

*Encl to DSI-5
Comment 28*

ONE YEAR WITHOUT A DISPOSAL SITE
FOR LOW-LEVEL RADIOACTIVE WASTE

Lessons Learned from the Barnwell Closure to 31 States

July 1, 1994–June 30, 1995

REPORTS FROM 680 COMPANIES
AND INSTITUTIONS
THAT USE RADIOACTIVE MATERIALS

JANUARY 1996



**ORGANIZATIONS
UNITED**

For Responsible Low-Level
Radioactive Waste Solutions

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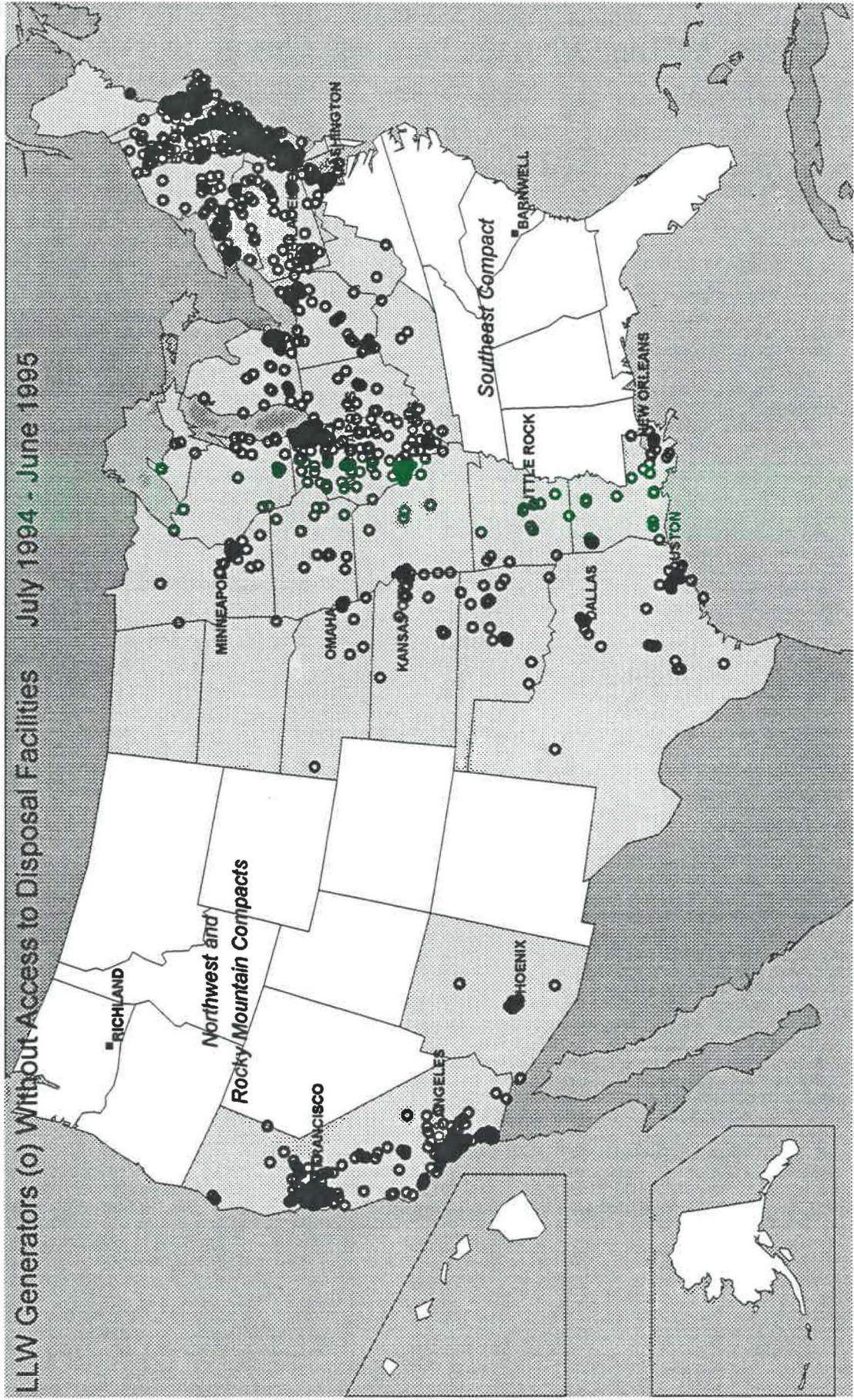


One Year Without a Disposal Site for Low-Level Radioactive Waste
Lessons Learned from the Barnwell Closure to 31 States

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LLW Generators (o) Without Access to Disposal Facilities July 1994 - June 1995



I. Introduction to the Issue

The low-level radioactive waste disposal facility at Barnwell, South Carolina, closed to companies and institutions outside its region in July 1994. An estimated 3,000 companies and institutions that use radioactive materials and generate low-level radioactive waste requiring disposal during 1992, 1993 and 1994, located in 31 states, were left stranded without a place to dispose of their low-level radioactive waste.

Within a year of the Barnwell restriction, **Organizations United for Responsible Low-Level Radioactive Waste Solutions** (“Organizations United”) sponsored a survey to discover the current and prospective effects, if any, on companies, institutions and consumers.

Organizations United is composed of medical, research, industrial and educational institutions, and electric utilities. (See Appendix A.) Its members rely on radioactive materials to generate electricity; diagnose and treat disease; research new cures for cancer, AIDS, diabetes and many other diseases; develop and test new pharmaceuticals; test and produce a wide variety of consumer goods for quality and safety, and conduct basic hydro-geologic, petro-chemical, atmospheric and space research. These activities create low-level radioactive waste. The goal of Organizations United is to increase the public’s awareness of the importance of radioactive materials and the need for environmentally safe disposal facilities.

An earlier study, also sponsored by Organizations United (*The Untold Story: Economic and Employment Benefits of the Use of Radioactive Materials*) showed that the use of radioactive materials (excluding nuclear energy) accounted for \$257 billion in revenues, 3.7 million jobs, and \$45 billion in tax revenues to local, state and federal governments. The report cautioned that “an impending lack of adequate disposal facilities jeopardizes our continued use of radioactive materials. If disposal of low-level waste becomes impossible or prohibitively expensive, the activities that produce the waste must be ultimately curtailed. This will have serious economic, employment and social consequences.”

Soon after Barnwell restricted access, stories of how companies were dealing with on-site storage of waste began to surface. Companies were managing the waste safely, but some companies were forced to use space previously designed for other purposes, such as parking garages. Stories of negative impacts for consumers and medical patients also began to surface.

On July 1, 1995, the Barnwell facility re-opened to all states except North Carolina—an unexpected reprieve. Thus the survey timing afforded a unique opportunity to see what would happen if disposal again became unavailable. Because Barnwell’s reopening is only a temporary solution that could change with the political winds, the survey offers a look at the likely consequences if new facilities are not developed to replace the Barnwell facility.

1. The facility at Barnwell and another in Richland, Washington, continued to accept waste from companies within their regions. For a brief history of the issue, see Appendix D.

**Compact and State Organization for Low-Level Radioactive Waste Disposal
Current Status – November 1995**

<p><u>Appalachian Compact</u></p> <ul style="list-style-type: none"> • Delaware • Maryland • Pennsylvania • West Virginia <p><u>Central Interstate Compact</u></p> <ul style="list-style-type: none"> • Arkansas • Kansas • Louisiana • Nebraska • Oklahoma <p><u>Central Midwest Compact</u></p> <ul style="list-style-type: none"> • Illinois • Kentucky <p><u>Midwest Compact</u></p> <ul style="list-style-type: none"> • Indiana • Iowa • Minnesota • Missouri • Ohio • Wisconsin <p><u>Northeast Compact</u></p> <ul style="list-style-type: none"> • Connecticut • New Jersey 	<p><u>Northwest Compact</u></p> <ul style="list-style-type: none"> • Alaska • Hawaii • Idaho • Montana • Oregon • Utah • Washington • Wyoming <p><u>Rocky Mountain Compact</u></p> <ul style="list-style-type: none"> • Colorado • Nevada • New Mexico <p><u>Southeast Compact</u></p> <ul style="list-style-type: none"> • Alabama • Florida • Georgia • Mississippi • North Carolina • Tennessee • Virginia <p><u>Southwestern Compact</u></p> <ul style="list-style-type: none"> • Arizona • California • North Dakota • South Dakota <p><u>Texas Compact (proposed)</u></p> <ul style="list-style-type: none"> • Maine • Texas • Vermont 	<p><u>Unaffiliated States</u></p> <ul style="list-style-type: none"> • District of Columbia • Massachusetts • Michigan • New Hampshire • New York • Puerto Rico • Rhode Island • South Carolina
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Notes:

1. **Bold** state names indicate designated facility host states for that compact.
2. **Bold** and *italicized* state names indicate hosts of operating disposal facilities.
3. The Rocky Mountain Compact signed a long-term contract with the Northwest Compact for access to the disposal facility at Richland, Washington.
4. South Carolina withdrew from the Southeast Compact in July 1995.
5. The District of Columbia and Puerto Rico are considered "states" under the Low-Level Radioactive Waste Policy Act.
6. The District of Columbia, New Hampshire, Puerto Rico and Rhode Island currently do not intend to site and operate disposal facilities. Massachusetts, Michigan and New York are engaged in facility siting efforts.

II. Executive Summary

Experts responsible for managing low-level waste in 680 companies and institutions were interviewed from February 1995 through early July 1995. The companies were selected at random by The WATS House, a national survey research firm, from the lists of those that had sent low-level waste to disposal facilities in the recent past. They included 271 industrial companies, 212 medical institutions, 110 academic institutions, 54 government facilities, and 39 electric companies. While electric power companies produce about half of the low-level radioactive waste generated in the nation, the large *majority* of businesses that generate low-level radioactive waste are not power companies.

The unusually high participation rate in this survey – 86% of those contacted who required off-site disposal agreed to be interviewed – indicates the importance of the issue.

The survey showed that without a place to dispose of low-level radioactive waste, companies and institutions quietly mobilized a variety of resources to manage the problem temporarily. However, the effects were overwhelmingly negative and, considering the short time-frame, dramatic:

- One year after loss of disposal access, 101 companies or institutions – 15% of those surveyed – had cut products or services. They reported impacts of these cuts on consumers and medical patients, ranging from increased costs and inconvenience to lower quality of life. Only a small percentage (2%) thought that the cutbacks already made would result in loss of life, but those two percent were 13 institutions.
- If lack of access to off-site disposal were to continue for another five years (to the year 2000), 211 companies or institutions (31%) expected new or additional cuts in products or services and increased impact on consumers. Many were in the health field. About one-fourth of the total sample (163 institutions) expected increased costs to consumers, and nearly as many (150) expected the cuts to cause public hardship or inconvenience. Other projected effects on consumers included negative impact on quality of life (120 institutions, 18%) and loss of life (39 institutions, 6%).
- Five medical institutions were forced to refer their patients to other facilities because of cuts in diagnostic procedures. If off-site disposal were not available for five additional years, an additional 30 institutions would have to refer patients elsewhere, according to respondents' projections.
- As might be expected when services are cut, there was some indication of disproportionate impact on disadvantaged groups. Only 3% (22 respondents) reported this disproportionate impact due to cuts already made, but 9% (60 respondents) suggested that prospective cuts would be more harmful to disadvantaged groups.
- In addition to the effects on the public, significant problems were reported for companies and institutions. A majority (386 institutions, 59%) had already incurred higher operating costs, and 113 (17%) reported a loss of revenues.

- Most companies or institutions made physical, structural, and/or personnel adaptations, such as adding or expanding on-site storage equipment and space, and adding or re-assigning personnel to manage the radioactive materials. Nearly 200 institutions added or re-assigned personnel to manage waste stored on-site. Fifty-seven companies eliminated jobs.
- While most companies or institutions had waste minimization and volume reduction programs in place before Barnwell access was restricted, 103 companies or institutions initiated these programs after they lost access to disposal. Methods included compaction, decontamination, incineration, recycling, and substitution for shorter-lived radioisotopes or other materials.
- The most dramatic step was to discontinue the use of radioactive materials and substitute other materials. Because radioisotopes are essential for the majority (80%) of companies or institutions, only 37 discontinued their use altogether. A slightly higher number— 94— companies or institutions were able to eliminate some of the uses. Eighty-seven companies or institutions made at least some substitutions. However, 37 of them said the change increased the cost of their services and/or had a negative effect on the quality of their services.
- Nearly three-fourths (72%) considered the loss of disposal access a major problem for the nation. Among the reasons cited: limited on-site storage capacity, increased potential for environmental and safety problems, and negative impact on consumers.
- A majority of those who considered loss of disposal access a major problem had not personally worked to draw public attention to their concerns, some fearing negative reaction. But a significant minority of respondents (191) did report active roles, ranging from letter writing to interviews on radio and television.

This report examines the aggregate data.

III. Method

A primary concern in choosing a methodology to study this issue was willingness to participate. Other surveys indicated that a large majority of waste management professionals might not discuss this issue, because most of the public are unaware that thousands of companies use radioactive materials in their work and are left with low-level radwaste as a by-product. Why would they want to shine the spotlight on waste? Most companies would naturally prefer to talk about the value of their work, such as the important research. Because of these concerns, a telephone methodology was chosen, in which the participant was offered complete anonymity. (See Appendix B.)

The social science research function of the Nuclear Energy Institute agreed to fund, direct and manage the study. The study was conducted by The WATS House, a national survey research firm located in Upper Darby, Pennsylvania.

Experts in 680 companies and institutions representing 271 industrial companies, 212 medical institutions, 110 academic institutions, 54 government facilities, and 39 electric companies – were interviewed between February and early July 1995.

Generators were selected at random from lists of companies that produce consumer goods or provide services using radioactive materials that require regulated disposal. The lists were collected from state regulatory and siting commissions. If respondents answered “yes” to either of the following questions at the beginning of the survey, they qualified for the interview:

- Did your institution/company send radioactive material to a low-level waste disposal facility in 1991, 1992 or 1993, either directly or through a broker or processor?
- Thinking about radioactive waste that is intended for disposal, are you currently storing any of this waste on-site?

The quantity of waste produced was not considered in determining the interview sample.

The exact number of companies and institutions that used off-site disposal in 1993 – before Barnwell closed – had not been clearly established. Based on available lists, the WATS House estimated the universe to be approximately 3,000 waste generators in the 31 states without access between July 1, 1994-June 30, 1995. This does not include companies or institutions in the Northwest Compact, the Rocky Mountain Compact, or the Southeast Compact (see p. 5). Based on this estimate, the 680 respondents represent 23 percent of the universe.

The study was conducted in two phases. In Phase I (February 1995), The WATS House surveyed a census of generators requiring off-site disposal in the Midwest Compact (Indiana, Iowa, Minnesota, Missouri, Ohio and Wisconsin) and in Michigan, an unaffiliated state. Of 214 possible interviews, The WATS House was able to interview 161, a 75% response rate. In Phase II (March-July 1995), The WATS House interviewed a representative sample of generators in the U.S., excluding those with access to disposal facilities: the Southeast, Northwest and Rocky Mountain Compacts. The District of Columbia and Puerto Rico were also excluded.

The number of interviews conducted in each compact was determined by the proportion of generators in that compact in relation to the U.S. as a whole. For example, because Pennsylvania represented 8% of all generators in the U.S., 8% of the sample to be interviewed was drawn from Pennsylvania. The different types of companies and institutions—industrial, medical, academic and so on— were chosen to represent their proportion within each compact. A detailed description of the sample can be found at the end of the questionnaire.

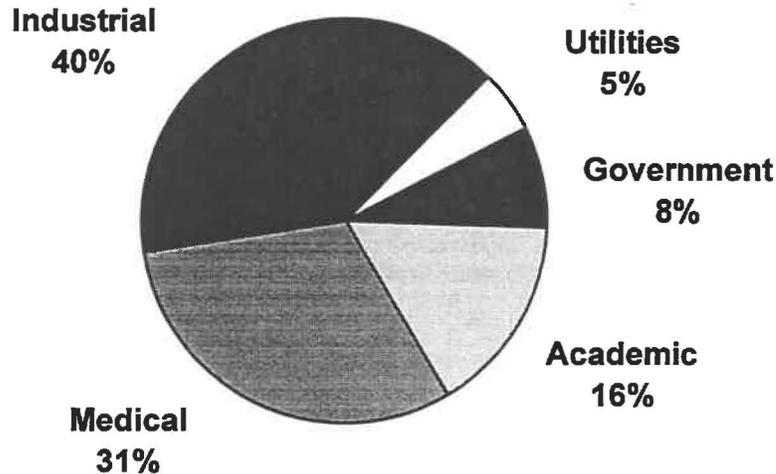
Eighty-six percent of qualified companies agreed to be interviewed—an unusually high participation rate. For many waste management professionals who had previously been silent, this survey was the first opportunity to express their concerns anonymously.

About The WATS House

The WATS House is a Pennsylvania-based public opinion research firm located near Philadelphia. The WATS House conducts in-depth research into public and consumer attitudes for decision makers in business, government and public affairs. The WATS House is a member of the Council of American Survey Research Organizations (CASRO) and adheres to their strict standards for survey research. For more information, contact Dan Margherita at (610) 352-5700, extension 589.

IV. Profile of Companies Interviewed

Forty percent of the companies or institutions interviewed were classified as industrial, 31% medical, 16% academic, 8% government, and 5% utilities. These are the established classifications of the National Low-Level Waste Management Program.



It was recognized that an organization may be able to classify itself in several ways. For example, an organization classified as "government" may be conducting medical research. To examine this, we asked each organization to identify which of the following areas were applicable and how it used radioactive materials.

"Which of the following apply to your company?" (multiple responses)

	Percent	Number
Industrial or manufacturing	34	232
Medical	29	197
Hospital	24	164
Medical office or clinic	18	122
Research hospital	16	108
Medical laboratory	29	194
College or university	26	175
Government	20	133
Pharmaceutical company	15	99
Medical school	14	92
Electric company	6	39

"In which of the following ways are radioactive materials used at your company/institution?"
(multiple responses)

	Percent	Number
Research	65	444
Education	34	229
Human use such as patient diagnosis or treatment	31	209
Production of a product	25	168
Quality assurance in manufacturing	24	166
Product treatment (irradiation, etc.)	14	97
Isotope manufacturing	7	46

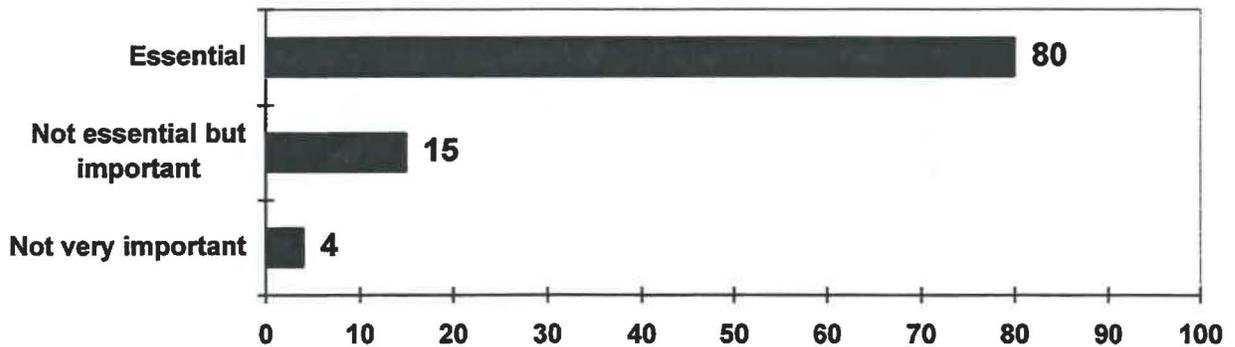
Most of the organizations said their use of radioisotopes was well established. Sixty-one percent had used radioactive materials requiring regulated disposal for more than 20 years.

"For about how many years has your company/institution used radioactive materials that require regulated disposal?"

Years	Percent	Number
Less than one year	< 1	3
1	< 1	4
2-3	3	19
4-5	5	31
6-7	3	23
8-10	8	52
11-15	8	54
16-20	9	61
More than 20	61	414
Don't know/refused	2	19

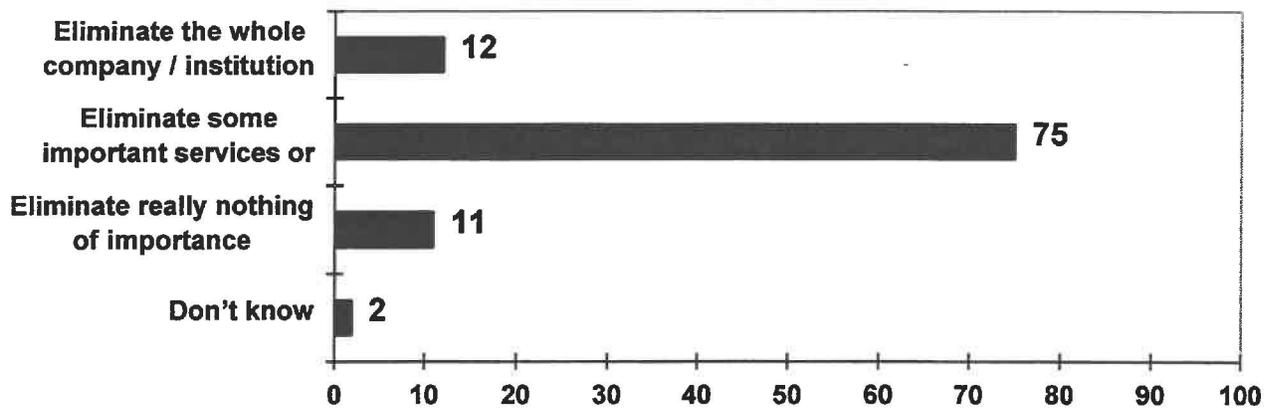
A large majority of the organizations consider their use of radioactive materials essential (80%). Only 4% said "not very important."

"Does your company/institution consider its use of radioactive materials essential, not essential but important, or not very important?"



Most said that to stop generating low-level radioactive waste, they would have to eliminate some important services or activities. Seventy-five companies (12%) said they would have to close.

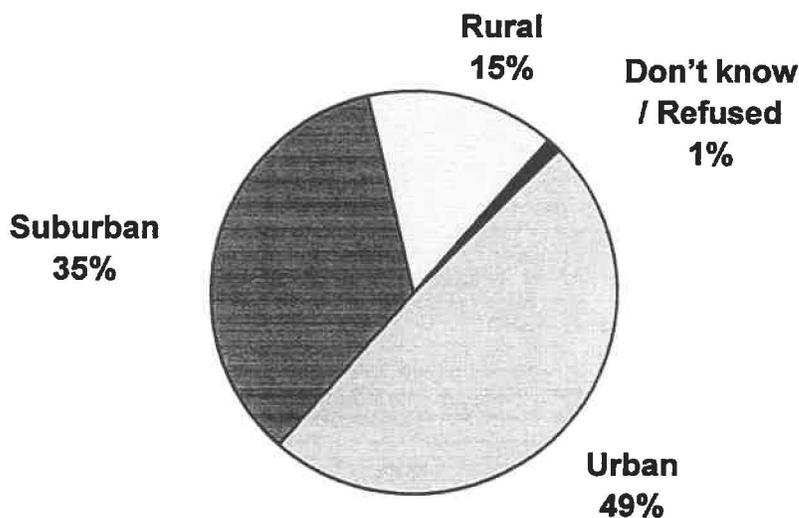
"In order for your company/institution to stop generating low-level radioactive waste, would you have to eliminate the whole company/institution, eliminate some important services or activities, or eliminate really nothing of importance?"



Almost half of the companies interviewed – 324 – employ thousands of workers, while 215 employ hundreds. One hundred thirty-eight companies employ fewer than 100.

The majority of organizations are located in the most populated areas, where space is at a premium. Forty-nine percent of the organizations (331) are located in urban areas, 35 percent (241) in suburban areas, and 15 percent (102) in rural ones.

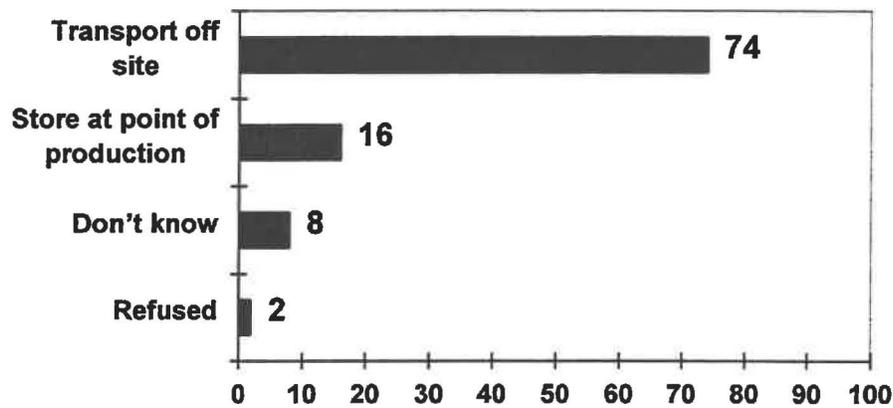
"Is your company/institution located in an urban, suburban, or rural area?"



V. Why Disposal Facilities are Preferable to On-Site Storage

A large majority of those interviewed (74%) said it is better to transport the waste to an off-site disposal facility rather than to store the waste at the point of production. Public opinion research has shown that large majorities of the public and opinion leaders agree with this principle (see Appendix C: "Perspective on Public Opinion: On Low-Level Radioactive Waste").

"As a general principle, do you think it is better to store the radioactive waste at the point of production, or to transport it to an off-site disposal facility?"



The primary explanation for this opinion is that the waste can be better managed and monitored at a few sites, rather than at many. Some said they simply don't have the space.

	Percent	Number
Waste Management	42	283
Can be better managed/monitored	26	180
Have more control	13	88
Better to have facility with dedicated professionals/secure	11	75
Can't be handled properly on-site	1	5
Environmental Safety	22	151
Public safety	10	71
Less hazard/less risk	7	50
Less risk of environmental harm	3	23
Storage/space	13	90
We have limited space	9	58
So we don't have to store it	1	7
So we don't have to build more storage	1	5

Sample quotes:

Those Saying Transport Off-Site

- I think the locality is better for one centralized facility than hundreds...
- It needs to go to one place so we'll know where it is.
- If companies fold, who will clean up? That's my biggest concern.
- It offers more security and better protection.
- It would be better controlled and much safer.
- There are too many small sites ... can't really store as safely as the larger sites.
- There are radioactive waste sites spread all over. That's not good, enhances chance for flood, national disaster; should have central monitored location.
- It can be better monitored there.
- Some people can't afford what they need for on-site and they'll find alternative methods.
- It's better to have produced waste stored in a regional facility that is licensed for that purpose as opposed to on-site at hundreds to thousands of locations. That's from a safety standpoint.
- Off-site disposal is just better practice, it has to be disposed of sometime, it can't just be left on-site forever, so you may as well just go off-site from the beginning.
- Since we are a public entity I don't think it's appropriate for us to store anything so hazardous on-site.
- I think it's much better to have one centralized location rather than multiple dispersed throughout the populated area.
- Better long-term management increases safety.
- Facilities being used for storage were never meant to be used as storage facilities. Off-site locations are better able to handle the materials and problems that go with them.
- It is by far the safest way to do it.
- By storing on-site you're endangering the personnel to the dangers of radiation. Also, the dry waste creates fire hazards.
- Better to get one group that could be much more capable of handling the waste properly than having all individuals doing it themselves.
- Having even a small amount of waste in Manhattan is really not a good idea.
- People guard it more securely. One place better than most.
- Too many separate controllers is not good. They need to centralize control.

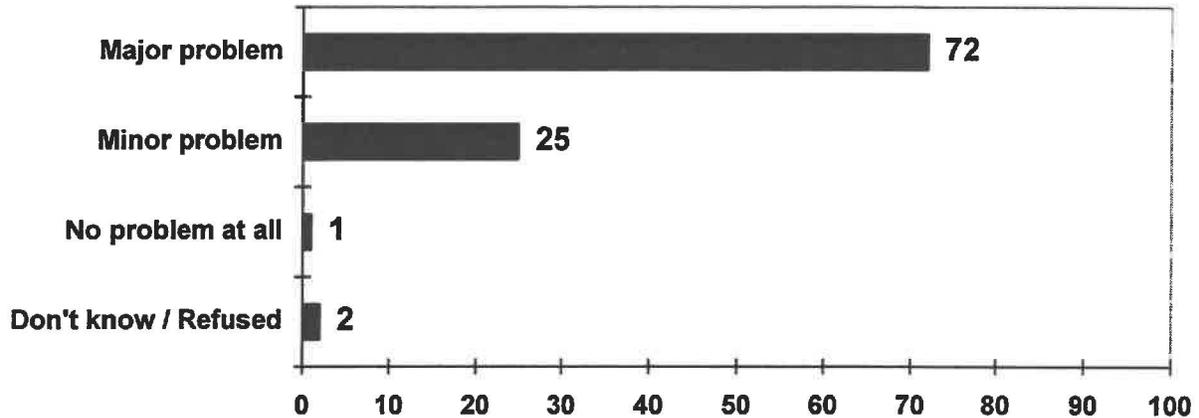
Those Saying Store On-Site:

- Because on-site keeps you aware in terms of reducing.
- All our waste is short life low-level waste, so it is easy to store on-site.
- There's no problem for us; we have very minuscule amounts that can be stored until it is totally non-radioactive, then dispose of it in the trash.
- It costs less to store on-site.
- Depends on what program you're in. In my case we have a place to store it. And we're not dealing with long-lived isotopes.

VI. Why Most Companies See Loss of Access as a Major National Problem

Nearly three-fourths said the loss of access to low-level radioactive waste disposal facilities is a major national problem.

“Do you view the loss of access to low-level radioactive waste disposal facilities as a major problem for the nation, a minor problem for the nation, or no problem for the nation at all?”



Those saying it was a “major problem” said the waste should be in a proper disposal facility, not stored temporarily at the points of production where space is limited. Many pointed out that the lack of off-site disposal access would limit research and result in negative consumer impacts.

	Percent	Number
Storage	33	226
Have nowhere to store the waste, should be in a disposal facility	17	113
Don't have space for it	5	33
Potential for problems, hazards with multiple sites	4	30
Facilities need storage/many are dangerous	4	29
Storage on-site creates safety problem	3	22
Uses	31	210
Will limit research/medical	12	83
Increased costs to consumer	5	33
Will impact the health care industry	4	29
Will negatively affect the economy, loss of jobs	4	26
Hospitals would have to turn patients away	4	25
Provides essential services/valuable	3	20
Products/services will be cut	2	14
Would limit power generation	2	12
Essential to everyday life	2	11

VII. How Most Companies Dealt with Temporary On-Site Storage When the Barnwell Facility Closed

Without a place to dispose of low-level radioactive waste, companies and institutions mobilized a variety of resources.

Most companies or institutions made physical, structural and/or personnel adaptations, such as adding on-site storage equipment, adding or expanding storage space, and adding or reassigning personnel to manage the radioactive materials.

While most companies or institutions had waste minimization and volume reduction programs before Barnwell closed, 103 companies or institutions initiated these programs after they lost access to disposal. Methods included compaction, decontamination, incineration, recycling, and substitution of shorter-lived radioisotopes or non-radioactive materials.

The most dramatic step was to discontinue the use of radioactive materials and substitute other materials. Since these materials are essential for the majority of companies or institutions, only 37 discontinued their use altogether. A slightly higher number—94 companies or institutions—eliminated some uses. Altogether, 87 companies or institutions made at least some substitutions. However, 37 of those said the change increased the cost of their services and/or had a negative effect on the quality of their services.

Discontinued uses of radioactive materials

A significant number of companies determined that they could no longer use radioactive materials, because they did not have access to a disposal facility.

- 132 companies (20%) discontinued some uses of radioactive materials (94 eliminated some, 37 eliminated all of the uses).

Substitutions

A significant number of companies substituted other materials for radioactive materials.

- 87 companies made substitutions (73 substituted for some of the uses, 13 substituted for all of the uses).

About half felt the substitution was not as effective for either cost or quality reasons:

- 37 companies said their substitutions had a negative effect on the cost of services.
- 37 companies said their substitutions had a negative effect on the quality of services.

Physical, structural and personnel adaptations

Large numbers of companies were forced to make physical, structural and personnel adaptations to be able to handle the waste on-site.

- 251 companies added storage equipment.
- 250 companies turned space formerly used for another purpose into a radioactive waste storage area.
- 233 companies expanded storage space.
- 183 companies added or reassigned personnel to manage the radioactive materials.

Waste minimization and volume reduction

Large majorities made efforts to minimize and reduce the volumes of waste. Most companies were already doing this before they were forced to store waste on-site.

- 523 companies said they have made an effort to reduce the amount of waste generated.
- 402 said they started doing this before they knew they would lose access to off-site disposal; 103 said they started doing this after they knew.
- 437 said they made an effort to reduce the volume of waste.
- 316 said they started doing this before; 103 said after.

Companies are using a number of approaches to reduce the volume of waste:

- 217 used compaction.
- 155 used decontamination.
- 86 used incineration.
- 32 substituted other materials or used radioisotopes with shorter half-lives.
- 20 returned sources to suppliers/vendors.
- 10 recycled materials.
- 17 used a combination of methods.

VIII. Effects on the Public, Companies and Institutions

Unlike surveys by other organizations, this survey asked respondents about (1) any cutbacks because of the lack of disposal facility access, (2) the impact of such cuts on their customers or patients, and (3) how the situation had forced their companies or institutions to change.

Cutbacks already made in products and services

The loss of off-site disposal access caused 101 companies to cut back on products or services, and/or medical, health or drug research, and/or medical or health services.

“Has the loss of disposal access caused your company/institution to cut back on any... (read list)?” (IF YES): “What products or services specifically were cut back? What else was cut back?”

	Percent	Number
MADE ONE OR MORE CUTBACK	15	101
Products or services	11	72
Medical or health or drug research	9	57
Medical or health services	3	19

Sample cutbacks as described by respondents:

- Disposal of sealed source for customers
- Analytical equipment
- Sealed sources used in bone scanners
- Student projects
- Laboratory analysis
- Any services that require half-life that exceeds 120 days, like cobalt
- Certain isotopes
- Research using carbon-14 or other materials like it because it's long-lived
- Limited the use of products and the selling of products
- Discontinued manufacture of certain alloys
- Use of radioisotopes in teaching courses, like P-32, S-35, C-14,
- Personnel for training technicians who service the public
- Service to student teaching labs
- Work of DNA replication
- Anything involving long-lived isotopes like iodine-125
- Cobalt for diagnostics and treatment of disease
- Radio label tracers; for example DNA and RNA assays
- Any long-lived isotopes, sealed sources for calibration
- Switch to other isotopes and techniques, which are not as sensitive, for research
- Research, biogenetic research
- Products not tested because of not using radioactive materials
- Development of vitamin production micro-organism
- Diagnostic procedures like cancer detection and radiation of blood transfusions

Most medical institutions said they were not yet forced to refer patients to other institutions. However, five medical institutions had referred patients to other health care institutions.

What the cutbacks mean

The respondents expressed concerns—some serious—about how the public could be harmed by the reduced availability of products and services that depend on use of radioactive materials. Negative effects included increased costs and hardship for patients and customers, negative quality of life impacts for customers and low-income or disadvantaged groups, and even loss of life.

“I’m going to read you a list, and for each item, please tell me if it is very likely, somewhat likely, not too likely, or not at all likely that this will result from the cutbacks you have made in products or services.”

SAID ONE OR MORE CUTBACKS LIKELY	Said “Likely”	
	Percent	Number
SAID ONE OR MORE CUTBACKS LIKELY	13	83
Increased costs to your customers/clients	11	70
Hardship or inconvenience to your customers/clients	10	65
Negative impacts upon quality of life of your customers/clients	7	48
Greater negative impact upon low-income or disadvantaged groups	4	22
Loss of life	2	13

“Why do you say ... is likely? What other reasons are there for your opinion?”

Sample quotes:

Increased costs to your customers/clients

- It would make the price of drugs go up.
- Because they are coming from overseas. The cost is 50%-100% higher.
- It would cost us more for isotopes, and that cost would be passed on to customers.
- Must switch procedures and buy equipment for substitution. Pass cost on.
- Because our analytical testing costs much more.
- We have to pass on the cost of non-isotopic alternatives that are more expensive.
- It will cost more for building or housing our own disposal than shipping it out for burial.
- If it costs a lot to handle the storage of waste, the cost has to be recovered.
- Things would be much less efficient without isotopes, and the increase in cost would be passed on.
- We spread cost among people we service; overhead added to research costs.
- The potential need for expansion of storage space, the addition of personnel to manage the waste materials and the additional time it takes to deal with radioactive materials.
- Customers eventually have to dispose of the waste, which increases cost.

Hardship or inconvenience to your customers/clients

- In many cases researchers devote time and effort to comply with the new situation and cut back on research.
- Present time no substitute for liquid trace or materials. Alternate methods are not as efficient. More money and no guarantee you'll get the answers looking for.
- Can't do as much research.
- This is a teaching institution, it's having a major impact on studies.
- If these tests can't be performed will have to go through surgical procedure.
- Patients would have to go elsewhere for their tests.
- If we have to delay our research, then it would take longer for a product to get into the market to help patients.
- Because we can't treat cancer and other diseases if we can't use radioactive materials.
- The ultimate customers are patients who lose out on medical services and products.
- The whole point of radiation isotope is to make the work easier.
- Delays in services and added cost.
- Well, what do you think, if you can't have the research done how will you know if you have a disease?
- We do basic research for a number of medical and terminal health care. Cures for diseases.
- We have customers who order those items who have to go elsewhere now for orders.
- They are going to have to find another lab to do it and in the state of California most labs are in the same boat so they might have to send it out of state. It's inconvenient.
- They can't have samples tested because we don't do it anymore, so if they can't get certain tests done it would cause hardships.
- Because of changes in operation procedures and equipment that we require.
- Capital investment in alternatives may cost hundreds of thousands. This is hard to justify to finance committees.
- The more we have to build to house on-site disposal the more the cost of our product will increase, and we'd also be forced to abandon certain projects.
- Drug research that was done will no longer be done. Drugs that could have been developed will not be.

Negative impacts upon quality of life of your customers/clients

- Without a breakthrough and new discoveries, customers can't take advantage of new products.
- Change in equipment will change work cycle and hours and loss of medical services.
- Certain drugs will not be developed and some projects will be abandoned, which may hinder the treating of some disease.
- The additional costs of the other materials will affect people economically.
- Some life-saving techniques can't be developed without isotopes.
- If pharmaceutical products cost more, it has impact on quality of life.
- Greater chance proper diagnosis will not be made. Also, they may not receive proper treatment.

Greater negative impact upon low income or disadvantaged groups

- That is our main population we serve (low-income and disadvantaged). They won't be able to afford it. The population we serve, a lot are government and federally funded.
- Tests on them would be decreased. The more money you have, the more expensive treatment you receive.
- The higher prices of our research and development will hurt that group.
- When there's an increase in cost the least able to bare would be the people of low income, when they need the same exact treatment everybody else needs.
- The poor have less opportunity to purchase expensive drugs.
- Jobs that are lost here. Loss of lower level technician jobs means less employment.
- They don't have the resources for distant medical care.

Loss of life

- First of all, anybody who goes under the surgeon's knife, there's always a risk. If they can't get what they need, they will open the patient up and explore, and that's definitely a risk to the patient's life. Also, the diseases that we study now, AIDS and cancer research is important too, and if it can't be cured through isotopes, people will die.
- Cardiac studies won't be pursued, which could lead to loss of life.
- Biomedical research is essential to saving lives.
- If the product is bad quality, it doesn't do the job, people die.
- Without the development of these new drugs and techniques, people could die.
- Patients who depend on research to save their lives will not make it.
- If new drugs aren't being investigated or made, people will die.
- Diagnostic, medical products. It's not available. It would result in loss of life.
- If we can't conduct research for possible cures, it may result in death because that can be a cure that we had to cut back on.

Higher costs, lost revenues, job cuts, relocation and business termination

Within one year, hundreds of companies or institutions were hurt by the lack of off-site disposal access. Many saw their costs go up and revenues go down. Some considered relocating their business (or at least the part of it that uses radioactive materials) to another state or country where disposal is available. Some eliminated jobs. Twenty-three companies considered going out of business.

"So far, has the loss of disposal access caused your company/institution to (read list):"

	Percent	Number
EXPERIENCED ONE OR MORE EFFECT	63	411
Incur higher cost of operations	59	386
Lose revenues	17	113
Consider relocating the business or services, or part of the business or services, to another state or country	9	60
Eliminate jobs	9	57
Consider going out of business	4	23

IX. Expected Effects If No Site Is Developed in Five Years

Cutbacks in products and services

Many companies expected to make new or additional cutbacks in products and services (177 companies), medical or health or drug research (134 companies), and medical or health services (80 companies) if a waste disposal facility were not available in five years.

"I'd like you to think five years ahead to the year 2000. Assume that access to a low-level waste disposal facility is not available. Assume also that your company/institution has made its best effort in waste minimization and waste reduction. Please tell me if your company/institution is likely or not likely to make new or additional cutbacks in any..."

	Percent	Number
MADE ONE OR MORE CUTBACK	32	211
Products or services	27	177
Medical, health or drug research	21	134
Medical or health services	12	80

"What [products or services/medical or health or drug research/medical or health services] specifically would be cut back?"

Sample quotes:

- The education mission and the research would be cut.
- We make only one product. We would have to replace processes to make it.
- Ability to offer the use of isotopes for student studies.
- Industrial gauges. We wouldn't be able to manufacture the gauges.
- Research. That's it, 100 percent.
- Student supported research. Drug investigations. Collaborative projects.
- Cancer research. The organic chemistry research.
- Development of new chemicals providing good health. Pharmaceutical, agricultural, chemical...
- Most of our product lines are not able to store their own waste. Can't offer decontamination waste services to our customers.
- Drug research and clinical trials like AIDS, etc.
- Smoke detectors.
- Cut back on all the other radioactive testing. We'd run out of storage space within the next five years.
- The quantification of certain tests for people with diabetes.
- Diagnostic studies and therapeutic procedures.
- The molecular biology classes as well as graduate activities.
- We would stop building electron capture detectors.
- New products in the pipeline have trouble getting on the market.
- Pre-clinical development.
- The whole field of nuclear medicine.

- Hormones, steroids.
- Radioactive implants in treating cancer.
- Our bone scan tests.
- Laboratory analysis.
- Research in biochemistry and biology.
- Service we provide to our nuclear power plant industries.
- Resources of personnel and other management areas.
- Use of sources for physics. We use alpha-beta sources for products and services. In a number of isotopes there's cadmium-109, cesium-137, Tritiated water, etc. We won't be using them, we'll have to dispose of them. It stops us from doing some experiments.
- Very specialized testing areas, like DNA probes and tuberculosis testing.
- Certain enzymes and molecular biology research.
- Radiation therapy, nuclear medical pathology.
- Two out of five things would be cut. One would be advanced microbiology and the other would be biochemistry.
- Performance of pharmacokinetics and tissue distribution studies.
- Research on drug residue in food. Quality of education or the cost will go up.
- Services to our students. For example: laboratory exercise we can't do. Radioactive labeled amino acids to study protein synthesis.
- Activities in development relating to plant growth.
- Just the medical research.
- Nothing new would be tried in fear of not being able to get rid of the waste.
- I won't be selling instrumentation. The testing using radioactive isotopes/materials. I will probably go out of business.
- Drugs. Pharmaceutical development of new drugs.
- That would be the infectious diseases area.
- Gene therapy and molecular biology.
- Nutritional and biochemistry materials.
- It would have a dampening effect. It would make things more difficult and expensive.
- The amount of research can't be done. Money goes to waste, and there are disposal and storage issues.
- Basic genetic research would be cut back.
- Oncology and some infectious diseases.
- Diagnosis and therapy for cancer patients especially.
- All research in general. We do mostly research on cancer and heart disease.
- All of the ones that use isotopes; like heart and liver research. Ninety percent use isotopes.
- People who develop drugs for cardiac arrhythmia, blood pressure and diabetes would not be able to do research.
- Across the board.
- We would have to terminate specific experiments for some of our cosmetic products.
- Research in kidney disease.
- Almost all research. For example, micro-biology research and living cell research.
- Sub-culture H-3 cell growth stimulus.
- Twenty percent of our research.
- Cholesterol studies.
- Performance of pharmacokinetics and tissue distribution studies.
- We'd stop investigating bone and marrow transplant research.

- Transplant rejection will be affected.
- Bio- and botanical research.
- The area of synthetic blood materials. The quality of blood testing.
- That would be a variety of things. Synthetic blood, cancer and AIDS research, and studies involving heart and lungs.
- Instrument calibration sources.
- Our diagnostic arm. The diagnostic laboratory would be cut back. That's research diagnostic.
- Drug abuse research.
- Reduce using in-house. Have to spend outside.
- There would be no test for hepatitis if we don't have radioactive materials.

Most medical institutions that provide patient care said they would not be forced to refer their patients to other facilities if a site were not available in five years. Still, the institutions that would be likely to refer patients to facilities elsewhere because of the unavailability of disposal rose from five currently to 30 by the year 2000.

Impacts on Customers

Many companies and institutions expected that projected cutbacks in products or services – if disposal remained unavailable for another five years – would have negative consequences for customers or patients.

I'm going to read you a list, and for each item, please tell me if it is very likely, somewhat likely, not too likely, or not at all likely that this will result from the new or additional cutbacks you have just mentioned.

	Said "Likely"	
	Percent	Number
MENTIONED ONE OR MORE LIKELY IMPACTS	28	180
Increased costs to your customers/clients	25	163
Hardship or inconvenience to your customers/clients	23	150
Negative impacts upon quality of life of your customers/clients	18	120
Greater negative impact upon low-income or disadvantaged groups	9	60
Loss of life	6	39

"Why do you say ... is likely? What other reasons are there for your opinion?"

Sample quotes:

Hardship or inconvenience to your customers/clients

- The type of education the students get will be limited because they won't be able to get in certain areas of research. They will miss out on the effect of radiation on cells.
- Student programs would no longer be available. They can't get the training they need for jobs. Customers won't be able to find professionally skilled technicians needed.
- Customers are people who have diseases and would suffer.
- The quality of the program would go down.

Negative impacts upon quality of life of your customers/clients

- Loss of jobs will have a negative impact on the quality of life.
- Increased cost. It costs patients more for services.
- Our customers would have a lower quality of life because if our research and development is hampered we wouldn't be able to produce the products they need.
- We produce and develop human therapeutics, so it would interfere and have an effect on the patient population.
- The loss of protection of smoke detectors from us.
- A lot of the quality of life is based on the development of a cure for diseases.
- When you lose the ability to do your own studies on-site you lose your level of confidence and won't have direct control over the studies
- Any cutbacks in the quality of materials will affect research.
- The more it costs to develop, the more it becomes difficult for customers to get.
- We would not be able to generate the next generation of herbicides.
- Unrealized drug development will affect the medical options of people.
- There would be a drastic reduction of medical research.
- We provide an excellent service that is not comparable to other labs in our area. Patients would lose out on these services if they have to go elsewhere.
- If the procedure is costly, the physician will look for alternatives or probably not do it.
- Delay in access to crop protection products.
- In the health field there are ethics involved in giving patients accurate testing, which would be lowered.
- If you don't get certain results for testing, like a diabetic, for example, they may not get results for 1 or 2 days—as opposed to 1 or 2 hours—and their life is in danger.
- May only have a few centers that provide treatment, people may have to travel.
- Because they would be forced to move to obtain services.

Greater negative impact upon low-income or disadvantaged groups

- People won't be able to afford the tests.
- Loss of wages through cutbacks and poor quality of medical care.
- Our institution services a large low-income population. Many first-time students come here. We are cheap. They would not benefit from our institution.
- An enormous portion of the economy depends on the use of radioactive materials.
- The people most affected are local, low income. They will not be able to afford costs.
- We treat low-income and disadvantaged groups for a very low price. Without diagnostic material, there would be more expensive procedures. It would be costly to the patients.
- The rich can afford other avenues.
- Rich people can go to Europe more easily and get treatment.
- Reduction of hospital services and higher costs almost always impact these groups the most.

Loss of life

- Simply because if there's less research, there will be less cures. For example, malaria is resistant to all kinds of medications. Medical research is trying to develop new treatments and/or a cure.
- If you can't make diagnosis with radioactivity, diseases could become terminal.
- Our customers have leukemia, so our research saves lives.
- The more on-site storage there is, the better chance of an accident.
- Greater expense for electricity.
- Better to have a few well-designed and controlled facilities than to have them spread out over less controlled areas.
- If no breakthrough is made, you can't save people's lives. For example: HIV, AIDS research, slows down the development.
- If I don't have materials, patients will die from not getting treatment.
- We deal with deadly diseases and if we're not finding the cures, people will die.
- We're testing a cure for AIDS, if the research comes to a halt then eventually AIDS victims would die. If we continue to test we can see if there is a cure.

Higher costs, added physical and regulatory requirements, lost revenues, job loss, relocation and business termination

The number of organizations that would be hurt by lack of off-site disposal access would rise rapidly over a five-year period. Besides rising costs, lost revenues, job elimination, and consideration of business relocation or termination, a large majority (415) of companies and institutions would run out of space and be required to expand on-site storage. Four hundred sixteen organizations said they would have to amend their radioactive materials license from the Nuclear Regulatory Commission in order to continue operations.

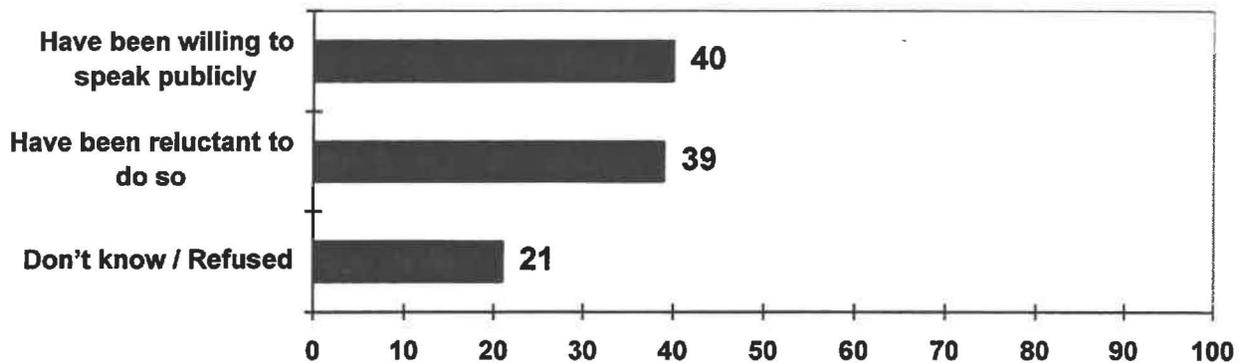
"And, if access to a low-level waste disposal facility is not available by the year 2000, would your company/institution be likely to (read list):"

	Percent	Number
WOULD EXPERIENCE ONE OR MORE EFFECT	83	542
Incur higher (added) cost of operations	68	446
Amend your radioactive materials license	64	416
Expand on-site storage space for radioactive waste	64	415
Lose more revenues	36	232
Eliminate jobs	21	135
Consider relocating all or part of the business or services to another state or country	13	84
Consider going out of business	7	37

X. Willingness To Speak Out About this Issue

Many (266) said they think people in companies or institutions like their own have been reluctant to speak publicly about this issue.

"In general, do you think that other companies/institutions like yours have been willing to speak publicly about this issue, or have they been reluctant to do so?"



Those who considered this issue a major national problem (72% of the sample) were asked if they have been personally active in communicating their views to public groups: 39% of them said they were active in speaking out, 61% said they were not.

"In what ways have you been communicating your views?"

	Percent	Number
	100	680
• Letters to state representatives/contact with state officials	7	50
• Work with state low-level radioactive waste groups	7	49
• Public forums/hearings	4	26
• Meet with groups of people, make public aware	4	24
• Attend seminars, regional meetings	3	18
• Teach training workshops	3	17
• Speak through radio, TV, give interviews	3	17
• Belong to lobby group	2	16
• Public speaking	2	15
• Articles in publications, journals	2	14
• Interviews in newspapers	2	12
• Other print, media efforts	2	4
• Through Department of Public Health	1	9
• Conduct tours at our facility	1	4
• Write letters to the editor	1	7
• Write letters	1	3
• Network with other professionals	1	8
• "Any opportunity I get"	1	6
• Conduct surveys	<1	2

Those who said they do not communicate their views explained why:

	Percent	Number
	100	680
• It does not impact us, has not been brought up	14	97
• Have to get clearance from company, very unpopular subject, fear of public abuse	10	70
• Time constraints, too much work to do	9	61
• We have people who speak for us, it's not my role	4	28
• We don't generate much waste	3	22

Sample quotes:

- I've never really had the chance. I'm not an activist, but if asked, I would give an opinion.
- I do not have the available time.
- I'm too busy. I don't have any time.
- Our problems are the same as other companies. There are groups that speak for us.
- I'm reluctant because of the way the public views radioactive waste.
- Because we don't generate enough.
- No way. I'm not a spokesperson for our company.
- You get negative responses. The public doesn't want to hear it.
- We decided to just pull out and drop the production line.
- Because it's a very sensitive issue with the public.
- I have never been called upon.
- We're keeping a low profile.
- The environmental groups are ... extremely difficult to talk to.
- Radiation is controversial.
- Because of administrative mandates.
- Political repercussions.
- Don't see it as a high priority in the company.
- I don't have the time or an outlet to be active in this field.
- I have no desire to do so.
- I think if you spend more time defending a project you might as well not do it.
- That's not my job.
- No chance.
- Ignorance. Public tends to brand radiation and lump it in with the bomb.
- Not allowed to. Legal reasons.
- Not allowed to. Work for the government.
- Laziness, not motivated. I guess I don't think it will do much good.
- No opportunities.
- I don't feel qualified.
- Problem is not acute yet.
- People against the issue are more vocal than those for it. That's true with any issue. We just can't get a fair hearing.
- I have no vested interest.
- The question just hasn't come up in any conversations.
- It would make people wonder about what's going on in their own backyard.

- I'm not permitted to.
- Science and the public doesn't mesh. The public is not receptive to anything to do with radioactive materials.
- Lack of a good audience or someone to get me going.
- It's not my place to speak out.
- I don't have access to groups of people who could help me.
- Our voice is not very important.
- Because there is an unfounded phobia ... don't speak about it publicly.
- Busy doing my job.
- We don't want anyone to know that we use radioactive materials in the manufacturing of our products.
- I stopped. I thought I wasn't getting anywhere.
- Don't want repercussions from community activists.
- Not authorized by the company.
- I think when people hear "radiation" they have a pre-conceived idea and it's difficult to change a person's perspective.
- Privately, but not publicly. Don't know where to begin publicly.
- I don't know a solution.
- No, because anything that has to do with nuclear issues reflects badly on the institution.
- When I tell most people what I do for a living they look at me like I'm crazy. I can't see myself speaking with the public.

XI. Other Comments

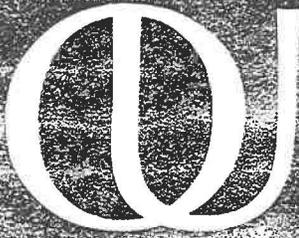
“What other comments would you like to make on this subject?”

Sample quotes:

- I can't stress enough that we must concentrate on the smaller sites that are not capable of storing the waste as safely as one, large, safely managed site.
- Please get us a low-level waste disposal facility as soon as possible. It's an impending crisis.
- I would like to see this happening. I think this is a good survey. The public needs to be aware of what is going on and be able to give opinions.
- Whatever can be done, please contact us and let us know what we can do.
- You did not ask the views about veterinary hospitals, so you're not getting the views of a large and important part of the population.
- I hope a disposal site is available by the year 2000.
- Stop doing surveys and build a site.
- Low-level waste is not a scientific health hazard, it's more of a political issue; the media makes it more than it is.
- We have storage capacity now... But if it fills up it would be a burden to us.
- I wish our state would get its act together and do something productive with this and stop playing political games.
- I guess just some way to educate people, although that's not always possible. It's always a problem to explain the risk because people perceive it as a greater than it is.
- I think it needs to be a great deal more education for the general public about the reasons for the sites and the consequences of not having them. I also think the federal government should apply more pressure to get the job done. Also, the federal government should be sensitive to cost issues for individual institutions and businesses.
- Everybody is waiting for someone else to solve this problem.
- I don't believe it's a technical problem, it's political.
- Right now they better find somewhere fast to store that stuff.
- All I can say is we are becoming dinosaurs. We are losing public opinion. Countries in Europe still will use this.
- Radioactive material is essential for the research and development of disease-curing products. We can dispose of this correctly and safely. Unfortunately, this has turned into a political issue.
- Politicians have their own agenda and want to stay in power by using fear tactics, such as making people afraid of radioactive materials. People need to be educated.
- This problem has been building for 10 years and has to be resolved. I blame this problem on politicians who have not acted in favor of the public citizenry.
- I think we need to work together to solve the problem for all concerned.
- The problem is not a public issue, it's a political issue. It's in their hands, because it was placed in their hands. And if they continue to not do anything, then the whole country will suffer. We need a scientific and rational policy to resolve the issue.
- Before, there were three sites. And I don't think we need more than three active sites for the nation.
- This was a good opportunity to speak with you.
- Go to it and get a facility.

Appendix A

Description of Organizations United: Mission and Goals



ORGANIZATIONS UNITED

For Responsible Low-Level Radioactive Waste Solutions

Charter

ORGANIZATIONS UNITED For Responsible Low-level Radioactive Waste Solutions

Section I Mission

Organizations United For Responsible Low-Level Radioactive Waste Solutions is a coalition dedicated to socially, environmentally, technically and economically responsible solutions for disposal of low-level radioactive waste.

Section II Goals

- Support the ongoing process, set forth in the Low-Level Waste Policy Act as amended, to develop centralized facilities for low-level radioactive waste disposal.
- Support programs to reduce low-level radioactive waste volumes.
- Increase awareness of the need for environmentally safe disposal facilities for low-level radioactive waste.
- Provide leadership, comment and perspective on current issues relating to disposal of low-level radioactive waste.
- Increase awareness that all people benefit from the use of radioisotopes and radioactive materials — in medicine, research, industry and the production of electricity — and that these benefits result in low-level radioactive waste.
- Persuade the public, policy-makers and the media that it is irresponsible to leave low-level waste disposal as a problem for future generations to solve.

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technically, economically
responsible solutions to
low-level radioactive
waste disposal.*

Members include:

*American Council on
Education*

*American College of
Nuclear Physicians*

*American Society of
Nuclear Cardiology*

*Association of American
Medical Colleges*

*Council on Radionuclides
and Radiopharmaceuticals*

Edison Electric Institute

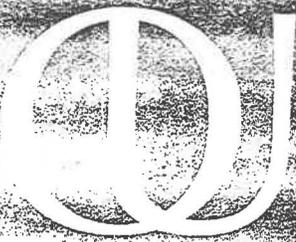
Health Physics Society

Society of Nuclear Medicine

*U.S. Council for Energy
Awareness*

Appendix B

Letter from Organizations United to Potential Respondents



ORGANIZATIONS UNITED

For Responsible Low-Level Radioactive Waste Solutions

May 5, 1995

TO: Radiation Safety Officer

SUBJECT: LLW Storage Survey

Soon you may be receiving a call from The WATS House, a national survey research firm. A large sample of about 700 generators is being interviewed in a major national survey on low-level radioactive waste (LLW) management issues. The survey is sponsored by Organizations United and funded by the Nuclear Energy Institute.

For the following reasons, it is very important that you respond to the survey if you are contacted:

- Generators and decision makers need more than anecdotal information to support the case for new disposal facilities. A statistically valid study of storage impacts will address this need.
- In contrast to various state studies that ask about volumes, activity, and so on, this survey asks for your expert opinion about the impact -- on products, services, and consumers -- of not having a disposal facility.
- This study is national in scope. A representative sample of hundreds of organizations in the 31 states that lack disposal access will be included in the survey.
- Anonymity is guaranteed. The findings will be presented in aggregate only, and you are assured by the research firm, by contractual agreement, that your responses will never be associated with your name and organization.

For further information or to check out the survey caller, you may contact Dan Margherita of The WATS House at (800) 929-6237. Thank you for your cooperation.

Sincerely,



Paul H. Genoa

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Physicists in Medicine*

*American College of Nuclear
Physicians*

*American Council on
Education*

*American Medical
Association*

American Nuclear Society

*American Society of Nuclear
Cardiology*

*Association of American
Medical Colleges*

*Council on Radionuclides
and Radiopharmaceuticals*

Edison Electric Institute

Health Physics Society

Nuclear Energy Institute

*Pharmaceutical Research
and Manufacturers of
America*

Society of Nuclear Medicine

*Society of Prospective
Medicine*

Appendix C

Public Opinion on Low-Level Radioactive Waste

Public Opinion

Prepared by the U.S. Council for Energy Awareness

SEPTEMBER 1993

On Low-Level Radioactive Waste

Ann Stouffer Bisconti

When it comes to radioactive waste, do Americans agree on anything? Polls of four population groups say the answer is yes.

The American people and their leaders have very clear views on low-level waste disposal. They want the problem solved. This waste is produced by hundreds of everyday activities—including generating electricity, diagnosing and treating diseases, testing new drugs, controlling the quality of manufactured products, and improving agriculture. The four polls found agreement with two basic principles:

- Building a facility and keeping these uses of radioactive materials is preferable to not building a facility and doing without the uses.
- Transporting the waste to a permanent disposal facility is preferable to keeping the waste stored at the many different sites where it is produced.

Pennsylvania and New Jersey are among the states that have started the process of finding a suitable site for disposal of low-level radioactive waste. The low-level waste

Polls Cited Here

- **Pennsylvania and New Jersey:** Market Strategies (600 in each state, representing all adults statewide, margin of error $\pm 4\%$, January-February 1993).
- **U.S. Public:** Bruskin/Goldring Research (1,000 nationally representative adults, margin of error $\pm 3\%$, February 1993).
- **Opinion Leaders:** Cambridge Reports/Research International (annual opinion leader poll, 50 in each of 10 groups, April-May 1993, see Figure 1).

TABLE 1: Keep the Activities

"If it came to a choice, which would you prefer: Build a disposal facility and keep the activities that produce low-level radioactive waste, or don't build a disposal facility and do without the activities that produce low-level radioactive waste?"

	Pennsylvania Poll %	New Jersey Poll %	U.S. Public Poll %	U.S. Opinion Leader Poll %
Keep the activities	65	64	57	79
Do without activities	28	29	33	15
Don't know	8	7	10	6

TABLE 2: Transport to Permanent Facility

"Which seems to you to be the best way to deal with this waste: Keep it stored at the many different sites where it is produced, or transport the waste to a permanent disposal facility?"

	Pennsylvania Poll %	New Jersey Poll %	U.S. Public Poll %	U.S. Opinion Leader Poll %
Transport to permanent facility	70	71	60	75
Store where produced	19	15	27	15
Don't know	11	15	13	11

generators in each of those states sponsored in-depth studies statewide to learn about their public's awareness, opinions, and concerns. Some comparison questions were also asked in national polls of the U.S. public and opinion leaders.

Centralized Disposal: The Environmentally Responsible Course

Why do people support centralized disposal facilities? Comments in the Pennsylvania and New Jersey polls show that many people today have a sense of generational responsibility. They want solutions to problems. Sample comments:

"I believe we have to have progress and products. So we will need ways to dispose of the waste from making those products."

"We need the medicine and the energy production, so we need something to hold the waste."

"Some way it has to be disposed of for future generations."

"Well, I think you must take responsibility for your own problems. If there is a problem, it should not be ignored."

"It's the right thing to do because it can solve the problems."

Many respondents volunteered that they viewed centralized disposal as a safer solution than leaving the waste where it is now. They believed the waste would be better controlled.

"Because it has to go somewhere, and it should be controlled."

"Because I think it would be a safer, better way to handle waste."

"This would make sure it would go to the right place."

"This way we can control it and keep it in one area."

"It would be safer for our environment and safer for our children's future."

Many people do not have an accurate picture of low-level radioactive waste. They are more inclined to see it as a liquid than a solid.

But large majorities in all four polls expressed confidence that this waste is manageable, regulated, and can be disposed of safely (Table 3).

All 10 opinion leader groups agreed, by lopsided margins, that low-level radioactive waste can be disposed of safely (Figure 2).

From Principles to Sites

Agreement that low-level radioactive waste can be disposed of safely is a first step, a necessary foundation for eventual disposal solutions. Finding suitable sites for disposal facilities is the next step.

The research reported here does not provide any clues about where those places might be—nor was it designed to do so. The social science literature and experience suggest that fair and scientifically sound processes for siting industrial facilities require public involvement, empathy, patience, and time.

TABLE 3: Perceptions of Low-Level Radioactive Waste

"I'm going to read you some pairs of words or phrases and, for each one, I'd like you to tell me which word or phrase comes closest to how you think of radioactive waste."

	Pennsylvania Poll %	New Jersey Poll %	U.S. Public Poll %	U.S. Opinion Leader Poll %
Solid	40	40	49	—
Liquid	52	49	32	—
Don't know	9	10	19	—
Manageable	64	63	70	83
Not manageable	31	33	23	14
Don't know	5	4	7	3
Regulated	69	61	75	84
Not regulated	29	35	19	12
Don't know	3	4	6	4
Can be disposed of safely	62	62	56	78
Cannot be disposed of safely	30	32	36	17
Don't know	8	6	8	5

FIGURE 1: U.S. Opinion Leaders: Percent who believe we should build disposal facilities and keep the activities that produce low-level waste

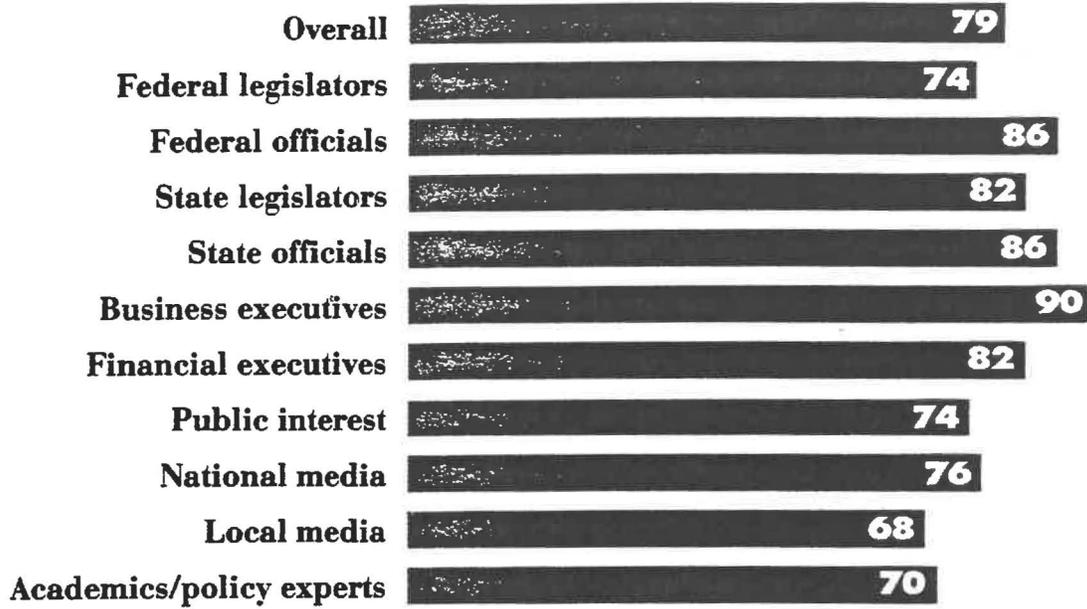


FIGURE 2: U.S. Opinion Leaders: Percent who believe that radioactive waste can be disposed of safely

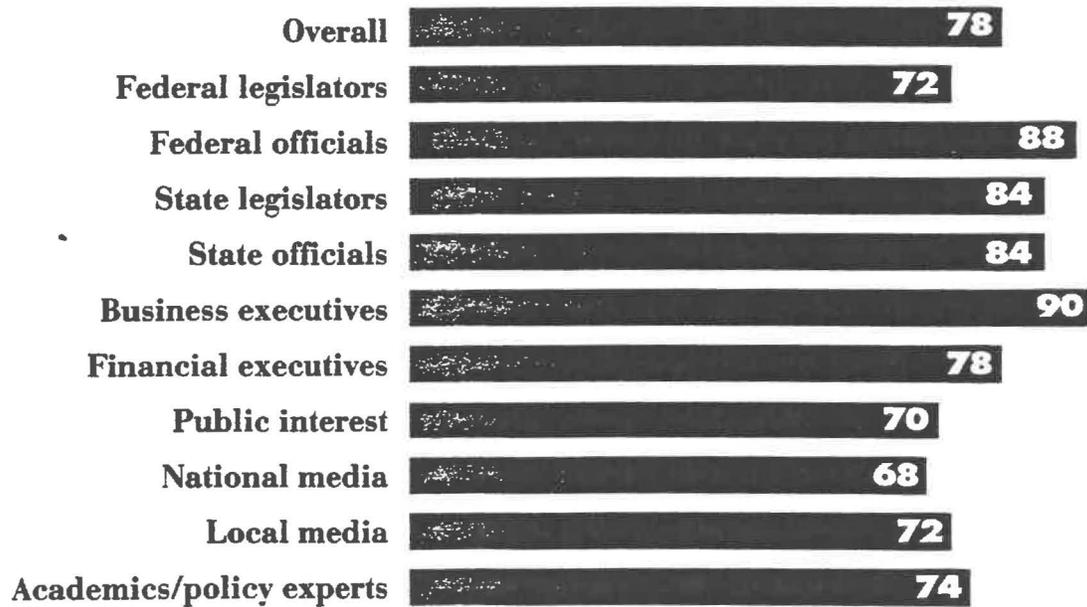


TABLE 4: Statements About Activities

"I'm going to read you some statements. For each one, please tell me if it would make a low-level radioactive waste facility much more acceptable, somewhat more acceptable, or no more acceptable to you."

	Pennsylvania Poll		New Jersey Poll	
	Much More Acceptable %	Much or Somewhat More Acceptable %	Much More Acceptable %	Much or Somewhat More Acceptable %
The availability of many life-saving medical diagnostic procedures and treatments depends on building facilities for low-level radioactive waste disposal.	39	84	37	80
The availability of nuclear energy as an option for future electricity supply depends on building facilities for low-level radioactive waste disposal.	29	70	28	65



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The U.S. Council for Energy Awareness (USCEA) is a non-profit organization established to communicate with the public about nuclear energy. Its membership includes electric utilities, architect engineering firms, manufacturing companies, unions, financial institutions, and others. Understanding public attitudes through social science research is a foundation for USCEA communications.

Appendix D

A Brief History of the Issue

A Brief History of the Issue

Throughout the 1970s, governors of the three states operating disposal facilities for the nation's low-level waste—South Carolina, Nevada and Washington— were coming under increasing pressure from constituents who were no longer willing “to take everyone else's waste.”

At their urging, Congress in 1980 passed the Low-Level Radioactive Waste Policy Act. It created a framework and timetable for each state to take responsibility for disposing of its own low-level waste. Each state could either develop its own facility, or join with other states in disposal compacts.

By 1985, little progress had been made; no compacts had been ratified or sites selected. So Congress amended the act to provide that on January 1, 1993, the three operating facilities—at Barnwell, S.C.; Richland, Wash.; and Beatty, Nev. could deny access to generators from any state not making sufficient progress in developing its own disposal facility.

The Beatty, Nev., site stopped accepting low-level waste on Jan. 1, 1993. The Richland, Wash., site refused all waste generated outside the Northwest and Rocky Mountain compacts. That left Barnwell as the only facility still available to every state.*

But on July 1, 1994, Barnwell stopped accepting waste generated outside the Southeast compact. Generators from 31 states outside the Southeast, Northwest and Rocky Mountain compacts had nowhere to dispose of their waste. Any waste they generated had to be stored on their own premises.

An unexpected reprieve came in July 1995, when the South Carolina legislature reopened Barnwell to waste generators—except those in North Carolina. But the legislators gave no indication how long the facility would remain open. If Barnwell fails to generate as much revenue as legislators anticipated, they are likely to reconsider their decision to keep it open — again depriving hospitals, universities, laboratories, power plants and manufacturers in 31 states of the means to dispose of their waste.

To date, most states have joined one of nine waste disposal compacts, and a 10th compact is currently being formed. Some states are not affiliated with a compact. (See page 6.)

The siting process in these states and compacts has been politically charged. Small but vocal groups have delayed the siting of some facilities as a tactic to shut down nuclear power plants. Only one new site—in California, host state for the Southwestern compact—has been licensed to date. Some compacts and states are making significant progress, but most new sites are not expected to become available until 2000 or later.

* The sole exception was Michigan, host state of the Midwest compact. Because of Michigan's lack of progress in choosing a site, it lost access to all three disposal facilities in 1990.

Appendix E

How Radioactive Materials Are Used

How Radioactive Materials Are Used

Medicine. Every year, one in three of the 30 million Americans who are hospitalized are diagnosed or treated with nuclear medicine techniques. Radionuclides are used in more than 10 million nuclear medicine procedures every year in the U.S. They also are used in 100 million laboratory tests on body fluid and tissue specimens.

Diagnosis is one of the main uses of nuclear medicine. It is made possible by the tendency of some natural elements to concentrate in certain parts of the body: iodine in the thyroid, phosphorus in the bones, potassium in the muscles. When a patient is injected with a radioactive element, a special camera can take pictures of the internal workings of the organ. For example:

- Myocardial perfusion imaging maps the blood flow to the heart, allowing physicians to see whether a patient has heart disease and determine what kind of treatment will be most effective.
- Bone scans can detect the spread of cancer six to 18 months sooner than X-rays.
- Kidney scans are much more sensitive than X-rays or ultrasound in fully evaluating kidney function.
- Imaging with radioactive technetium-99m can help diagnose bone infections in young children at the earliest possible stage.
- Laboratory techniques using radioactivity can detect underactive thyroids in newborn babies, making prompt treatment possible and saving many children from mental retardation.
- Radionuclides—in a stronger form—also can be used to treat disease. When President and Mrs. Bush suffered from Graves disease, a thyroid condition, they were cured by drinking a form of radioactive iodine that concentrates naturally in the thyroid and destroys the diseased portion. This treatment is so successful that it has virtually replaced thyroid surgery.
- Radioactive iodine is also widely used to treat thyroid cancer. Compared to drug therapy, it has a lower recurrence rate and avoids potentially fatal side-effects like destruction of bone marrow.

Scientific Research. The Food and Drug Administration requires all new drugs to be tested for safety and effectiveness. More than 80 percent of those drugs are tested with radioactive materials.

Radioactive materials are also essential to the biomedical research that seeks causes and cures for diseases like AIDS, cancer and Alzheimer's disease.

Radionuclides are used extensively in metabolic studies, genetic engineering and environmental protection studies.

Carbon-14, a naturally occurring, long-lived radioactive substance, makes it possible for archaeologists to tell when artifacts containing plant or animal material were alive, created or used. For example, carbon-14 dating showed that the Shroud of Turin did not belong to the period when Christ was alive.

Criminal investigators use radiation to examine physical evidence and to link suspects to crimes.

Museums rely on radioactive materials to verify the authenticity of paintings and art objects.

Industry. Today, practically every industry uses radioactive materials. Because radiation loses energy as it passes through substances, industry has been able to develop highly sensitive gauges to measure the thickness and density of many materials, as well as imaging devices to inspect finished goods for weaknesses and flaws.

Small amounts of a radioactive substance are commonly used as tracers in process materials. They make it possible to track leakage from piping systems, monitor the rate of engine wear and corrosion of processing equipment, observe the velocity of materials through pipes, and gauge system filtration efficiency.

Radiation detection instruments are widely used, because they make it possible to take measurements without direct physical contact with the substance being measured, and they provide excellent cost savings. For example, level gauges containing radioactive sources are used where heat, pressure or corrosive substances, like molten glass or metal, make it difficult or impossible to use direct contact gauges.

Other industrial uses of radioactive materials:

- The automobile industry uses radioactive materials to test the quality of steel in cars.
- Aircraft manufacturers use radiation to check for flaws in jet engines.
- Mining and petroleum companies use radionuclides to locate and quantify mineral deposits.
- Can manufacturers use radioactive materials to obtain the proper thickness of tin and aluminum.
- Pipeline companies use radioactive materials to look for defects in welds. Oil, gas and mining companies use them to map geological contours, using test wells and mine bores, and to determine the presence of hydrocarbons.
- Construction crews use radioactive materials to gauge the density of road surfaces and subsurfaces.

Agriculture. Radionuclides are a basic tool for agricultural scientists around the world. Among their many uses:

- Hundreds of new varieties of hardier, more disease-resistant crops—including peanuts, tomatoes, onions, rice, soybeans and barley—have been developed in agricultural research laboratories through the use of radioactive materials.
- Radioactive materials have been used to improve the nutritional value of some crops, as well as improve their baking or melting qualities or reduce their cooking time.
- To breed disease-resistant livestock, scientists use radioactive material to pinpoint where illnesses strike animals.
- By showing how plants absorb fertilizer, radioactive materials help researchers learn when fertilizer should be applied and how much is needed. This helps prevent the over-use of fertilizers, a major source of soil and water pollution.
- Radioactive materials help farmers and scientists control insect pests. Unlike chemicals, which can leave unhealthy residues in the soil, on plants and in water, this technology does not pollute. California has used radiation sterilization techniques since the mid-1970s to control infestations of Mediterranean fruit flies.

Consumer Products and Services. Radioactive materials supply necessities and conveniences that virtually everyone depends on.

- More than 100 nuclear power plants provide about one-fifth of U.S. electricity. Vermont, Connecticut, New Jersey, Maine, New Hampshire, South Carolina and Illinois generate more than 50 percent of their electricity from nuclear energy.
- Smoke detectors—installed in nearly 90 percent of U.S. homes—rely on a tiny radioactive source to sound the alarm when it senses smoke from a fire.
- Computer disks “remember” data better when they are treated with radioactive materials.
- Non-stick pans are treated with radiation to ensure that the coating will stick to the surface.
- Photocopiers use small amounts of radiation to eliminate static and prevent paper from sticking together and jamming the machine.

Cosmetics, hair products and contact lens solutions are sterilized with radiation to remove irritants and allergens.

Appendix F

Some Common Radioisotopes — and Their Uses

Some Common Radioactive Isotopes — and Their Uses

Americium-241:	Used in many smoke detectors for homes and businesses ... to measure levels of toxic lead in dried paint samples ... to ensure uniform thickness in rolling processes like steel and paper production ... and to help determine where oil wells should be drilled.
Cadmium-109:	Used to analyze metal alloys for checking stock, scrap sorting.
Calcium-47:	Important aid to biomedical researchers studying the cell function and bone formation of mammals.
Californium-252:	Used to inspect airline luggage for hidden explosives ... to gauge the moisture content of soil in the road construction and building industries ... and to measure the moisture of materials stored in silos.
Carbon-14:	Helps in research to ensure that potential new drugs are metabolized without forming harmful by-products.
Cesium-137:	Used to treat cancer tumors ... to measure correct patient dosages of radioactive pharmaceuticals ... to measure and control the liquid flow in oil pipelines ... to tell researchers whether oil wells are plugged by sand ... and to ensure the right fill level for packages of food, drugs and other products. (The products in these packages do not become radioactive.)
Chromium-51:	Used in research in red blood cell survival studies.
Cobalt-57:	Used in nuclear medicine to help physicians interpret diagnostic scans of patients' organs.
Cobalt-58:	Tracer used to diagnose pernicious anemia.
Cobalt-60:	Used to sterilize surgical instruments ... and to improve the safety and reliability of industrial fuel oil burners.
Copper-67:	When injected with monoclonal antibodies into a cancer patient, helps the antibodies bind to and destroy the tumor.
Curium-244:	Used in mining to analyze material excavated from pits ... and slurries from drilling operations.
Iodine-123:	Widely used to diagnose thyroid disorders.
Iodine-129:	Used to check some radioactivity counters in in-vitro diagnostic testing laboratories.

Iodine-131:	Used to diagnose and treat thyroid disorders. (Former President George Bush and Mrs. Bush were both successfully treated for Grave's Disease, a thyroid disease.)
Iridium-192:	Used to test the integrity of pipeline welds, boilers and aircraft parts.
Iron-55:	Used to analyze electroplating solutions.
Krypton-85:	Used in indicator lights in appliances like clothes washers and dryers, stereos and coffeemakers ... to gauge the thickness of thin plastics and sheet metal, rubber, textiles and paper ... and to measure dust and pollutant levels.
Nickel-63:	Used to detect explosives ... and as voltage regulators and current surge protectors in electronic devices.
Phosphorus-32:	Used in molecular biology and genetics research.
Plutonium-238:	Has safely powered more than 20 NASA spacecraft since 1972.
Polonium-210:	Reduces the static charge in production of photographic film and photograph records.
Promethium-147:	Used in electric blanket thermostats ... and to gauge the thickness of thin plastics, thin sheet metal, rubber, textiles and paper.
Radium-226:	Makes lightning rods more effective.
Selenium-75:	Used in protein studies in life science research.
Sodium-24:	Used to locate leaks in industrial pipelines ... and in oil well studies.
Strontium-85:	Used to study bone formation and metabolism.
Strontium-90:	Used in survey meters by schools, the military and emergency management authorities.
Technetium-99m:	The most widely used radioactive pharmaceutical for diagnostic studies in nuclear medicine. Different chemical forms are used for brain, bone, liver, spleen and kidney imaging and also for blood flow studies.
Thallium-204:	Measures the dust and pollutant levels on filter paper ... and gauges the thickness of plastics, sheet metal, rubber, textiles and paper.

Thoriated tungsten:	Used in electric arc welding rods in the construction, aircraft, petrochemical and food processing equipment industries. They produce easier starting, greater arc stability and less metal contamination.
Thorium-229:	Helps fluorescent lights to last longer.
Thorium-230:	Provides coloring and fluorescence in colored glazes and glassware.
Tritium:	Used for life science and drug metabolism studies to ensure the safety of potential new drugs ... for self-luminous aircraft and commercial EXIT signs ... for luminous dials, gauges and wrist watches ... and to produce luminous paint.
Uranium-234:	Used in dental fixtures like crowns and dentures to provide a natural color and brightness.
Uranium-235:	Fuel for nuclear power plants and naval nuclear propulsion systems ... and used to produce fluorescent glassware, a variety of colored glazes and wall tiles.
Xenon-133:	Used in nuclear medicine for lung ventilation and blood flow studies.

Appendix G

The Questionnaire

The WATS House
Upper Darby, Pennsylvania

**GENERATORS THAT SENT THEIR WASTE TO AN OFF-SITE DISPOSAL
FACILITY**

[February - July, 1995]

Good _____, my name is _____ calling from _____. Did you receive a letter from [SAMPLE SOURCE] about our survey on low-level radioactive waste issues?

[IF "YES", SAY:]

Good. I want to assure you that the findings will be presented in aggregate form only, and your name and your institution's name will **not** be associated with the data or even listed as one of the respondents. We are simply surveying a representative sample of generators in 33 states that have no facility to dispose of their radioactive waste.

[IF "NO", SAY:]

Let me briefly review what the letter said. **(SUMMARIZE LETTER. THEN, CONTINUE.)**

In the interview, should I refer to your place of work as a "company" or as an "institution"? **[USE THIS THROUGHOUT THE INTERVIEW.]**

A NOTE ON THE USAGE OF THIS DOCUMENT:

While a total of six hundred eighty (680) interviews were completed by telephone over the five month period of late February through early July, 1995, some of the questions were added or rearranged after the initial effort among generators in the Midwest Compact; and, also, in the state of Michigan.

For this reason, not all questions were asked of all respondents, although less than thirty interviews were actually affected. Stated another way, of the total, six hundred fifty-two (652) interviews were completely consistent in the question format.

Therefore, response percentages are shown based upon the total respondents who were asked, or could have been asked, the question. This will usually, but not always, be either 680 or 652.

The numbers in the extreme right-hand column are the frequencies (whole numbers) of people who responded in that way.

Percentages may not add back to total due to rounding. An asterisk () denotes less than one percent.*

1. Did your institution/company send radioactive material to a low-level waste disposal facility in 1991, 1992 or 1993, either directly or through a broker or processor?

Yes
No
Don't Know

2. Thinking about radioactive waste that is intended for disposal, are you currently storing any of this waste on-site?

Yes
No
Don't Know

[IF "NO" TO BOTH Q.1 AND Q.2, THANK AND TERMINATE.]

[IF "REFUSED" IN BOTH Q.1 AND Q.2, THANK AND TERMINATE.]

[IF "YES" TO EITHER Q.1 OR Q.2, CONTINUE.]

3. Does your company/institution consider its use of radioactive materials essential, not essential but important, or not very important?

	(100%)	(652)
Essential	80%	522
Not Essential But Important	15%	99
Not Very Important	4%	29
Can't Say/Depends	*	2
Refused	-	-

4. What have been the primary benefits to consumers from the uses of radioactive materials at your company/institution? **(PROBE!)** What other benefits?

	(100%)	(680)
MEDICAL APPLICATIONS	54%	370
Radiation/Cancer Treatments/ Treatment Of Disease	27%	181
Medical/Biomedical Research	13%	91
Development Of Drugs/Medicine	11%	72
Medical/Health Services	7%	44
Medical Therapy	5%	33
Improved Medical Testing	5%	33
Blood Testing/Analysis	2%	11
Other Medical	3%	20
CONSUMER APPLICATIONS	18%	119
New/Better Consumer Products	6%	39
Electricity/Power	5%	35
Safer/More Stable Products	3%	19
Used For Quality Control Purposes	2%	15
Other Consumer Applications	3%	20
MISCELLANEOUS	40%	271
Research & Development/Studies	15%	104
Education	10%	66
Cleaner Environment	4%	25
Military/Defense Applications	3%	18
Research To Make Quality Of Life Better	2%	16
Plant/Animal Applications	2%	10
Natural Resources (Oil & Gas)	1%	8
Other Miscellaneous	10%	69
None	2%	14
Refused	*	1

5. In order for your company/institution to stop generating low-level radioactive waste would you have to eliminate the whole company/institution, eliminate some important services or activities, or eliminate really nothing of importance?

	(100%)	(652)
Eliminate The Whole Company/Institution	12%	75
Eliminate Some Important Services Or Activities	75%	490
Eliminate Really Nothing Of Importance	11%	72
Can't Say/Depends	2%	14
Refused	*	1

6. Now that disposal is no longer available, has your company/institution discontinued any of the uses of radioactive materials that require regulated disposal?

		(100%)	(652)
Yes		20%	132
No	[SKIP TO Q.11.]	78%	507
Don't Know	[SKIP TO Q.11.]	2%	10
Refused	[SKIP TO Q.11.]	*	3

[IF "YES", ASK:]

7. Have you discontinued all of the uses or some of the uses?

		(100%)	(652)
All Of The Uses		6%	37
Some Of The Uses		14%	94
Don't Know		*	1
Refused		-	-
<i>Not Asked</i>		80%	520

[IF ANY USES DISCONTINUED IN Q.6/Q.7, ASK:]

8. Has your company/institution substituted other methods or materials for these former uses of radioactive materials?

		(100%)	(652)
Yes, Have Substituted		13%	87
No, Have Not			
Substituted	[SKIP TO Q.11.]	7%	44
Don't Know	[SKIP TO Q.11.]	*	1
Refused	[SKIP TO Q.11.]	-	-
<i>Not Asked</i>		80%	520

[IF "YES, SUBSTITUTED", ASK:]

9. Have you substituted for all the uses or some of the uses?

		(100%)	(652)
All Of The Uses		2%	13
Some Of The Uses		11%	73
Don't Know		*	1
Refused		-	-
<i>Not Asked</i>		87%	565

* * *

6. Now that disposal is no longer available, has your company/institution discontinued any of the uses of radioactive materials that require regulated disposal?
8. Has your company/institution substituted other methods or materials for these former uses of radioactive materials?
9. Have you substituted for all the uses or some of the uses?

	(100%)	(652)
Have Not Discontinued Any Uses	78%	507
Have Discontinued All/Some Uses	20%	132
Discontinued But Not Substituted	7%	44
Discontinued But DK Re: Substitution	*	1
Discontinued And Substituted	13%	87
Substituted For All Uses	2%	13
Substituted For Some Uses	11%	73
Substituted But DK Re: Uses	*	1
Don't Know Re: Discontinuation	2%	13

* * *

[IF ANY USES SUBSTITUTED IN Q.8/Q.9, ASK:]

10. Has this substitution had a positive effect, negative effect, or no effect upon: **[READ LIST AND ROTATE.]**

		POS	NEG	NO	DK	REF	<i>NOT</i> <i>ASKED</i>
The Cost Of Services	(100%)	4%	6%	*	2%	2%	87%
	(652)	23	37	1	14	12	565
The Quality Of Services	(100%)	2%	6%	*	3%	2%	87%
	(652)	15	37	2	22	11	565

[ASK EVERYONE.]

11. In order to store the waste on site, did your company/institution: **[READ LIST.]**

	SUMMARY OF "YES"	
	(100%)	(650)
Add Storage Equipment	39%	251
Turn Space That Was Formerly Used For Some Other Purpose Into A Radioactive Waste Storage Area	39%	250
Expand Storage Space	36%	233
Add Or Re-Assign Personnel To Manage The Radioactive Materials	28%	183
MADE ONE OR MORE CHANGES:	63%	425

12. Have you made any effort to reduce the **amount** of waste generated in the process of using radioactive materials, that is, waste minimization?

		(100%)	(652)
Yes		80%	523
No	[SKIP TO Q.14.]	18%	119
Don't Know	[SKIP TO Q.14.]	1%	7
Refused	[SKIP TO Q.14.]	*	3

[IF "YES", ASK:]

13. Did you start doing this before or after you knew that you would lose access to off-site disposal?

	(100%)	(652)
Before	62%	402
After	16%	103
Don't Recall	2%	13
Refused	1%	5
<i>Not Asked</i>	20%	129

[ASK EVERYONE.]

14. Have you made any effort to reduce the volume of radioactive waste stored?

	(100%)	(652)
Yes	67%	437
No [SKIP TO Q.17.]	31%	202
Don't Know [SKIP TO Q.17.]	1%	8
Refused [SKIP TO Q.17.]	1%	5

**MADE ONE OR MORE CHANGES
(Q.11) OR REDUCING AMOUNT
OF WASTE GENERATED (Q.12)
OR REDUCING VOLUME OF WASTE
STORED (Q.14)**

91% 590

[IF "YES", ASK:]

15. Which of these methods have you used in an effort to reduce this volume? **[READ LIST. INDICATE AS MANY AS ARE MENTIONED.]**

	(100%)	(652)
Compaction	33%	217
Incineration	13%	86
Decontamination	24%	155
Substituting Materials/Using Shorter Half-Lives	5%	32
Reduction In Generating Waste	4%	26
Eliminate Use/Stopped Using Waste	4%	25
Decay In Storage/On Site	4%	24
Returning/Sending Back To Suppliers/Vendors	3%	20
Combination Of Methods	3%	17
Recycle/Reuse	2%	10
Separate/Sort It Better	*	2
Disposal	*	2
Some Other Means	11%	69
[DO NOT READ.] Don't Know	1%	5
[DO NOT READ.] Refused	*	1
<i>Not Asked</i>	33%	215

16. Did this reduction start before or after you knew that you would lose access to off-site disposal?

	(100%)	(652)
Before	48%	316
After	16%	103
Don't Recall	2%	13
Refused	1%	5
<i>Not Asked</i>	33%	215

[ASK EVERYONE.]

17. Has the loss of disposal access caused your company/institution to cut back on any:
[READ LIST AND ROTATE.]

	SUMMARY OF "YES"	
	(100%)	(652)
Products Or Services	11%	72
Medical Or Health Or Drug Research	9%	57
Medical Or Health Services	3%	19
MADE ONE OR MORE CUTBACK	15%	101

[IF "YES" TO ANY IN Q.17, ASK Q.18 - Q.20 AS APPROPRIATE:]

18. What products or services specifically were cut back? **(PROBE!)** What else was cut back?

	(100%)	(652)
Research Studies/Research Involving Radioactive Isotopes	3%	22
The Products We Sell	2%	14
Switch To Non-Radioactive Isotopes/ Short Half-Life Radioactive Isotopes	1%	6
Loss of Jobs	1%	5
Animal Studies/Animal Research	*	3
Plant/Facility Will Shut Down	*	1
Other	2%	16
Don't Know	1%	8
<i>Not Asked</i>	<i>89%</i>	<i>580</i>

19. What medical or health or drug research specifically were cut back? **(PROBE!)** What else was cut back?

	(100%)	(652)
RESEARCH	5%	34
Research Programs That Cause Large Amount Of Radioactive Waste	2%	13
Medical Research	2%	12
Drug Development Research	1%	5
Animal-Related Projects	1%	4
Programs (Unspecified)	*	1
Other Research	*	3
MISCELLANEOUS	2%	13
New Product Development	1%	4
Other Miscellaneous	1%	9
Don't Know	1%	7
Refused	1%	4
<i>Not Asked</i>	<i>91%</i>	<i>595</i>

20. What medical or health services specifically were cut back? (**PROBE!**) What else was cut back?

	(100%)	(652)
RESEARCH	2%	12
Medical Research	1%	5
Drug Research	1%	4
Research Programs That Cause Large Amount Of Radioactive Waste	*	3
Other Research	*	2
MISCELLANEOUS	*	2
Don't Know	1%	5
Refused	-	-
<i>Not Asked</i>	<i>97%</i>	<i>633</i>

[IF "YES" TO ANY CUTBACKS, ASK:]

21. I'm going to read you a list, and for each item, please tell me if it is very likely, somewhat likely, not too likely or not at all likely that this will result from the cutbacks you have made in products or services. **(READ LIST AND ROTATE.)**

	VL	SL	NT	NAA	DK	REF	<i>NOT ASKED</i>
Hardship Or Inconvenience To Your Customers/ Clients	(100%) 5% (652) 35	5% 30	1% 9	3% 21	* 2	1% 4	85% 551
Increased Cost To Your Customers/ Clients	(100%) 8% (652) 53	3% 17	1% 9	3% 17	1% 4	* 1	85% 551
Negative Impact Upon Quality Of Life Of Your Customers/Clients	(100%) 3% (652) 22	4% 26	2% 16	4% 29	1% 7	* 1	85% 551
Loss Of Life	(100%) 1% (652) 4	1% 9	2% 13	10% 68	1% 6	* 1	85% 551
Greater Negative Impact Upon Low Income Or Disad- vantaged Groups	(100%) 2% (652) 10	2% 12	3% 17	8% 52	1% 8	* 2	85% 551
"VERY" OR "SOMEWHAT LIKELY" TO ANY		13%					

**[IF "VERY LIKELY"/"SOMEWHAT LIKELY" TO ANY IN Q.21,
ASK Q.22 - Q.26 AS APPROPRIATE:]**

22. Why do you say that hardship or inconvenience to your customers/clients is likely?
(PROBE!) What other reasons are there for your opinion?

	(100%)	(652)
RESEARCH	3%	20
Medical Research/Cures Students Wouldn't Learn What They Need	1%	6
Students Wouldn't Learn About Isotopes	1%	5
Research Would Be Reduced	1%	4
Drug/Pharmaceutical Research	*	2
Other Research	*	1
	1%	4
COST	2%	14
Our Costs Will Go Up We'll Have To Pass Costs On To Customers	1%	9
Cost Of Storage	*	2
Other Cost	*	1
	1%	4
MISCELLANEOUS	6%	40
Would Have To Find Alternatives For Materials Used Before/Substitute	2%	11
Delays/Cutbacks in Services	1%	9
Wouldn't Be Able To Dispose Of Materials	1%	5
Need Radioactive Material To Make/ Test Products	1%	4
We'd Have To Shut Down/Loss Of Jobs	1%	4
Will Have To Find Other Products/ Services To Offer	*	3
Would Get Less Grants/Funds	*	2
Will Have To Make More Storage Space	*	1
Other Miscellaneous	1%	9
Don't Know	*	1
<i>Not Asked</i>	<i>90%</i>	<i>587</i>

23. Why do you say that increased cost to your customers/clients is likely? **(PROBE!)**
 What other reasons are there for your opinion?

	(100%)	(652)
COST	8%	54
Costs Would Have To Go Up	4%	24
Cost Of Storing On-Site/ Cost Of Having To Build More Storage Facilities	2%	16
Would Have To Use More Expensive Alternatives	2%	12
Cost More To Ship/No Longer Available Locally	1%	8
Cost More To Dispose Of Waste/ Have Limited Access To Landfills	1%	6
Overhead Costs Would Go Up	*	2
Cost To Process/Handle Waste	*	1
Other Cost	1%	4
MISCELLANEOUS	4%	24
Would Have To Substitute For Non- Radioactive Research/Develop Slower Research	2%	13
Would Curtail Certain Types Of Research	*	2
Would Have To Store On-Site	*	1
Other Miscellaneous	1%	8
Don't Know	*	2
<i>Not Asked</i>	89%	582

24. Why do you say that a negative impact upon the quality of life of your customers/clients is likely? **(PROBE!)** What other reasons are there for your opinion?

	(100%)	(652)
RESEARCH	4%	26
Less Availability Of New Drugs/ Would Reduce Medical Products/ No Treatment	2%	11
Would Do Less Experiments/Research	1%	5
Won't Have Same Quality Of Research/ Would Have Less Productive Research	1%	5
Students Wouldn't Get Proper Education/ Wouldn't Learn About Isotopes	*	3
Would Reduce Discovery Of New Testing	*	3
Wouldn't Be Able To Do Medical Research	*	2
Other Research	*	1
COST	1%	4
MISCELLANEOUS	3%	21
Patient Diagnosis/Benefits To Patients	2%	10
Resources Would Have To Be Spread Thinner	*	2
Other Miscellaneous	2%	10
Don't Know	*	1
<i>Not Asked</i>	<i>93%</i>	<i>604</i>

25. Why do you say that loss of life is likely? **(PROBE!)** What other reasons are there for your opinion?

[PLEASE SEE VERBATIM RESPONSES]

26. Why do you say that it is likely to have a greater negative impact upon low income or disadvantaged groups? **(PROBE!)** What other reasons are there for your opinion?

[PLEASE SEE VERBATIM RESPONSES]

[ASK EVERYONE.]

27. I'd like you to think five years ahead to the year 2000. Assume that access to a low-level waste disposal facility is not available. Assume also that your company/institution has made its best effort in waste minimization and waste reduction. Please tell me if your company/institution is likely or not likely to make new or additional cutbacks in any: **[READ LIST AND ROTATE.]**

	SUMMARY OF "YES, LIKELY" (100%)	(652)
Products And Services	27%	177
Medical Or Health Or Drug Research	21%	134
Medical Or Health Services	12%	80
LIKELY TO MAKE ONE OR MORE CUTBACKS	32%	211

[IF "YES" TO ANY IN Q.27, ASK Q.28 - Q.30 AS APPROPRIATE:]

28. What products or services specifically would be cut back? **(PROBE!)** What else would be cut back?

[PLEASE SEE VERBATIM RESPONSES]

29. What medical or health or drug research specifically would be cut back? **(PROBE!)** What else would be cut back?

[PLEASE SEE VERBATIM RESPONSES]

30. What medical or health services specifically would be cut back? **(PROBE!)** What else would be cut back?

[PLEASE SEE VERBATIM RESPONSES]

[IF "YES" TO ANY FUTURE CUTBACKS, ASK:]

31. I'm going to read you a list, and for each item, please tell me if it is very likely, somewhat likely, not too likely or not at all likely that this will result from the new or additional cutbacks you have just mentioned. **(READ LIST AND ROTATE.)**

	VL	SL	NT	NAA	DK	REF	<i>NOT ASKED</i>
Hardship Or Inconvenience To Your Customers/ Clients	(100%) 13% (652) 87	10% 63	3% 17	6% 37	1% 5	* 2	68% 441
Increased Cost To Your Customers/ Clients	(100%) 18% (652) 116	7% 47	2% 12	4% 29	1% 6	* 1	68% 441
Negative Impact Upon Quality Of Life Of Your Customers/ Clients	(100%) 9% (652) 61	9% 59	4% 28	8% 55	1% 7	* 1	68% 441
Loss Of Life	(100%) 2% (652) 13	4% 26	7% 43	19% 122	1% 7	- -	68% 441
Greater Negative Impact Upon Low Income Or Disad- vantaged Groups	(100%) 4% (652) 28	5% 32	7% 43	15% 95	2% 12	* 1	68% 441

**SOMETHING
"VERY" OR
"SOMEWHAT"
LIKELY TO
HAPPEN**

**28%
180**

**[IF "VERY LIKELY"/"SOMEWHAT LIKELY" TO ANY IN Q.31,
ASK Q.32 - Q.36 AS APPROPRIATE:]**

32. Why do you say that hardship or inconvenience to your customers/clients is likely?
(PROBE!) What other reasons are there for your opinion?

	(100%)	(652)
RESEARCH	11%	72
Medical Research Would Decrease/ New Drug Development Would Be Cut	4%	26
Would Have To Eliminate Certain Research Projects	3%	19
Students Won't Be Able To Do Their Research Here	2%	14
Will Eliminate Tools For Research Development/Cut The Amount Of Radioactive Material For Analysis	2%	12
Other Research	*	3
COST	8%	50
Will Increase Costs/Increased Costs Will Be Passed On To Customers	5%	30
Increased Cost For Storage	1%	6
Will Cost More For Disposal	*	3
Alternate Routes Would Be More Costly	*	2
Other Cost	2%	13
MISCELLANEOUS	8%	49
Would Affect Quality Of Products	2%	13
Would Provide Less Services	2%	10
Need To Travel Further For Treatment	*	3
Other Miscellaneous	4%	25
Don't Know	*	3
<i>Not Asked</i>	<i>77%</i>	<i>502</i>

33. Why do you say that increased cost to your customers/clients is likely? **(PROBE!)**
What other reasons are there for your opinion?

	(100%)	(652)
COST	20%	133
Costs Will Be Passed On/		
Someone Has To Pay	9%	60
Cost Of Storage/Cost Of		
Building Storage	6%	38
Non-Radioactive Alternatives		
Are More Expensive	3%	22
Cost Of Disposal	2%	15
Cost Of Handling/Supervising/Managing	1%	9
Customers' Costs Would Rise	1%	8
Higher Cost Of Tuition/Board	1%	5
Increased Cost Of Personnel/Manpower	1%	4
Alternate Routes Would Be More Costly	1%	4
Other Cost	3%	18
MISCELLANEOUS	7%	45
Going Into Non-Radioactive Research/		
Amending Procedures	4%	26
Other Miscellaneous	3%	22
Don't Know	*	3
<i>Not Asked</i>	75%	489

34. Why do you say that a negative impact upon the quality of life of your customers/clients is likely? **(PROBE!)** What other reasons are there for your opinion?

[PLEASE SEE VERBATIM RESPONSES]

35. Why do you say that loss of life is likely? **(PROBE!)** What other reasons are there for your opinion?

[PLEASE SEE VERBATIM RESPONSES]

36. Why do you say that it is likely to have a greater negative impact upon low income or disadvantaged groups? **(PROBE!)** What other reasons are there for your opinion?

[PLEASE SEE VERBATIM RESPONSES]

[ASK EVERYONE.]

37. Are you a medical institution that provides patient care?

	(100%)	(559)
Yes	28%	157
No	[SKIP TO Q.40.] 72%	400
Refused	[SKIP TO Q.40.] *	2

[IF "YES", ASK:]

38. So far, has the loss of disposal facilities caused your institution to refer patients to facilities somewhere else?

	(100%)	(559)
Yes	1%	5
No	27%	151
Don't Know	-	-
Refused	*	1
<i>Not Asked</i>	72%	402

39. If access to a low-level waste disposal facility is not available by the year 2000, would your institution be likely to refer patients to facilities somewhere else?

	(100%)	(559)
Yes	5%	30
No	21%	117
Don't Know	2%	10
Refused	-	-
<i>Not Asked</i>	72%	402

[ASK EVERYONE.]

40. Again, so far, has the loss of disposal access caused your company/institution to:
[READ LIST AND ROTATE.]

	SUMMARY OF "YES"	
	(100%)	(652)
Incur Higher Cost Of Operations	59%	386
Lose Revenues	17%	113
Consider Relocating The Business Or Services, Or Part Of The Business Or Services, To Another State Or Country	9%	60
Eliminate Jobs	9%	57
Consider Going Out Of Business	4%	23
CAUSED ONE OR MORE EVENTS	63%	411

41. And, if access to a low-level waste disposal facility is not available by the year 2000, would your company/institution be likely to: **[READ LIST AND ROTATE.]**

	SUMMARY OF "YES"	
	(100%)	(652)
Incur Higher (Added) Cost Of Operations	68%	446
Have To Amend Your Radioactive Materials License	64%	416
Have To Expand On-Site Storage Space For Radioactive Waste	64%	415
Lose (More) Revenues	36%	232
Eliminate (More) Jobs	21%	136
Consider Relocating The Business Or Services, Or Part Of The Business Or Services, To Another State Or Country	13%	84
Consider Going Out Of Business	7%	37
LIKELY TO HAVE ONE OR MORE EVENT OCCUR	83%	542

42. As a general principle, do you think it is better to store the radioactive waste at the point of production, or to transport it to an off-site disposal facility?

	(100%)	(680)
Store At Site	16%	108
Transport Off-Site	74%	505
Can't Say/Depends	8%	57
Refused [SKIP TO Q.44.]	2%	10

43. Why do you say that? (PROBE!) What other reasons are there?

	STORE AT SITE		
	(100%)	(680)	
ENVIRONMENTAL SAFETY	5%	34	
Transporting Waste Is Risky/Hazardous	3%		18
Public Safety/Get It Away From Population/Away From Bodies Of Water	1%		9
Less Hazard/Less Risk/Safer	1%		5
We Use Low-Level Waste/Waste With More Manageable Half-Life	1%		4
Less Risk Of Environmental Impact	*		3
Other Environmental Safety	1%		4
WASTE MANAGEMENT	4%	27	
Have More Control/Easier To Control	3%		17
Better Managed/Monitored/Safer	1%		6
Better To Have Facility With Dedicated Professionals/Secure Facility	*		3
Other Waste Management	*		2
STORAGE/SPACE	2%	12	
We'd Have To Build Additional Storage	*		3
We Don't Have To Store It/No Reason	*		2
We Have Limited Space	*		1
Other Storage	1%		6
MISCELLANEOUS	9%	60	
More Economical At This Time	3%		17
Our Volume Is Not Great	2%		14
Everyone Should Be Responsible For Their Own	1%		9
Short-Lived Waste Is OK To Store/ Long-Lived Waste Should Be Shipped	1%		6
Depends Upon Type And Amount Of Waste Should Be Disposed Of In Proper Facility	*		3
More Convenient	*		2
Other Miscellaneous	2%		15
Don't Know	*		1
<i>Not Asked</i>	84%		572

* * *

43. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	TRANSPORT OFF-SITE (100%)	(680)
WASTE MANAGEMENT	42%	283
Can Be Better Managed/Monitored/Safer	26%	180
Have More Control/Easier To Control	13%	88
Better To Have Facility With Dedicated Professionals/Secure Facility	11%	75
Can't Be Handled Properly On-Site	1%	5
Other Waste Management	1%	7
ENVIRONMENTAL SAFETY	22%	151
Public Safety/Get It Away From Population/ Away From Bodies Of Water	10%	71
Less Hazard/Less Risk/Safer	7%	50
Less Risk Of Environmental Impact	3%	23
Transporting Waste Is Risky/Hazardous	1%	5
We Use Low-Level Waste/Waste With More Manageable Half-Life	*	1
Other Environmental Safety	2%	15
STORAGE/SPACE	13%	90
We Have Limited Space	9%	58
We Don't Have To Store It/No Reason	1%	7
We'd Have To Build Additional Storage	1%	5
Other Storage	3%	21
MISCELLANEOUS	22%	150
More Economical At This Time	5%	37
Should Be Disposed Of In Proper Facility	4%	30
You Don't Want It To Accumulate	2%	11
More Convenient	1%	7
Short-Lived Waste Is OK To Store/Long-Lived Waste Should Be Shipped	1%	7
Our Volume Is Not Great	1%	5
Everyone Should Be Responsible For Their Own	1%	5
Depends Upon Type And Amount Of Waste	*	1
Other Miscellaneous	10%	65
Don't Know	1%	6
<i>Not Asked</i>	<i>26%</i>	<i>175</i>

* * *

43. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	UNDECIDED	
	(100%)	(680)
WASTE MANAGEMENT	8%	10
Better Managed/Monitored/Safer	1%	5
Have More Control/Easier To Control	*	2
Better To Have Facility With Dedicated Professionals/Secure Facility	*	1
Other Waste Management	1%	4
STORAGE/SPACE	1%	7
We Don't Have To Store It/No Reason	*	3
We Have Limited Space	*	1
Other Storage	*	3
ENVIRONMENTAL SAFETY	*	3
Less Hazard/Less Risk/Safer	*	2
Public Safety/Get It Away From Population/Away From Bodies Of Water	*	1
MISCELLANEOUS	5%	35
Depends Upon Type And Amount Of Waste	2%	14
Short-Lived Waste Is OK To Store/Long-Lived Waste Should Be Shipped	1%	9
Everyone Should Be Responsible For Their Own	*	3
More Economical At This Time	*	3
Our Volume Is Not Great	*	1
Other Miscellaneous	1%	9
Don't Know	1%	9
Refused	*	1
<i>Not Asked</i>	92%	623

[ASK EVERYONE.]

44. Overall, do you view the loss of access to low-level radioactive waste disposal facilities as a major problem for the nation, a minor problem for the nation, or no problem for the nation at all?

	(100%)	(680)
Major Problem	72%	488
Minor Problem	25%	169
No Problem	1%	7
Can't Say/Refused	2%	16

45. Why do you say that? (PROBE!) What other reasons are there?

	MAJOR PROBLEM	
	(100%)	(680)
STORAGE	33%	226
Have Nowhere To Store Waste/Should Be		
A Depository	17%	113
Don't Have Space For It	5%	33
Potential For Problems/Hazards With		
Multiple Sites	4%	30
Facilities Need Storage/Many Facilities		
Are Dangerous	4%	29
Storage On-Site Creates A Safety Problem	3%	22
We Can Store Some Waste On-Site	1%	5
Other Storage	3%	22
USES	31%	210
Will Limit Research/Medical Research	12%	83
Increased Costs To Consumer	5%	33
Will Impact The Health Care Industry	4%	29
Will Negatively Affect The Economy/		
Will Mean Less Jobs	4%	26
Hospitals Would Have To Turn Patients		
Away/Essential To Life-Threatening		
Diseases	4%	25
Provides Essential Services/		
Is A Valuable Tool	3%	20
Products/Services Will Be Cut Back	2%	14
Would Limit Power/Energy Generation	2%	12
It Is Essential To Everyday Life	2%	11
Will Reduce Testing/Running Studies	1%	8
Other Uses	2%	16
WASTE	9%	59
Power Companies' Waste Is Greater/		
Impact Will Be On Major Waste		
Generators	2%	16
It Will Accumulate	2%	12
Federal Government Should Manage It	1%	9
We Don't Generate Much Radioactive		
Waste	1%	7
Don't Have Resources To Dispose Of It	1%	6
Everyone Should Be Responsible		
For Their Own	1%	4
Other Waste	2%	11

45. Why do you say that? (**PROBE!**) What other reasons are there? [CONTINUED]

	MAJOR PROBLEM	
	[continued]	
	(100%)	(680)
MISCELLANEOUS	12%	79
Will Cause People To Address The Problem/Something Must Be Done	2%	15
No One Wants It In Their Backyard	1%	6
It Is A Minor Problem In The Short Term/A Significant Problem In The Long Term	1%	5
People Will Come Up With Alternatives	1%	5
Other Miscellaneous	7%	48
Don't Know	1%	4
<i>Not Asked</i>	28%	192

* * *

45. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	MINOR PROBLEM	
	(100%)	(680)
STORAGE	5%	32
Have Nowhere To Store Waste/ Should Be A Depository	2%	14
We Can Store Some Waste On-Site	1%	10
Don't Have Space For It	1%	4
Storage On-Site Creates A Safety Problem	*	2
Potential For Problems/Hazards With Multiple Sites	*	1
Other Storage	*	3
WASTE	4%	29
We Don't Generate Much Radioactive Waste	3%	18
Power Companies' Waste Is Greater/ Impact Will Be On Major Waste Generators	*	2
Federal Government Should Manage It	*	1
Other Waste	1%	8
USES	2%	13
Will Limit Research/Medical Research Hospitals Would Have To Turn Patients Away/Essential To Life-Threatening Diseases	1%	4
Provides Essential Services/Is A Valuable Tool	*	2
Will Negatively Affect The Economy/ Will Mean Less Jobs	*	1
Will Impact The Health Care Industry	*	1
Other Uses	1%	6

45. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	MINOR PROBLEM	
	[continued]	
	(100%)	(680)
MISCELLANEOUS	14%	95
It Is A Minor Problem Compared To Other, Bigger Problems	8%	56
People Will Come Up With Alternatives	2%	12
It Is A Minor Problem In The Short Term/ A Significant Problem In The Long Term	1%	9
No One Wants It In Their Backyard	1%	4
Will Cause People To Address The Problem/Something Must Be Done	*	3
Other Miscellaneous	2%	14
It Is No Problem/Has No Effects	2%	11
Don't Know/Refused	1%	5
<i>Not Asked</i>	75%	511

* * *

45. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	NO PROBLEM AT ALL	
	(100%)	(680)
WASTE	*	2
We Don't Generate Much Radioactive Waste	*	1
Other Waste	*	1
STORAGE	*	1
We Can Store Some Waste On-Site	*	1
USES	*	1
Provides Essential Services/Is A Valuable Tool	*	1
MISCELLANEOUS	*	4
People Will Come Up With Alternatives	*	1
It Is A Minor Problem Compared To Bigger Problems	*	1
No One Wants It In Their Backyard	*	1
Will Cause People To Address The Problem/Something Must Be Done	*	1
Other Miscellaneous	*	1
<i>Not Asked</i>	99%	673

* * *

45. Why do you say that? (PROBE!) What other reasons are there? [CONTINUED]

	CAN'T DECIDE	
	(100%)	(680)
STORAGE	1%	6
Facilities Need Storage/Many Facilities Are Dangerous	*	3
Have Nowhere To Store Waste/Should Be A Depository	*	1
We Can Store Some Waste On-Site	*	1
Don't Have Space For It	*	1
USES	*	2
Will Limit Research/Medical Research	*	2
Will Reduce Testing/Running Studies	*	1
WASTE	*	1
We Don't Generate Much Radioactive Waste	*	1
MISCELLANEOUS	1%	4
It Is A Minor Problem In The Short Term/A Significant Problem In The Long Term	*	2
Other Miscellaneous	*	2
Don't Know	*	2
Refused	*	1
<i>Not Asked</i>	98%	667

[ASK EVERYONE.]

46. In general, do you think that other companies/institutions like yours have been willing to speak publicly about this issue; or have they been reluctant to do so?

	(100%)	(680)
Have Been Willing To Speak		
Publicly	40%	274
Have Been Reluctant To Do So	39%	266
Don't Know	20%	134
Refused	1%	6

[IF LOSS OF ACCESS CONSIDERED "MAJOR PROBLEM" IN Q.44, ASK:]

47. Have you personally been active in communicating your views to public groups?

	(100%)	(680)
Yes, Active	28%	191
No, Not Active	[SKIP TO Q.49.] 44%	297
Refused	[SKIP TO Q.50.] -	-
<i>Not Asked</i>	28%	192

48. [IF "YES, ACTIVE", ASK:] In what ways have you been communicating your views? (PROBE!) In what other ways have you been doing this?

	(100%)	(680)
OFFICIAL MEETINGS	15%	104
Letters To State Representatives/ Contact With State Officials	7%	50
Working With State Low-Level Radioactive Waste Groups	7%	49
I Belong To A Lobbying Group	2%	16
Through Department Of Public Health	1%	9
PUBLIC MEETINGS	13%	88
Public Forums/Hearings	4%	26
Meet With Groups Of People/Make The Public Aware	4%	24
Attend Seminars/Regional Meetings	3%	18
Teach Trainings/Workshops	3%	17
Public Speaking	2%	15
We Conduct Tours At Our Facility	1%	4
Other Public Meetings	*	2
PRINT EFFORTS/MEDIA	7%	47
Speak Through Radio & Television/ Give Interviews	3%	17
Articles In Publications/Journals	2%	14
Interviews In Newspapers	2%	12
Write Letters To The Editor	1%	7
Write Letters	1%	3
Surveys/Conduct Surveys	*	2
Other Print Efforts/Media	2%	4
MISCELLANEOUS	4%	28
Network With Other Professionals	1%	8
"Any Opportunity I Get"	1%	6
Not Publicly Active/Have To Get Clearance From My Company/Very Unpopular Subject/Fear Of Public Abuse	*	1
Behind The Scenes/Private	*	1
Other Miscellaneous	2%	15
<i>Not Asked</i>	<i>72%</i>	<i>489</i>

[NOW SKIP TO Q.50.]

[IF "NO, NOT ACTIVE", ASK:]

49. Why is that? (PROBE!) What other reasons are there?

	(100%)	(680)
OFFICIAL MEETINGS	1%	8
Working With State Low-Level Radioactive Waste Groups	*	3
I Belong To A Lobbying Group	*	3
Letters To State Representatives/ Contact With State Officials	*	2
PUBLIC MEETINGS	1%	4
Meet With Groups Of People/ Make The Public Aware	*	3
Attend Seminars/Regional Meetings	*	1
PRINT EFFORTS/MEDIA	*	1
Surveys/Conduct Surveys	*	1
MISCELLANEOUS	42%	287
It Does Not Impact Us/Has Not Been Brought Up	14%	97
Not Publicly Active/Have To Get Clearance From My Company/Very Unpopular Subject/Fear Of Public Abuse	10%	70
Time Constraints/Too Much Work To Do	9%	61
We Have People Who Speak For Us/ It's Not My Role	4%	28
We're Low-Level Users/Don't Generate Much	3%	22
I'm New In Position/Haven't Been Here Long	2%	12
Behind The Scenes/Privatey	1%	8
Network With Other Professionals	*	2
Other Miscellaneous	4%	30
<i>Not Asked</i>	<i>56%</i>	<i>383</i>

[ASK EVERYONE.]

50. You may already have mentioned this, but which of the following apply to your company/institution?

	SUMMARY OF "YES"	
	(100%)	(680)
Industrial Or Manufacturing Company	34%	232
MEDICAL	29%	197
Hospital	24%	164
Medical Office Or Clinic	18%	122
Research Hospital	16%	108
Medical Laboratory	29%	194
College Or University	26%	175
Government	20%	133
Pharmaceutical Company	15%	99
Medical School	14%	92
Electric Company	6%	39

51. In which of the following ways are radioactive materials used at your company/institution?

	SUMMARY OF "YES"	
	(100%)	(680)
Research Use	65%	444
Education	34%	229
Human use such as patient diagnosis or treatment	31%	209
Production Of A Product	25%	168
Quality assurance in manufacturing	24%	166
Product treatment such as by irradiation	14%	97
Isotope manufacturing	7%	46

52. Now I have just a few questions for classification purposes only. Does your company/institution employ thousands of employees, hundreds of employees, or fewer than a hundred employees?

	(100%)	(680)
Thousands Of Employees	48%	324
Hundreds Of Employees	32%	215
Fewer Than A Hundred Employees	20%	138
Don't Know	*	1
Refused	*	2

53. Is your company/institution located in an urban, suburban, or rural area?

	(100%)	(680)
Urban Area	49%	331
Suburban Area	35%	241
Rural Area	15%	102
Can't Say	1%	5
Refused	*	1

54. For about how many years has your company/institution used radioactive materials that require regulated disposal? **[DO NOT READ LIST.]**

	(100%)	(680)
Less Than 1 Year	*	3
1 Year	*	4
2 To 3 Years	3%	19
4 To 5 Years	5%	31
6 To 7 Years	3%	23
8 To 10 Years	8%	52
11 To 15 Years	8%	54
16 To 20 Years	9%	61
More Than 20 Years	61%	414
Don't Know	2%	16
Refused	*	3
AVERAGE NUMBER OF YEARS:		19.6
MEDIAN NUMBER OF YEARS		25.0

55. That is all of the questions I have. What other comments would you like to make on this subject?

	(100%)	(559)
GOVERNMENT	7%	39
Get A Real Commitment From Government/Pressure Federal & State Representatives To Do Something	3%	17
It Is A Political Issue/Should Be Handled By Politicians	2%	10
Decisionmakers Should Be More In Tune With What Is Going On	*	2
Direct Opinions To Congressmen/Legislators	*	2
Other Government	2%	10
COMMUNICATION	3%	17
Educate The Public	1%	7
Educate People On Its Positive Uses	1%	7
Be More Active/More Up Front	*	2
Write Letters To Newspaper Editors/Get News Media On Our Side	*	1
Other Communications	*	2
MISCELLANEOUS	28%	159
We Need A Disposal Site Soon	13%	70
The Use Of Radioactive Material/Isotopes Is Essential To Medical Research/Patient Care	2%	9
Conduct Studies/Surveys/Make Findings Available	1%	7
We Are A Minimal User/Generator Of Waste	1%	7
Health/Medical/Physician Societies Should Get More Involved	1%	5
Other Miscellaneous	15%	82
No/No Advice	53%	295
Don't Know	12%	65
Refused	1%	3

**[INTERVIEWER:
IF THERE WERE EXTENSIVE COMMENTS MADE
TO THE OPENED-ENDED QUESTIONS
THROUGHOUT THE INTERVIEW,
PLEASE ASK THE FOLLOWING Q.56:]**

56. Thank you for your comments. Would you be willing to be interviewed on this topic for an article about the need for off-site disposal facilities?

	(100%)	(596)
Yes	50%	299
No	44%	264
Can't Say/Depends	5%	33
Refused	-	-

SAMPLE TYPE:

	(100%)	(680)
Industrial	40%	271
Medical	31%	212
Academic	16%	110
Government	8%	54
Utilities	5%	33

COMPACTS & STATES:

	(100%)	(680)
Southwest	22%	148
Arizona	2%	10
California	20%	138
Unaffiliated	19%	132
New York	14%	92
Massachusetts	5%	33
New Hampshire	1%	4
Rhode Island	*	3

COMPACTS & STATES [continued]:

	(100%)	(680)
(*) Midwest	17%	118
Ohio	6%	43
Wisconsin	3%	21
Minnesota	3%	18
Missouri	3%	18
Indiana	1%	9
Iowa	1%	9
Appalachian	12%	84
Pennsylvania	8%	53
Maryland	4%	24
Delaware	1%	5
West Virginia	*	2
Northeast	9%	64
New Jersey	6%	43
Connecticut	3%	21
Central Midwest	5%	32
Illinois	5%	31
Kentucky	*	1
Surf 'n Turf	5%	31
Texas	4%	28
Vermont	*	3
Central	3%	23
Kansas	1%	9
Arkansas	*	4
Nebraska	*	4
Louisiana	*	3
Oklahoma	*	3
All Other	7%	48
(*) Michigan	6%	43
Virginia	*	2
Mississippi	*	1
North Carolina	*	1
Tennessee	*	1

(*) Denotes Census of generators, rather than Sampling, in the Midwest Compact; and, in the state of Michigan

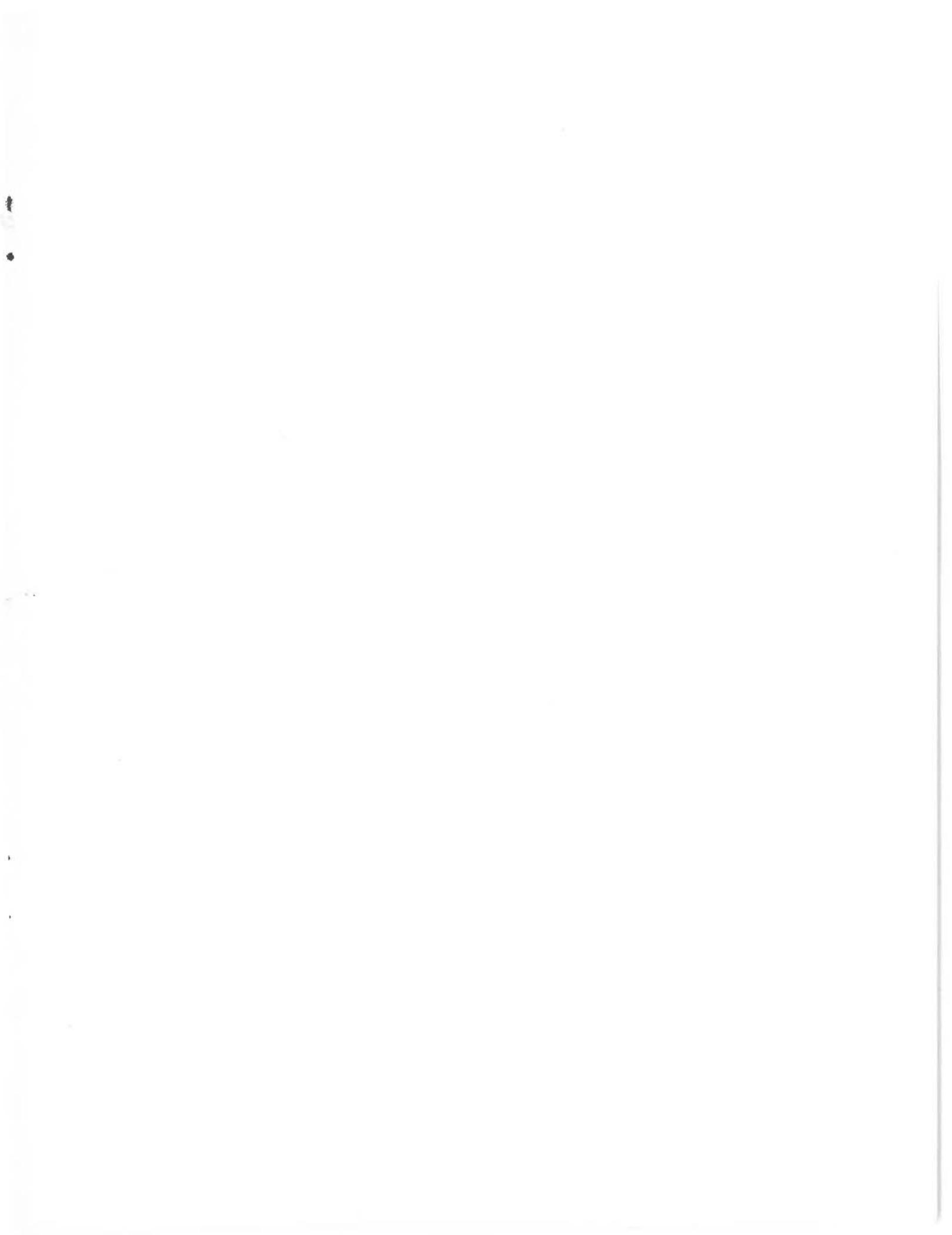
COMPACT x GENERATOR TYPE [PERCENTAGES]:

	IND	MED	ACA	GVT	UTI
Southwest	9%	10%	3%	*	*
Unaffiliated	8%	8%	3%	*	*
Midwest	6%	4%	4%	2%	2%
Appalachian	5%	2%	2%	2%	*
Northeast	5%	2%	1%	1%	1%
Central Midwest	2%	1%	1%	*	*
Surf 'n Turf	2%	1%	1%	*	*
Central	1%	1%	1%	*	*
All Other	2%	2%	1%	1%	1%

COMPACT x GENERATOR TYPE [FREQUENCIES]:

	IND	MED	ACA	GVT	UTI
Southwest	59	65	18	3	3
Unaffiliated	54	51	21	3	3
Midwest	39	29	26	13	11
Appalachian	36	16	15	15	2
Northeast	33	16	6	5	4
Central Midwest	14	8	5	3	2
Surf 'n Turf	16	6	6	2	1
Central	7	7	6	1	2
All Other	13	14	7	9	5

THANK YOU VERY MUCH FOR YOUR TIME, AND YOUR COOPERATION.



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