level nuclear waste. The Governor advocated a larger number of regional burial sites, but definitely not one site for every State--50 sites are not needed.

The Governor of South Carolina told us the best solution to the low-level waste problem is Federal legislation requiring each State to handle its own low-level waste. He considered this a good approach because it would force each State to find a solution. Further, it would be the base from which States could negotiate with each other on regional agreements. However, he said that a national policy decision is needed to force the issue and provide proper oversight.

State officials in Illinois, Pennsylvania, and Nevada generally favored a State solution to the low-level waste problem. The consensus was that whereas a State could provide daily monitoring of low-level waste disposal activities, the Federal Government could not. Further, a State could provide greater assurance that the health and safety of its citizens were being protected. However, officials in each State acknowledged that the political climate in their State may prevent them from taking action to solve the low-level waste problem.

In contrast, New York State officials openly favored a Federal solution to the low-level waste disposal problem, including Federal ownership and operation of the disposal site. These officials portrayed nuclear power as a political monster in the aftermath of the accident at Three Mile Island in Pennsylvania. They also said not enough is known about the harmful effects of extremely low doses of radiation.

According to all parties contacted, tremendous political obstacles await any State decision to develop additional low-level waste disposal capacity. Without a clear decision on responsibility, any State action to solve this problem may not materialize so long as the States can expect the Federal Government to provide a solution.

In our view, the shallow-land burial of certain types of low-level wastes is a proven disposal method that could be handled by the States. Disposal of other low-level waste types through such methods as intermediate depth burial, however, may be an entirely different matter. Intermediate depth burial is not a proven disposal technique and the technical expertise needed to construct and maintain such sites over several hundred years may only reside with the Federal Government.

THE FEASIBILITY OF USING EXISTING WASTE BURIAL SITES SHOULD BE FULLY EVALUATED

At present, DOE has 14 active low-level nuclear waste burial sites, while commercial operators maintain 3 open and 3 closed sites. To the extent that these 20 sites can be collectively used to bury low-level nuclear waste, more sites need not be developed. In our view, however, DOE has not fully evaluated the feasibility of using most of these sites.

Concerned that the disposal capacity at the three operating commercial burial sites could become inadequate, NRC requested DOE in November 1979 to develop contingency options allowing use of DOE burial sites on an emergency basis. DOE therefore prepared a study that analyzed various alternatives and described the necessary steps to accept waste at DOE sites. The study assessed capacities of DOE sites, possibilities for expanding disposal space at most of these sites, and the institutional problems that might arise in transferring the wastes.

The DOE study report opened by stating that 8 of the 14 DOE sites are small and dedicated to specialized facilities, and for these reasons were dismissed from further consideration. The DOE study then considered the remaining six major sites for disposal or storage: Idaho National Engineering Laboratory, Oak Ridge National Laboratory, Los Alamos Scientific Laboratory, Savannah River Plant, Nevada Test Site, and Richland. The study stated that any of these sites could accept commercial waste for storage, but then eliminated the first three as practical options. According to the study, the disposal areas at the Idaho National Engineering Laboratory and Oak Ridge National Laboratory

will be full shortly after 1985. DOE did not consider the third site, the Los Alamos Scientific Laboratory, to be a suitable candidate for receiving commercial low-level waste because it is "inaccessible." The three sites remaining are Richland, Nevada Test Site, and Savannah River Plant.

The most obvious feature about the three remaining disposal sites is that each is near one of the three operating commercial sites. Therefore, we questioned the practicality of this plan considering that the Governors of Washington, Nevada, and South Carolina already object to their States storing all the Nation's commercial low-level waste. DOE officials admitted that a strong possibility exists that the Governors would similarly object to storing commercial wastes at DOE sites within their States.

DOE does not advocate using its sites for commercial low-level waste because of the possibility of Federal regulation of defense waste activities. It may be for this reason that DOE has developed a plan that has little likelihood of working.

In our opinion, DOE should develop a plan that has some possibility of success. This may begin by reconsidering the eight minor DOE sites. Upon being asked for specific information, a DOE official provided us four reasons why these eight sites do not merit consideration for commercial low-level waste.

--All eight sites have relatively small designated disposal areas.

--Seven of the eight sites handle only waste contaminated with uranium at very low levels of radioactivity.

--All eight sites would require special equipment and new operating procedures to handle the high levels of radioactivity typically found in commercial low-level waste.

--Four of these sites are used primarily for defense research and development, and national security could be adversely affected by storing or disposing offsite wastes at these locations.

Better reasons than those given us may be necessary to preclude using these minor sites. For instance, DOE did not indicate that the designated disposal areas at these minors sites could not be expanded. Also, DOE did not provide any compelling technical or environmental reasons

against using the sites or list specific examples illustrating their point that accepting commercial waste at a DOE site would threaten national security. A DOE official did subsequently tell us that expansion of boundaries at these minor sites could conceivably provoke State opposition in some instances.

Since one major aspect of the current low-level waste disposal problem is the existing regional imbalance, the DOE plan should alleviate this imbalance by distributing low-level waste to DOE sites in States other than those currently having commercial disposal sites. This could be on a permanent disposal basis or on an interim storage basis with permanent disposal awaiting the licensing of new commercial sites. Additional evaluation is needed before dismissing the use of minor DOE sites to alleviate the existing regional imbalance.

Possibly the closed commercial sites could be used again

Although NRC did not ask DOE to study the three closed commercial sites, the possibility exists that these sites could be used once again to store commercial waste. These sites are located in West Valley, New York; Sheffield, Illinois; and Maxey Flats, Kentucky.

DOE has been studying the West Valley site since it closed operations in 1976. It must make several unique decisions at this site concerning technical alternatives and financial responsibilities. Other issues, such as decommissioning, high-level waste disposal, spent-fuel storage, and low-level waste burial also exist at West Valley.

In its November 1978 report on the West Valley site, DOE said that the considerable information available about the adequacy of the site for storing radioactive waste and the experience gained to date in operating the burial site make its continued use attractive. A decision on the continued use of the Sheffield,Illinois, site and the Maxey Flats, Kentucky, site would also seem warranted. 1/

1/In our report entitled "Improvements Needed in the Land Disposal of Radioactive Waste--A Problem of Centuries" (RED-76-54, January 12, 1976) we discussed that some radioactivity had migrated from the Maxey Flats site because of inadequate waste management.

A FEDERAL FOCAL POINT OVER LOW-LEVEL WASTE MATTERS SHOULD BE ESTABLISHED

In September 1979, DOE started developing a national low-level waste strategy. This effort was subsequently sanctioned by the President on February 12, 1980, in a message to the Congress on nuclear waste management. In this message the President designated DOE as the lead agency to develop a national low-level waste disposal plan and to produce this plan by 1981. The President, however, did not establish a clear line of authority over low-level waste matters.

During our review, we found that a problem exists with State representatives knowing exactly who is in charge at the Federal level. For example, a DOE task force representative from the State of Washington told us that dealing with the Federal Government on the low-level waste issue was like dealing with a "shadow." He said no focal point exists that can reply to questions or issues the States raise. A DOE official agreed with this observation and said a focal point should be established. He illustrated his point by using the States' problem in getting technical assistance for site characterization studies. NRC, DOE, EPA, and the U.S. Geological Survey all offer technical assistance for such studies, and the States do not know who to contact first.

Another DOE task force representative from the State of Connecticut told us that DOE and NRC sometimes work as if they are operating in entirely different worlds. Many of the interchanges between the Federal agencies, he said, could be characterized as "turf preservation," and that the Federal agencies were position-oriented and not problem-oriented.

From our contacts with various officials, it has become obvious that a single focal point to coordinate answers to the low-level waste problem is needed. To the extent that DOE has lead agency responsibility over low-level waste matters, it has not taken advantage of it.

NEW SHALLOW-LAND BURIAL SITES SHOULD NOT BE DEVELOPED

Because Federal agencies see a critical need to relieve the regional imbalance in disposal sites, they are now encouraging the States to develop new shallow-land burial sites. We agree that a regional imbalance exists. However,

developing new shallow-land burial sites before certain issues are resolved is premature.

In various ways Federal agencies have encouraged the licensing of new regional shallow-land burial sites. For example, DOE prepared a preliminary study of an approach to regional disposal sites for low-level radioactive waste. In this study, DOE recommended that regional shallow-land burial sites should be developed and should be located according to waste generation rates.

In October 1979 NRC telegraphed the Governors of all the States, saying that, even if Nevada and Washington were to reopen their sites, a critical need exists for additional disposal capacity. In this telegram, NRC encouraged the States to develop additional shallow-land burial sites. The telegram stated that, while NRC has not finalized its criteria and standards on shallow-land burial, the States should not perceive that NRC has suspended licensing new burial sites. On the contrary, the telegram indicated that NRC is ready to license new sites on a case-by-case basis.

By deciding to encourage more disposal sites, the Federal agencies have acted before DOE's national low-level waste management plan is completed. This plan is supposed to include a complete analysis of shallow-land burial versus alternative methods of waste disposal. Based on the President's message of February 12, 1980, DOE must issue the final plan by 1981.

The plan should show the number, type, and general location of waste disposal sites needed (see pages 19 to 21). Although DOE has performed some early analysis of the number of sites needed and where they should be located, it has done no work on the type of or methods of disposal needed. By DOE's own admission, NRC's and EPA's waste classification studies may find that although shallow-land disposal may be suitable for many categories of low-level waste, other categories may require alternative disposal methods. These techniques may include burial at intermediate depths, mined cavities, ocean disposal, or engineered structures. Obviously , the premature development of new shallow-land burial sites could result in unneeded burial because DOE has not decided the number and type of sites that will be needed.

If NRC acts promptly to implement the recommendations in chapter 2, the present disposal problem will be alleviated in the short-term. For example, mandating a volume reduction program would decrease the amount of low-level waste sent to the three commercial sites. Also a definition

of what is low-level waste would allow some waste to be stored for a period and then sent to a sanitary landfill as uncontaminated trash.

CONCLUSIONS

NRC can alleviate--on the short term--the present disposal problem if it acts promptly on the recommendations included in chapter 2. Such action is also necessary to determine the additional disposal capacity needed.

In the long term, there is a regional imbalance between the location of waste generators and commercial disposal sites. However, we believe establishing new shallow-land burial sites should not proceed before certain issues are resolved as part of a national plan. This is not to say that momentum should not continue on all fronts to relieve the regional imbalance. Rather, the actual development of new shallow-land burial sites should be done in concert with a rational scheme agreed to by all parties involved. Hopefully, the national low-level waste plan being developed by DOE will fulfill the role of a rational scheme.

Once the plan is completed, the question will arise whether developing new disposal sites is a State or Federal responsibility. NRC, DOE, and many States believe the States should have this responsibility, but some States desire a Federal solution. This policy question should be resolved so that the contending parties will know their roles and stand ready to act once the national plan is completed.

In our view, the shallow-land burial of certain types of low-level wastes is a proven disposal method that could be handled by the States. Disposal of other low-level waste types through such methods as intermediate depth burial, however, may be an entirely different matter. Intermediate depth burial is not a proven disposal technique and the technical expertise needed to construct and maintain such sites over several hundred years may only reside with the Federal Government.

DOE's reasons for not allowing its disposal sites to accept commercial waste are not persuasive. Its basic posture appears to reject using any site where procedural changes or additional equipment would be required for commercial waste. The most serious argument DOE officials presented is that accepting commercial waste is a threat to national security; however, they could provide no specific examples illustrating this argument.

DOE has not been aggressive or specific in developing a solution to the low-level waste problem. It wants the States to accept the responsibility for low-level waste disposal and seems afraid that any aggressiveness on its part or use of its own sites could be misinterpreted as the Federal Government taking care of the problem. As DOE reevaluates the use of its sites, it also should evaluate, in conjunction with NRC, the feasibility of using the closed commercial sites once again.

At least two State representatives and one DOE official have said that a Federal focal point over low-level waste matters is needed. Based upon our understanding of the number of Federal agencies involved in providing technical assistance to the States, we agree with this contention.

RECOMMENDATIONS

We recommend that the Chairman, NRC, should not license any new shallow-land burial sites while DOE is developing a national low-level waste plan. This plan, according to the President, must be completed by 1981.

We recommend that the Secretary, DOE, in working on a national low-level waste plan should

- --reach agreement with other Federal agencies and appropriate parties on the number, type, and general location of waste disposal sites needed on a regional basis;
- --define the Federal versus State responsibility for low-level waste disposal;
- --evaluate the feasibility of using existing DOE facilities for disposing of commercial low-level waste;
- --investigate, in conjunction with NRC, the possibility of reopening the closed commercial sites; and
- --have DOE act as a Federal focal point over low-level waste matters other than licensing and regulation which is the responsibility of NRC and the Agreement States.

AGENCY COMMENTS

In commenting on the report, officials from both EPA and the Department of Transportation said they were in basic agreement with the thrust of the report. Officials from NRC

and DOE, however, posed one major objection. They disagreed with our recommendation that the Chairman of NRC should not license any new shallow-land burial sites while DOE is developing a national low-level waste management plan. Officials from both the NRC and DOE said such a recommendation would have a bad psychological effect on the States' momentum to develop new shallow-land burial sites. Also, the States will expect a Federal solution to the low-level waste disposal problem.

In our view, momentum should continue on all fronts to relieve the regional imbalance between the location of waste generators and commercial burial sites. We believe the States can handle the responsibility of operating the shallow-land burial of certain types of low-level wastes. However, new shallow-land burial sites should only be developed in the context of a national low-level waste management plan, which provides the proper planning and coordination needed to satisfy long-term disposal needs. The President has directed DOE to develop such a plan.

Still, DOE has not been aggressive in its work on this plan. It wants the States to accept the responsibility for low-level waste disposal and is afraid that any aggressiveness on its part could be misinterpreted as the Federal Government taking care of the problem. Consequently, DOE is doing very little toward taking the lead in resolving the low-level waste problem. NRC officials expressed similar pessimism about DOE's efforts in this area, and because of that, downplayed the value in waiting until DOE completes work on the national low-level waste management plan.

To make the national plan a success, DOE must be assertive in its role as lead agency for planning and coordination. This entails coordinating all Federal nonregulatory aspects of low-level waste management; working out effective relationships with regulatory bodies such as NRC and EPA; and developing strong and effective ties between the Federal Government and the States on all aspects of low-level waste disposal.

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