DOE/ER/01570-T28

MASTER

Vermont State Briefing Book for Low-Level Radioactive Waste Management

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

DOE/ID/01570--T28

VERMONT STATE BRIEFING BOOK ON LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

NOTICE

PORTIONS OF THIS REPORT ARE ILLEGIBLE.
It has been reproduced from the best available copy to permit the broadest possible availability.

July 1981

DOE/ID/01570--T28

DE82 015279

Centaur Associates, Inc.
Washington, D.C. 20036

Prepared for EG&G Idaho, Inc.
Under Subcontract No. K-7666

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MGW

ABSTRACT

The Vermont State Briefing Book is one of a series of State briefing books on low-level radioactive waste management practices. It has been prepared to assist State and Federal agency officials in planning for safe low-level radioactive waste disposal. The report contains a profile of low-level radioactive waste generators in Vermont. The profile is the result of a survey of Nuclear Regulatory Commission licensees in Vermont. The briefing book also contains a comprehensive assessment of low-level radioactive waste management issues and concerns as defined by all major interested parties including industry, government, the media, and interest groups. The assessment was developed through personal communications with representatives of interested parties, and through a review of media sources. Lastly, the briefing book provides demographic and socioeconomic data and a discussion of relevant government agencies and activities, all of which may affect waste management practices in Vermont.

CONTENTS

	Page
ABSTRACT	i
CONTENTS	ii
LIST OF FIGURES	v
LIST OF TABLES	vi
1. INTRODUCTION	1-1
2. OVERVIEW OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT PRACTICES IN VERMONT	2-1
2.1 Background	2-1
2.2 Generator Activities Related to Low-Level Radioactive Waste Management	2-3
2.2.1 In-house Activities	2-6
2.2.2 Generator Community Concerns	2-7
2.3 State Activities Related to Low-Level Radioactive Waste Management	2-8
2.4 Population and Economic Trends Potentially Affecting Low-Level Radioactive Waste Generation and Management	2-13
2.4.1 Medical Waste	2-13
2.4.2 Reactor-Generated Waste	2-15
2.4.3 Research	2-16
3. DEMOGRAPHY	3-1
3.1 Location	3-1
3.2 Topography	3-1
3.3 Climate	3-4
3.3.1 Precipitation	3-4
3.3.2 Storms and Other Weather	3-5
3.4 Population	3-6
3.4.1 Standard Metropolitan Statistical Areas	3-8
3.4.2 Major Cities	3-8
3.4.3 Population Projections	3-12

CONTENTS (continued)

		Page
3.5	Economy	3-12
3.5.1	Major Employment Sectors	3-12
3.5.2	Employment and Per Capita Income	3-12
3.5.3	Gross State Product	3-16
3.5.4	Agriculture	3-19
3.6	Schools, Hospitals, Federal Laboratories, and Military Installations	3-19
3.6.1	Schools	3-21
3.6.2	Hospitals	3-21
3.6.3	Federal Laboratories	3-21
3.7	Land Use	3-23
4.	GOVERNMENT STRUCTURE	4-1
4.1	Major Political Parties	4-1
4.2	Congressional Delegation	4-1
4.3	State Government	4-3
4.3.1	Executive Department	4-3
4.3.2	Legislative Department	4-9
4.3.3	Judicial Department	4-12
4.4	Statutory Regulations	4-12
4.5	Federal Activities on Low-Level Radioactive Waste Management in Vermont	4-12
4.6	Local Activities Affecting Low-Level Radioactive Waste Mangement in Vermont	4-13
5.	INTEREST GROUPS CONCERNED WITH LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT	5-1
5.1	National Groups	5-1
5.2	State and Local Groups	5-2
6.	PRINTED MEDIA REVIEW OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT ISSUES	6-1
7.	PROFILE OF LOW-LEVEL RADIOACTIVE WASTE GENERATORS	7-1
7.1	Source of Shipped Waste	7-1
7.1.1	Type of Facility Shipping Waste	7-1
7.1.2	Source of Radioactivity in Shipped Waste	7-1

CONTENTS (continued)

		Page
7.2	Volumes of Shipped Waste	7-4
7.3	Activity of Shipped Waste	7-4
7.4	Physical Characteristics of Shipped Waste	7-4
7.5	Cost of Shipping Waste	7-11
7.6	Destination of Shipped Waste	7-11
7.7	Summary	7-16

APPENDIX A RADIOACTIVE MATERIAL LICENSE HOLDERS IN CONNECTICUT

APPENDIX B DEMOGRAPHY: SUPPORTING DOCUMENTATION

APPENDIX C GOVERNMENT STRUCTURE: SUPPORTING DOCUMENTATION

APPENDIX D STATE LEGISLATION AND REGULATIONS

APPENDIX E INTEREST GROUPS

APPENDIX F REPRESENTATIVE NEWSPAPER ARTICLES ON LOW-RADIOACTIVE WASTE MANAGEMENT ISSUES

APPENDIX G SURVEY METHODOLOGY

APPENDIX H GLOSSARY

LIST OF FIGURES

Figure		Page
3-1	Counties of the State of Vermont	3-2
3-2	Major Topographical Features: Vermont	3-3
3-3	Population Density by County: Vermont (1980)	3-7
3-4	Population Increase by County: Vermont (1970-1980)	3-9
3-5	Cities and Towns with Population of 1,000 or Over: Vermont	3-11
3-6	Projected Population Increase by County: Vermont	3-13
3-7	Employment by County: Vermont (1977)	3-15
3-8	Per Capita Income by County: Vermont (1970)	3-17
3-9	Percent of Gross Product by Industry for 1979: United States and Vermont	3-20
3-10	Land Use: Vermont	3-24
4-1	Senatorial Districts: Vermont	4-10
4-2	Representative Districts: Vermont	4-11

LIST OF TABLES

Table		Page
1-1	Commercial Shallow Land Burial Sites	1-2
1-2	Volume of Waste Disposed: 1971-1978	1-3
1-3	Low-Level Radioactive Waste: Generation and Disposal	1-5
2-1	Use of Commercial Low-level Waste Disposal Facilities	2-2
2-2	Disposal Method for Low-level Radioactive Waste	2-4
2-3	Source of Radioactivity	2-5
2-4	Trends in Waste Generation and Disposal for Vermont	2-18
3-1	Historical and Projected Population for Counties in the State of Vermont	3-10
3-2	Major Employment Sectors in Vermont by County	3-14
3-3	Employee Compensation and Estimated Gross State Product by Industry for Vermont	3-18
3-4	Enrollment Per 1,000 Persons	3-22
4-1	Vermont Members of the United States Congress	4-2
4-2	Summary of Legislation Relating to Radioactive Waste Introduced in the 97th Congress	4-4
7-1	Response to Survey by Type of Facility	7-2
7-2	Type of Facility Shipping Waste	7-3
7-3	Source of Radioactivity Resulting in Shipped Waste	7-5
7-4	Volume of Shipped Waste	7-6
7-5	Projected Volume of Shipped Waste	7-7
7-6	Activity of Shipped Waste	7-8
7-7	Radioisotypes in the Shipped Waste	7-9
7-8	Onsite Processing of Shipped Waste	7-12
7-9	Type of Shipping Container Used	7-13
7-10	Physical Form of Shipped Waste	7-14
7-11	Nonradiological Hazard of Shipped Waste	7-15

1. INTRODUCTION[1]

The Vermont State Briefing Book on Low-Level Radioactive Waste Management is one of a series of State briefing books being prepared to assist State and Federal agency officials in planning for safe low-level radioactive waste disposal. The Vermont Briefing Book provides State officials with basic information related to low-level radioactive waste management practices in the State. A comprehensive assessment of management issues and concerns as defined by all major interested parties--including industry, government, the media, and interest groups--and a profile of generators who ship low-level radioactive waste are the primary focuses of the briefing book. The briefing book also includes demographic and socioeconomic data and a discussion of relevant government agencies and their activities as they relate to the processing, handling, and disposal of low-level radioactive waste.

Commercial burial capacity for low-level radioactive waste has significantly declined in recent years. Of six commercial low-level radioactive waste disposal sites that have operated within the United States, only three are currently accepting additional waste and steps are being taken to limit the types and volumes of waste these sites accept. Table 1-1 illustrates this situation. Projections of total national low-level radioactive waste generation and the capacity of existing commercial disposal facilities indicate that if no change in present practices or trends occurs, the current disposal sites will probably be filled by the mid-1990s. However, recent limitations of yearly burial quantities and waste types to be accepted by disposal sites located in the States of South Carolina and Washington will reduce the availability of burial space. South Carolina, which accounted for approximately 80 percent of the waste burial in 1979, is limiting the acceptance of waste to 50 percent of the 1979 volume or 2,830 cubic meters monthly by October 1981. The State of Washington has passed legislation, effective July 1981, restricting out-of-State low-level radioactive waste to that which is medically related. Therefore, it is quite probable that by the mid-1980s there will be more waste volume generated per year than can be buried. Table 1-2 illustrates the amount of low-level radioactive waste buried at each site since 1971.

TABLE 1-1. COMMERCIAL SHALLOW LAND BURIAL SITES[2,3]

Location	Year First Licensed	Site Operator	Licensing Authority	Current Operation
Barnwell, SC	1971	Chem-Nuclear Systems, Inc.	State and NRC	Significantly reduced volume accepted since 1979
Beatty, NV	1962	Nuclear Engineering Company	State	Open
Richland, WA	1965	Nuclear Engineering Company	State and NRC[a]	Only accepting medically related waste from out-of-State after June 1981.
Maxey Flats, KY	1962	Nuclear Engineering Company	State	Closed 1977
Sheffield, IL	1967	Nuclear Engineering Company	NRC	Closed 1978
West Valley, NY	1963	Nuclear Fuel Services	State and NRC	Closed 1975

a. State maintains license for by-product materials and Nuclear Regulatory Commission (NRC) licenses for special nuclear materials. At time of report writing, Nuclear Regulatory Commission license was being contested by the site operator. Negotiations are currently underway to resolve the conflict between the Nuclear Regulatory Commission, the State and the site operator.

TABLE 1-2. VOLUME OF WASTE DISPOSED: 1971-1981[4,5,6,7,8]
(cubic meters)

Year	Disposal Site						National Annual Total
	Kentucky	Nevada	South Carolina	Illinois	New York	Washington	
1971	13,171	3,584	1,171	4,430	6,362	584	29,302
1972	15,577	4,301	3,757	5,956	7,054	654	37,299
1973	10,072	4,076	15,839	8,524	7,497	1,033	47,041
1974	8,897	4,103	18,244	12,373	8,574	1,411	53,602
1975	17,109	4,943	18,072	14,116	1,889	1,500	57,629
1976	13,783	3,864	40,227	13,480	--[a]	2,867	74,221
1977	428	4,742	46,563	17,643	--	2,718	72,089
1978	--[a]	8,827	61,566	102	--	7,422	77,917
1979	--	6,491	63,443	--[a]	--	9,980	79,914
1980	--	12,732	54,725	--	--	24,824	92,281
1981 (estimated)	--	6,000	40,040	--	--	10,000	56,040

a. Suspended operations

Low-level radioactive waste has become an everyday part of our lives. Its use is illustrated in Table 1-3 which highlights the sources of low-level radioactive material and the resulting waste. The extent of low-level radioactive waste generated both in the State of Vermont and throughout the nation has prompted an assessment of low-level radioactive waste management. The U.S. Department of Energy's Low-Level Waste Management Program has been given the responsibility for coordinating the development of a national low-level radioactive waste management program including assessments of specific State and industry situations. These assessments will help form the basis for the U.S. Department of Energy's technical and resource assistance to States to help them resolve low-level radioactive waste disposal issues. State briefing books on low-level radioactive waste management practices are also being prepared as part of the process leading to a national low-level waste management plan.

Section 2 of this briefing book reviews both low-level radioactive waste management in Vermont and trends potentially affecting low level radioactive waste management. The demographic characteristics of the State are briefly described in Section 3. An overview of the State's governmental structure, particularly as it pertains to low-level waste management issues, is covered in Section 4. Sections 5 and 6 cover the concerns of national and State interest groups and the media coverage given to low-level radioactive waste issues in the State. The survey methodology and the State profile of shipped low-level waste, developed from responses to the survey, are discussed in Section 7. Appendices to this briefing book include State laws concerning low-level radioactive waste management, some representative media coverage on the issues, a current list of radioactive material licensees in the State, and a glossary of terms.

TABLE 1-3. LOW-LEVEL RADIOACTIVE WASTE: GENERATION AND DISPOSAL[9,10]

Initial Sources of Radioactive Material	Processing		Commercial Uses of Radionuclides	Method of Low-Level Radioactive Waste Disposal	Other Low-Level Radioactive Waste Sources
Production and research reactors	Low-level waste (40%)[a]		▲ Oil well logging	Sealed sources returned to processor; non-sealed sources left in earth; no LLRW generated at user level.	Decontamination, decommissioning and nuclear laundry operations all generate LLRW waste; indirectly received from all users (5%)[a].
	Processing of radionuclides[b]	Low-level waste from operations and old material returned by users (<5%)[a]	■▲◆ Medical diagnosis and therapy	Low-level waste generated by hospitals, clinics and laboratories; LLRW cayed in-house or shipped to LLRW site. (20%)[a]	
	▲		◆▲ Biological and medical research	Low-level waste generated at teaching hospitals, universities and private R&D labs conducting medical and biological research; LLRW decayed deceased in-house and shipped to LLRW burial site.(20%)[a]	
			▲ Industrial radiography	Sealed sources returned to processor; no LLRW generated at user level.	
Accelerators and cyclotron	Low-level waste when decommissioned[a] (<1%)		▲ Industrial irradiation	Colbalt 60 left in equipment during life of irradiator; high-level radioactive generated only during decommissioning.	
	Processing of radionuclides[b]	Low-level waste from operations and old material returned by users (<5%)[a]	■▲ Industrial gauges	Sealed sources returned to manufacturer upon decommissioning or failure; no LLRW generated at user level.	
	◆		◆ Radioactive tracing	Isotope consumed during test; unused test kits returned to manufacturer; no LLRW generated at user level.	
Naturally occurring radioactive material	Low-level radioactive waste (<5%)[a]				
	Processing of radionuclides[b]	Low-level waste from operations and old material returned by users (<5%)[a]	■ Glazes for ceramics	Consumed in product; LLRW generated at manufacturing level as by-product. (<1%)[a]	
High-level output	■		▲ Electrons tube and lights	Consumed in product; LLRW generated at manufacturing level as by-product. (<1%)[a]	
			▲ Lantern mantles	Consumed in product; LLRW generated at manufacturing level as by-product. (<1%)[a]	
			■ Metallurgy/welding	Consumed in product; LLRW generated at manufacturing level as by-product. (<1%)[a]	
			■▲ Luminous light tubes and paint	Most of radioactive material consumed in product; many instruments returned to manufacturer; LLRW contained both in by-products and old equipment; old equipment is returned to manufacturer. (<1%)[a]	
			▲ Smoke detectors	Radioactive material placed in product; very slight by-product of LLRW waste generated at manufacturing level. (<1%)[a]	
			▲ Research associated with reactor (site)	Low-level waste generated at test laboratories; not returned to manufacturer. (<1%)[a]	
			◆ Laboratory testing services	Low-level waste generated at test laboratories; not returned to manufacturer. (<1%)[a]	

a. Estimated volume of total commercial low-level radioactive waste generated at that point.

b. Radium, cobalt 60, uranium and accelerator produced radionuclides are imported directly by manufacturers at the processor level.

▲ Reactor generated material

◆ Accelerator generated isotope

■ Natural occurring radioactive materials (radium)

LLRW - Low-level radioactive waste

REFERENCES

Text

1. Kitty Dragonette, private communication, Low-Level Waste Licensing Branch, Nuclear Regulatory Commission, Washington, D.C., March 3 and May 5, 1981.

Tables

2. William F. Holcomb, "Inventory (1962-1978) and Projections of Shallow Land Burial of Radioactive Wastes at Commercial Sites: An Update," Nuclear Safety, 21, 3, May-June, 1980.

3. (See Reference 1.)

4. Staff member, private communication, Radiological Control Section, Department of Social and Health Services, Olympia, Washington, May 4, 1981.

5. Virgil Audry, private communication, Bureau of Radiological Health, South Carolina Departmetn of Health and Environment, May 5, 1981.

6. Stan Martin, private communication, Radiological Health Program, Health Division, Carson City, Nevada, May 4, 1981.

7. (See Reference 2.)

8. B.D. Guilbeault, The 1979 State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Burial Grounds, prepared for EG&G Idaho, Inc. under Subcontract K-5108, Task 23, November, 1980.

9. Centaur Associates, Inc., An Economic Study of the Radionuclides Industry, prepared for the Nuclear Regulatory Commission under Contract NRC-07-78-431, February 15, 1980, pp. 7-28.

10. National Low-Level Waste Management Program, Managing Low-Level Radioactive Wastes, LLWMP-1, August 1980, pp. 5-9.

2. OVERVIEW OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT PRACTICES IN VERMONT

The broad issues and concerns related to low-level radioactive waste management have recently been given increasing attention from the State and Federal governments, waste generators, and in some cases, the media and interest groups. This section provides an overview of low-level radioactive waste management practices in Vermont. It is divided into four parts: (a) background material, including a summary profile of radioactive material licensees in the State, (b) generator activities related to low-level radioactive waste (c) State activities on low-level radioactive waste management, and (d) trends in radioactive waste generation.

2.1 Background

Vermont is a minor generator of low-level radioactive waste accounting for about one-half of one percent of the nation's low-level radioactive waste.(1) Shippers in Vermont include medical and educational institutions, industry, State government, and a commercial nuclear power plant.

Vermont is a non-agreement State in which all radioactive material licenses are administered by the Federal government through the Nuclear Regulatory Commission. There are 37 facilities in the State which hold a Nuclear Regulatory Commission license.(2) In order to develop a profile of these licensees, a survey was conducted, which focussed primarily on shippers of low-level radioactive waste to commercial disposal sites (the results of the survey are presented in Section 7). Of the 37 licensee holders, 28 (75.7 percent) responded. Of the facilities which responded, eight indicated that they ship or have shipped waste to commercial disposal sites. Table 2-1 presents a breakdown of licensees by type of facility, response to the questionnaire, and shippers to commercial disposal facilities.

TABLE 2-1. USE OF COMMERCIAL LOW-LEVEL WASTE DISPOSAL FACILITIES

Facility	Number of Licensees	Respondents		Shippers		
		Number	Percent	Number	Percent	Percent of All Respondents
Medical	15	11	73.3	3[b]	27.3	10.7
Educational	4	4	100.0	1	25.0	3.6
Industrial	11[a]	6[a]	58.3	2	33.3	7.1
Commercial Power Reactor	1	1	100.0	1	100.0	3.6
Governmental	6	6	100.0	1	16.7	3.6
Total	37	28	75.7	8	--	27. 6

a. Subtotals do not include one facility, listed as a Nuclear Regulatory Commission licensee in Vermont, which indicated that it did not hold a license from the Nuclear Regulatory Commission.

b. Two hospitals which responded to the 1979 Nuclear Regulatory Commission survey, but not the Centaur survey, shipped low-level radioactive waste in 1978 and 1979. They are not included in this subtotal.

The disposal methods used for low-level radioactive waste are shown in Table 2-2. Since some facilities use more than one disposal method, the columns in the table indicating the number of facilities using each disposal method do not total to the number of respondents. Ten of the 27 survey respondents indicated they generated no waste. Those that generate waste use a variety of disposal procedures in addition and often in place of shipping to commercial disposal sites. No licensees in Vermont incorporate radioactive materials into products that are then distributed.

Source of radioactivity by type of facility is presented in Table 2-3. Some facilities receive radioactive material from more than one source. The number of facilities listed in the table for each source, therefore, does not add to the total number of respondents. The major sources of radioactivity among the respondents are sealed sources (15 out of 20 respondents), nuclear reactors (seven of 20 respondents) and unsealed sources (five of 20 respondents).

2.2 Generator Activities Related to Low-Level Radioactive Waste Management

Low-level radioactive waste will continue to be produced in Vermont. The continued operation of Vermont Yankee will assure that the current annual volume of waste will remain approximately the same throughout this decade. In addition, industry as well as educational and medical institutions will continue to need and use radioactive materials. One of the major issues now facing low-level radioactive waste generators is the availability of safe and economical waste disposal methods. As discussed in Section 1, the continued availability of commercial disposal sites in the near-term remains a key issue for waste generators. Low-level radioactive waste generators in Vermont have taken and continue to undertake a number low-level radioactive waste management activities. These activities relate first to their own facilities and second to the broader issues of low-level radioactive waste management.

TABLE 2-2. DISPOSAL METHOD USED FOR LOW-LEVEL RADIOACTIVE WASTES

Type of Facility	No. of Respondents	Ship to Commercial Low-Level Waste Disposal Site		Release to Sewer		Combine with Refuse		Bury On-site		Vent to Atmosphere		Return to Vendor		No Waste Generated		Other	
		No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents
Medical	11	3	10.7	5	17.9	7	25.0	--	--	2	7.1	1	3.6	2	7.1	2	7.1
Educational	4	1	3.6	2	7.1	2	7.1	1	3.6	1	3.6	1	3.6	--	--	1	3.6
Industrial	6	2	7.1	--	--	--	--	--	--	--	--	1	3.6	4	14.3	--	--
Power Reactor	1	1	3.6	--	--	--	--	--	--	1	3.6	--	--	--	--	1	3.6
Governmental	6	1	3.6	1	3.6	--	--	--	--	--	--	1	3.6	4	14.3	--	--
Total[a]	27	8	27.6	8	27.6	9	32.1	1	3.6	4	14.3	4	14.3	10	35.7	4	14.3

a. The "total number" exceeds the total number of respondents due to use of several practices at each facility.

TABLE 2-3. SOURCES OF RADIOACTIVITY

Type of Facility	Number of Respondents	Nuclear Reactor		Sealed Sources		Unsealed Radioactive Material		Cyclotron	
		No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents	No.	Percent of All Respondents
Medical	5	4	20.0	2	10.0	3	15.0	2	10.0
Educational	3	2	10.0	1	5.0				
Industrial	6	--	--	6	30.0	1	5.0	--	--
Power Reactor	1	1	5.0	1	5.0				
Governmental	5	--	--	5	25.0	1	5.0	--	--
Total[a]	20	7	35.0	15	75.0	5	25.0	2	10.0

a. The total exceeds the total number of respondents due to facilities generating waste from several sources.

2.2.1 In-house Activities

Vermont waste generators are examining their procedures to identify ways to produce less waste and to reduce the volume of waste generated. Waste generated is being reduced by careful planning of all work and by improving procedures to eliminate or reduce waste produced. More rigorous waste-sorting procedures can reduce the volume of waste to be shipped. Volume reduction is also being achieved through the use of technology such as compaction.

While no plans currently exist for its development, an incinerator for dry waste generated at Vermont Yankee has been mentioned as a possibility. Incineration would sharply reduce the overall volume of Vermont Yankee's, and the State's, waste. Several things, however, stand in the way of any further consideration of the incinerator. Should the New England states develop a regional disposal site there may be no need for an incinerator. The economics of a regional site might also preclude justifying the capital costs of an incinerator. Such a site would have to cover its fixed costs; any substantial reduction in volumes received might only serve to raise unit volume prices to generators. By reducing volume, incineration raises the level of radioactivity in the remaining residue thus complicating procedures for handling wastes. In addition an incinerator would almost certainly require a special permit for a disposal facility. The regulatory procedures needed for such a permit would require a major effort on the part of Vermont Yankee management. Should an incinerator be considered a disposal facility by State regulatory agencies (as opposed to a volume reduction facility), the State legislature would have to approve its development.(3)

For these reasons Vermont Yankee's management has postponed any further consideration of the incinerator until the question of a New England disposal site is resolved. One other option that could be employed as a last resort is onsite storage. Although this is being given even less consideration than the incincerator, such storage would be allowed under Vermont Yankee's current license and could be used in the event of a future disposal crisis.(4)

Other Vermont generators have changed or will soon change waste management procedures. General Electric is in the process of reducing, and possibly eliminating, the need for shipping. General Electric periodically test fires radioactive ammunition and has in the past shipped not only the spent ammunition but also earth from the impact area. By the summer of 1981, General Electric plans to separate spent ammunition from the earth thus substantially reducing shipment volumes. In addition General Electric has explored the option of recycling spent ammunition, which would eliminate the need for shipping.(5)

Hospitals' need for shipping has also been reduced by the recent Nuclear Regulatory Commission rules exempting scintillation fluids and carcasses from regulation. These changes should accelerate the current downward trend in hospital shipments.

Conversely, Middlebury College is expected to begin shipping waste. In the past the college has used onsite burial to dispose of much of its waste. A general increase in concern over waste (stimulated in part by 1979 closings of commercial sites) and over public relations led to the decision to stop onsite burial.(6)

2.2.2 Concerns of the Generator Community

Vermont's low-level radioactive waste generators expressed the following types of broad concerns during interviews conducted for this study.

- Classification of waste by level of radioactivity (need for a definition of low-level waste).

- Public perception of low-level radioactive waste (confusion with high-level or other hazardous waste).

- Transportation of radioactive material through communities (local prohibitions on the transportation of radioactive materials despite the fact that such local laws are not binding).

- Routing of shipments through neighboring States (inconsistent and restrictive regulations among States result in the use of secondary highways with greater risks than preferred routes using the Interstate system).

- A permanent solution to low-level radioactive waste disposal (a regional approach).

- General public lack of knowledge about low-level radioactive waste including distinctions between low- and high-level waste, effects of storage on levels of radioactivity in some radioisotopes (i.e., the assumption the radioactivity is a constant value) and relative risks of low-level wastes versus hazardous materials.

- Over-regulation of low-level radioactive waste compared to hazardous waste.

- Politicization of low-level radioactive waste issues in general and the concommitant potential for excluding technically sound disposal options.

2.3 State Activities Related to Low-level Radioactive Waste Management

State involvement with low-level radioactive waste management grew out of earlier programs concerned with occupational and health applications of radiation. These latter programs date back to the late

1950s and early 1960s and evolved from industrial hygiene programs. By 1967 Vermont had a full-time official (on loan from the U.S. Public Health Service) working in radiation and two years later a State employee replaced this official. During this period concern focussed almost entirely on medical and dental uses of radioactivity and this continues to be the primary concern.

Vermont passed its initial legislation and issued its basic regulations to govern ionizing radiation in 1970. With the exception of adding non-ionizing radiation two years ago, the legislative and regulatory framework has remained basically unchanged since 1970.[7]

Low-level radioactive waste did not become a major concern of the State until 1979. In that year radioactivity was detected in Lake Champlain after the temporary closure of two of the commercial disposal sites. It was also reported that the University of Vermont was using the sewers to dispose of certain radioisotopes. (This is permissible under specified conditions spelled out in the University's Nuclear Regulatory Commission license. As a result of adverse publicity, though, University policy changed so that all low-level waste is now shipped to commercial disposal sites regardless of other allowed disposal options.) Analysis of the University's discharges to sewers showed that they were well within regulatory limits. Water samples from the lake showed no increase in radioactivity over background levels.[8,9]

With the heightened public interest and concerns of a lack of data on low-level radioactive waste, a advisory committee was created to advise the State Department of Health. The committee recruited members from government, industry, academia, and the medical fields. The general charge to the committee was to fill information gaps on the generation of low-level waste and to assess present and needed governmental action.

The general findings of the committee were that no major problems existed, but greater attention to monitoring disposal methods was needed. An inventory of generators showed compliance well within regulatory requirements and adequate safety controls. Among its specific recommendations and findings were the following:

- When wastes can be stored until radioactivity reaches background levels and then disposed of as ordinary solid waste, this procedure is preferrable to shipping to commercial disposal sites.

- When such storage and decay is impractical, shipping should be employed.

- Monitoring by governemnt of waste from clinical labs had been neglected and should be improved. These wastes are appropriate for storage and decay procedures.

- Vermont should join with other New England states to develop regional disposal sites.(10)

The report of the advisory committee was issued in June 1980. It is considered the official State position on low-level radioactive waste.

In 1980 the State also amended a 1977 law that requires State legislature approval of any nuclear waste storage, disposal, or reprocessing facility. The 1980 amendment expanded the law to include low-level radioactive waste facilities.

Beginning in late summer of 1980, Vermont officials have participated in a number of interstate and regional meetings concerned with low-level waste. In September the Legislative Counsel's office met with representatives from the New Hampshire legislature to discuss a regional disposal site and waste generation data for New England states. At this meeting some consideration was given to allocating hazardous and low-level waste sites among the States. The main conclusion of the meeting, however, was to continue discussions at a future meeting.(11)

In November Vermont, along with other New England states, met to comment on a proposed Nuclear Regulatory Commission rule (10 CFR 61). Representatives from the Legislative Counsel's office and the Department of Health participated in the workshops sponsored by the New England Regional Commission. The summary of the workshop describes the range of comments made by participants on waste disposal and disposal site issues relevant to the proposed Nuclear Regulatory Commission rule.(12)

Representatives of the State attended a conference in March 1981 sponsored by the Joint Legislative Committee on Radioactive Waste Management Policy of the State of New Hampshire. Other States represented at the conference were Connecticut, Maine, Massachusetts, New Hampshire, Pennsylvania, and Rhode Island. (Although invited, representatives from New Jersey and New York did not attend.) The conference included a presentation of a report to the Governor of Massachusetts prepared by the Massachusetts Advisory Council on Radiation Protection. This report recommends that "immediate action by Massachusetts to solve its own problem is the best course to follow. Should regional legislation be enacted, Massachusetts can enter into appropriate regional agreements in an advantageous and strong bargaining position."(13) The report goes on to make more specific recommendations about the development of a low-level waste management program, for example, siting considerations.

Vermont representatives at the March conference indicated that the development of a New England compact for low-level radioactive waste was generally regarded as beneficial. Caution, however, was expressed that support for the compact might erode if Vermont (or any other New England state with a relatively small low-level radioactive waste problem) was selected as the site for a regional disposal site. Vermont, it was felt, would contribute its fair share to a regional solution but would resist having to take more than its share of regional responsibility for low-level radioactive waste.[15]

Follow up to the March meeting is expected to include further regional meetings. (A meeting of representatives of the New England Governors was scheduled for mid-April, shortly after the Vermont sit-visit.) In addition, task forces drawn from the executive and legislative branches of government are expected to be established in states where they do not already exist.

Vermont has also regulated large quantity shipments of LLRW and radioactive materials. The primary means of regulation is the requirement for two-day prior notice of shipments and two-hour notice of any schedule changes or additional information on shipments. The Vermont Director of Occupational Health is empowered to change shipping procedures to protect public health and safety.(16) The Vermont Agency of Transportation has recently adopted regulations identical to the U.S. Department of Transportation regulations (49CFR Parts 100 to 179) scheduled to take effect in 1982. (17).

2.4 Population and Economic Trends Potentially Affecting Low-Level Radioactive Waste Generation and Management

Radioactive materials are used directly in products and indirectly in the manufacturing process in virtually every sector of the national economy. The main generators of radioactive waste nationally are nuclear medicine, biomedical research, and commercial power reactors. Combined, these three sectors generate an estimated 90 percent of the nation's commercially buried waste.(18) Preliminary estimates for the State of Vermont indicate that 73 percent of shipped waste results from a reactor and 27 percent from medical and research applications.(19) Analysis of trends will primarily focus on these three types of waste generators.

2.4.1 Medical Waste

The volume of medical waste, consisting primarily of scintillation liquids and solid laboratory trash, has greatly increased during the past ten years. Several factors come into play when projecting trends in future waste volumes from medical procedures. These factors are: population size and age profile, number of tests per patient, and the volume of waste per test.

Radiopharmaceuticals are utilized in the diagnosis of a wide range of medical disorders. General demand for nuclear medical procedures is closely correlated with general demand for medical services, which, in turn, is highly affected by population size and age profile. Future

demand for medical services, including nuclear diagnosis and therapy, is a function of population size. Population growth projections for the State of Vermont indicate a growth of 1.2 percent annually from 1980 to 1990, well above the national average of .9 percent. This will result in an increase of 64,100 persons by 1990 (see Section 3.4), which can be expected to translate directly into an equivalent increase in demand for nuclear medical services.

In addition, Vermont's population, like that of the rest of the nation, is taking on a more mature age profile. A resulting increase in demand for nuclear medical procedures may result. However, Vermont currently has a population slightly younger than the national average. In 1978, 29 percent of the population was over 45 years of age, compared to 31 percent nationally and 43 percent were under 24 years of age.(20)

Nationally, the per capita number of applications of nuclear medicine has greatly increased during the past decade, due to new and improved applications, particularly diagnostic applications of radioisotopes. Nuclear medicine developments in in vivo diagnostic techniques have been dominated by the increased use of Technetium-99 and of scintillation cameras, among radiopharmaceuticals and equipment respectively. The development and growth of radioimmunoassay and the equipment used with it are the most outstanding trends for in vitro diagnosis. Developments in therapeutic applications have been relatively minor.(21)

The value of sales of medical procedures including both diagnosis and therapy applications increased from $920 to $2,440 million between 1967 and 1978.(22) Capital expenditures by medical operations for radiopharmaceutical equipment increased from $60 million to $160 million between 1967 and 1978.(23) Most of this growth resulted from increased use of diagnostic radiopharmaceuticals rather than therapy applications. Sales of radiopharmaceuticals increased from $9.8 million to $111.5 million between 1967 and 1976.(24) The number of in vivo diagnostic procedure increased from 1.2 million to 7.6 million annually.(25)

The last relevant trend is the decrease in the level of waste shipped per test. Two main factors have contributed to reducing the volume of waste shipped to burial sites per application of nuclear medicine. First, there has been a shift toward using isotopes with shorter half-lives. This is due to the development of new isotopes and more sensitive laboratory equipment which facilitate temporary onsite storage of waste and its disposal after decay as non-radioactive waste. Second, there has been an increase in the use of volume reducing techniques. These techniques take the form of both improved procedures, e.g., a more aggressive waste-sorting policy, and technological innovations, e.g., mini-scintillation vials. Volume reduction techniques are a response to rising disposal costs, increased difficulty in disposing of waste, and the problems and paperwork associated with shipping waste to burial sites.

2.4.2 Reactor-Generated Waste

There is currently one commercial power reactor operating in Vermont and no experimental or research reactors. The Vermont Yankee facility is in a relatively early stage of its operating cycle and is expected to continue operation well into the next century.[26] Waste from this site was estimated at 270 cubic meters with 963 curies of radioactivity in 1979.[27] Volume reduction by compaction currently takes place onsite, and if an incinerator should be installed, the volume of dry solids shipped to a burial site would be reduced by approximately 80 percent and total waste volume shipped reduced by approximately 50 percent.

Due to the long lead time necessary for the development of a nuclear reactor or fuel reprocessing facility, it can be confidently assumed that no new reactor facilities will be operational before 1990, as no additional applications for reactor facilities have been filed with the NRC since Vermont Yankee. In addition, a State law would require legislative approval of any new reactor site.

Commercial power reactors are licensed for a forty year period from the issuance of the construction permit and forty years is the best available estimate of a reactor's operating life cycle. Assuming a forty year life cycle Vermont Yankee will be eligible for decommisioning in 2007.[28] Unless accomplished primarily by facility encapsulation, an extremely large volume of low-level radioactive waste can be anticipated in 2007.

2.4.3 Research

Small volumes of radioactive material are used for research at one university in Vermont. Research-related waste in Vermont consists primarily of scintillation liquids, laboratory trash, and contaminated animal carcasses.

Nationally, the use of radioisotopes for research has increased greatly during the past decade and continued growth is expected. The number of individuals directly associated with research using radioisotopes increased from 44,547 to 68,262 between 1969 and 1979 or by over 5 percent annually.[29] Approximately 85 percent of this activity was related to biomedical research.

In Vermont, the increase in the use of radioisotopes for research reflects the national trend. This increase is due to both increased use of traditional isotopes and new uses of previously unutilized isotopes. There is every indication that this trend will continue and the associated low-level waste generated can be expected to increase. No major volume reduction plans exist and an increase in shipped volume can be expected.

Additional industrial applications of radioactive material in Vermont include industrial control measurement devices, measurement gauges, smoke detectors, and industrial radiography. However, these applications generate extremely small volumes of radioactive waste; no major changes in their level of use or waste are anticipated.

In summary, the uses of radioactive material in Vermont are expected to increase slightly during the next ten years and the volume of waste generated at the user level is expected to increase proportionally. However, the net volumes of waste shipped to burial sites will be relatively unaffected due to the application of volume reduction techniques. Table 2-4 summarizes the anticipated changes in the use of radioactive material, the trends in the volume of waste shipped relative to the level of waste generated, and the net level of waste shipped.

TABLE 2-4. TRENDS IN WASTE GENERATION AND DISPOSAL FOR VERMONT

Generators of Low-Level Radioactive Waste	Material Use	Waste Management	Waste Shipped
Medical Diagnosis and Therapy	Increase due to population increase, new applications - Partially offset by younger age profile	Reductions in volume of low-level waste shipped per test	Decrease in volume shipped.
Nuclear Reactors	No major changes	Possible volume reduction due to incinerator	Reduction or no change in volume shipped
Research	Slight increase in biomedical applications at universities	No volume reduction planned	Slight increase in volume shipped
Industrial	No major changes	No major changes	No change

REFERENCES

1. B.D. Guilbeault, The 1979 State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Burial Grounds, prepared for EG&G Idaho, Inc. under Subcontract K-5108, Task 23, November 1980.

2. The survey was sent to 38 Nuclear Regulatory Commission licensees. However, one facility indicated that their license was inactive.

3. Mark Strum, private communication, Vermont Yankee Nuclear Power Corporation, May 11, 1981.

4. Robert Leach, private communication, Vermont Yankee Nuclear Power Corporation., April 16, 1981.

5. William Aswad, private communication, General Electric Company, April 15, 1981.

6. Thomas Root, private communication, Middlebury College, April 16, 1981.

7. Raymond McCandless, private communications, Vermont Department of Health, Division of Occupational and Radiological Health, April 13 and 17, 1981.

8. (See Reference 7.)

9. Lloyd F. Novick, Report of the Advisory Committee on Low-Level Nuclear Waste, State of Vermont Department of Health, June 19, 1980.

10. (See Reference 9.)

11. Al Boright, private communication, Legislative Counsel's Office, April 13, 1981.

12. New England Regional Commission, Report to the U.S. Nuclear Regulatory Commission Summarizing the Proceedings of the November 6-7, 1980 Workshop on Low-Level Waste Management Licensing Rule, undated.

13. Massachusetts Advisory Council on Radiation Protection, Low-Level Radioactive Waste Management in Massachusetts, Report to the Governor of Massachusetts, November 1980.

14. M. Arnold Wight, Jr., Chairman, Joint (New Hampshire) Legislative Committee on Radioactive Waste Management Policy, letter to Edward J. King, Governor of Massachusetts, March 20, 1981.

REFERENCES (Continued)

15. Peter Bluhm, private communication, Legislative Counsel's Office, April 13, 1981.

16. Regulation for Radiation Protection, Subchapter 1, Section 5-311.

17. Robert Merchant, private communication, Vermont Agency of Transportation, April 14, 1981.

18. (See Reference 1.)

19. (See Reference 1, pp. 93-94.)

20. U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1979, p. 30.

21. Arthur Young and Company, Determination of the Economic Parameters of the Radionuclide and Radionuclide Devices Industry with Special Reference to the Nuclear Medical Market, prepared for the Nuclear Regulatory Commission under contract NRC-12-77-193, June 2, 1978, pp. 1-3.

22. Centaur Associates, Inc., An Economic Study of the Radionuclides Industry, prepared for the Nuclear Regulatory Commission under Contract NRC-07-78-431, Washington, D.C., February 15, 1980, p. 127.

23. (See Reference 22.)

24. (See Reference 21.)

25. (See Reference 21.)

26. W. F. Holcomb, "A Summary of Shallow Land Burial of Radioactive Wastes at Commercial Sites Between 1962 and 1976 with Projections," Nuclear Safety, 19, 1, January-February 1978.

27. (See Reference 3.)

28. Claire Mills, private communications, Nuclear Regulatory Commission, Washington, D.C., June 16, 1981.

29. (See Reference 22.)

3. DEMOGRAPHY

This section describes Vermont in terms of its population, economy, agriculture, schools, hospitals, and Federal laboratories. It also provides background information on land use and some of the State's natural features--climate and topography. Supporting documentation is provided in Appendix B.

3.1 Location

Located in the northeastern part of the United States in New England, Vermont is bordered on the north by the Canadian Province of Quebec, on the east by the Connecticut River, on the south by Massachusetts, and on the west by New York. The Connecticut River separates New Hampshire from Vermont. On its western border Lake Champlain separates Vermont from New York for a length of over 100 miles. With a total area of 9,609 square miles, Vermont ranks 43rd in size of the 50 States. As shown in Figure 3-1, the State is divided into 14 counties which range in size from 83 to 962 square miles.

3.2 Topography[1]

The Green Mountains dominate Vermont's topography, and form four distinct ranges, as shown in Figure 3-2. The Green Mountains proper traverse the center of the State from north to south. The Taconic Mountains are located in the southwestern part of Vermont. The Granite Hills lie east of the Green Mountains from the Canadian border to the middle of the State, and the Red Sandrock Hills extend along the shore of Lake Champlain on Vermont's western border. Numerous rivers and streams empty east into the Connecticut River on Vermont's border with New Hampshire or west into Lake Champlain.

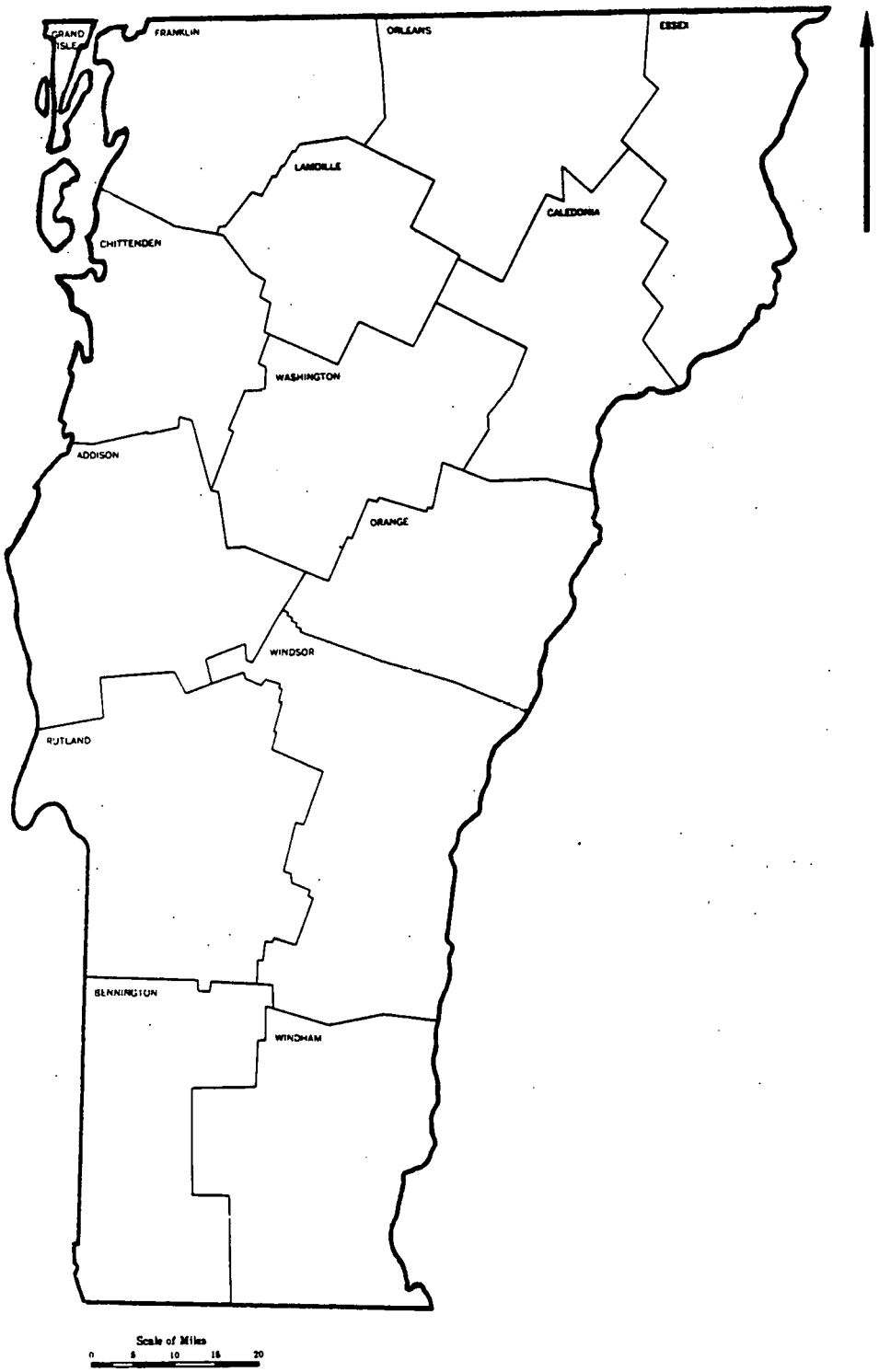


FIGURE 3-1. COUNTIES OF THE STATE OF VERMONT

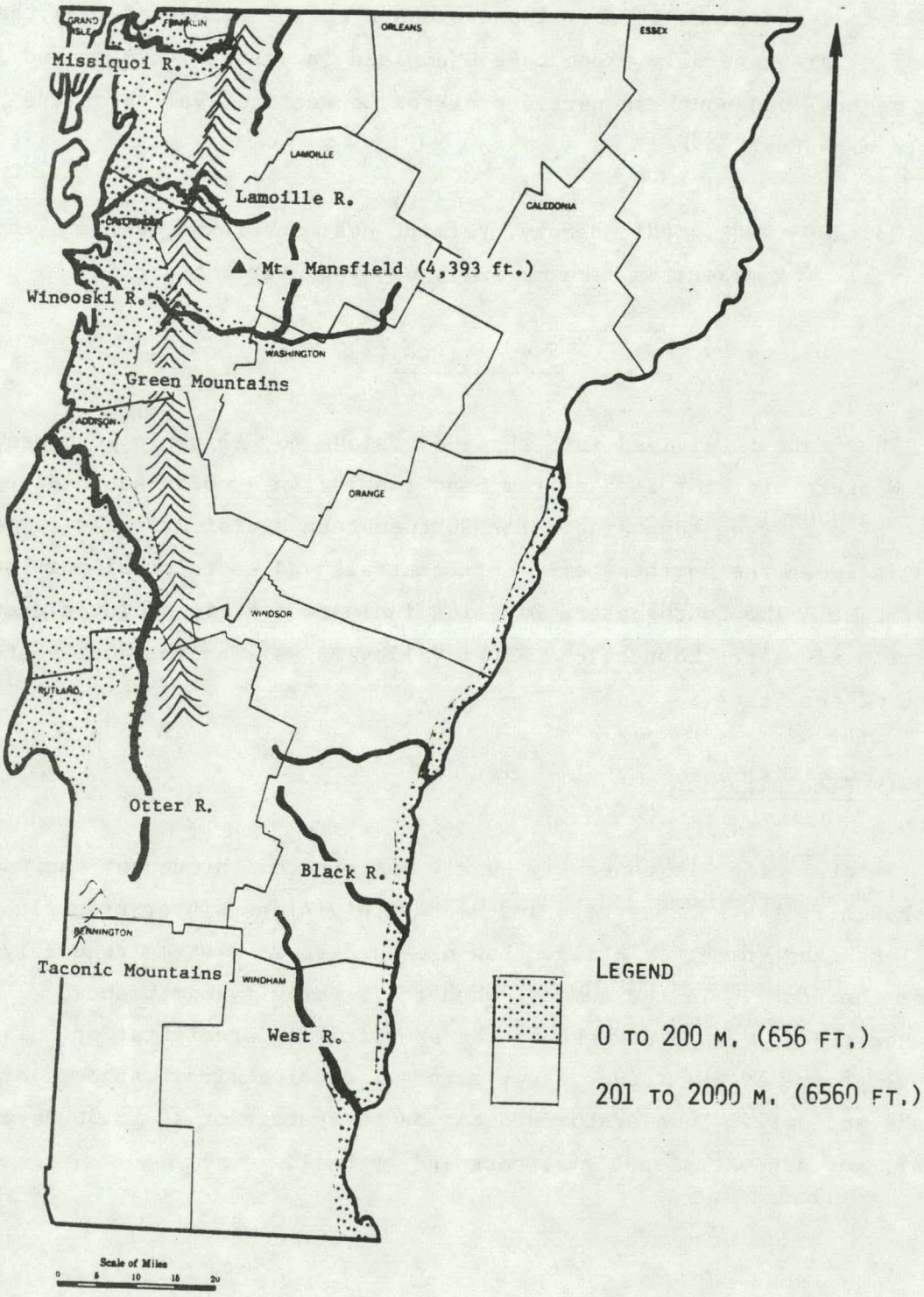


FIGURE 3-2. MAJOR TOPOGRAPHICAL FEATURES: VERMONT[32]

The terrain is hilly to mountainous. Although much of Vermont has elevations between 500 and 2,000 feet above sea level, many peaks rise to over 3,000 feet. Mt. Mansfield, the highest point in the State, is 4,393 feet above sea level. Those areas with elevations of less than 500 feet are generally along Lake Champlain in western Vermont and in the central and southern portions of the Connecticut Valley on the State's eastern border.

Noted for its scenic beauty, Vermont has many lakes, streams, and forests. Its mountains make skiing a major winter attraction.

3.3 Climate[2]

The State is divided into three divisions for climatic purposes. The Western Division is a narrow band running in a north-south direction west of the Green Mountains. The Northeastern Division is the largest and includes the northeastern, northcentral, and eastcentral portions of the State. The Southeastern Division includes a strip of low-elevation terrain along the Connecticut River Valley as well as the southeastern part of the State.

3.3.1 Precipitation

Precipitation is generally evenly distributed throughout the year, although in the Northeastern and Western Divisions winter precipitation is less than summer rainfall. Low-pressure storm systems regularly pass over the State. In the summer, when their activity diminishes, thunderstorms more than make up the shortfall in precipitation. These local storms often produce heavy rainfall causing minor washouts of roads and soil. Thunderstorms occur on an average of 20 to 30 days per year, and are occasionally accompanied by hail.

Both widespread floods and prolonged droughts are uncommon. When flooding does occur, it is usually in the spring as a result of a combination of rain and melting snow. Frequently, this flooding is exacerbated by ice jams.

Total annual average precipitation ranges from 36.47 inches in the Western Division to 41.97 inches in the Southeastern Division. In all three divisions January and February are the driest months and June, July, and August the wettest.

Average annual snowfall ranges from 55 to 65 inches in the Western Division and in parts of the Connecticut River Valley. Locations in the Green Mountains, with their higher elevations, record up to 125 inches. These locations also experience more frequent snowfall. Over the State as a whole, between 20 and 40 days of snowfall of one inch or more can be expected. Snow cover is usually continuous throughout the winter, with the greatest depth generally occurring in late February or early March.

3.3.2 Winds, Storms, and Other Weather

Prevailing winds are from the west. During the winter, winds are generally from the northwest, while in the summer winds are usually from the southwest. Topography can influence wind direction; winds often parallel river valleys, and the major valleys in Vermont lie in a north-south direction.

"Northeasters," a well known phenomenon in New England, are an influence on Vermont's weather, particularly in the Southeastern Division, which is closest to the ocean. They bring strong winds and heavy rain and snow. Because Vermont is far enough inland, tropical storms bring heavy rain but only light to moderate winds.

Thunderstorms occur on 20 to 30 days per year, usually from midspring to early fall. Occasionally they are accompanied by damaging hail. Ice storms are not common, although at least one can be expected each year.

Days with fog number between 10 and 60, although some years may record a higher number of foggy days.

During the period 1956-1975, 21 tornadoes were recorded, for an average of about one per year. More may have occurred in sparsely settled areas but were not noted.

3.4 Population[3, 4, 5,)]

Vermont, the 48th most populous State in the nation, had a population of 511,299 in 1980. Vermont's population density in 1980 was 55.2 persons per square mile. In 1970, 32.2 percent of Vermont's population lived in urban areas as compared to 38.5 in 1960. (A breakdown of population by rural and urban areas for 1980 was not available at the time this report was prepared).

As Figure 3-3 indicates the population of Vermont is concentrated in three adjacent northern counties, Franklin, Chittenden and Washington. In 1980 Chittenden had a population of 115,598 and a population density of 217 persons per square mile, Washington County had a population of 52,391 and a population density of 74 persons per square mile and Franklin County had a population of 34,800 and a population density of 53 persons per square mile. These counties contain 39.6 percent of the States population.

Vermont's population increased from 389,881 to 511,299 or 31.1 percent between 1960 and 1980, considerably above the national increase of 23.6 percent. During the years 1960 to 1970 Vermont's population increased from 389,881 to 444,330 or 14.0 percent. During the same period the national population increased 13.4 percent or at approximately the same rate. Between 1970 and 1980 Vermont's population increased two thirds again as rapidly as the nation's, from 444,330 to

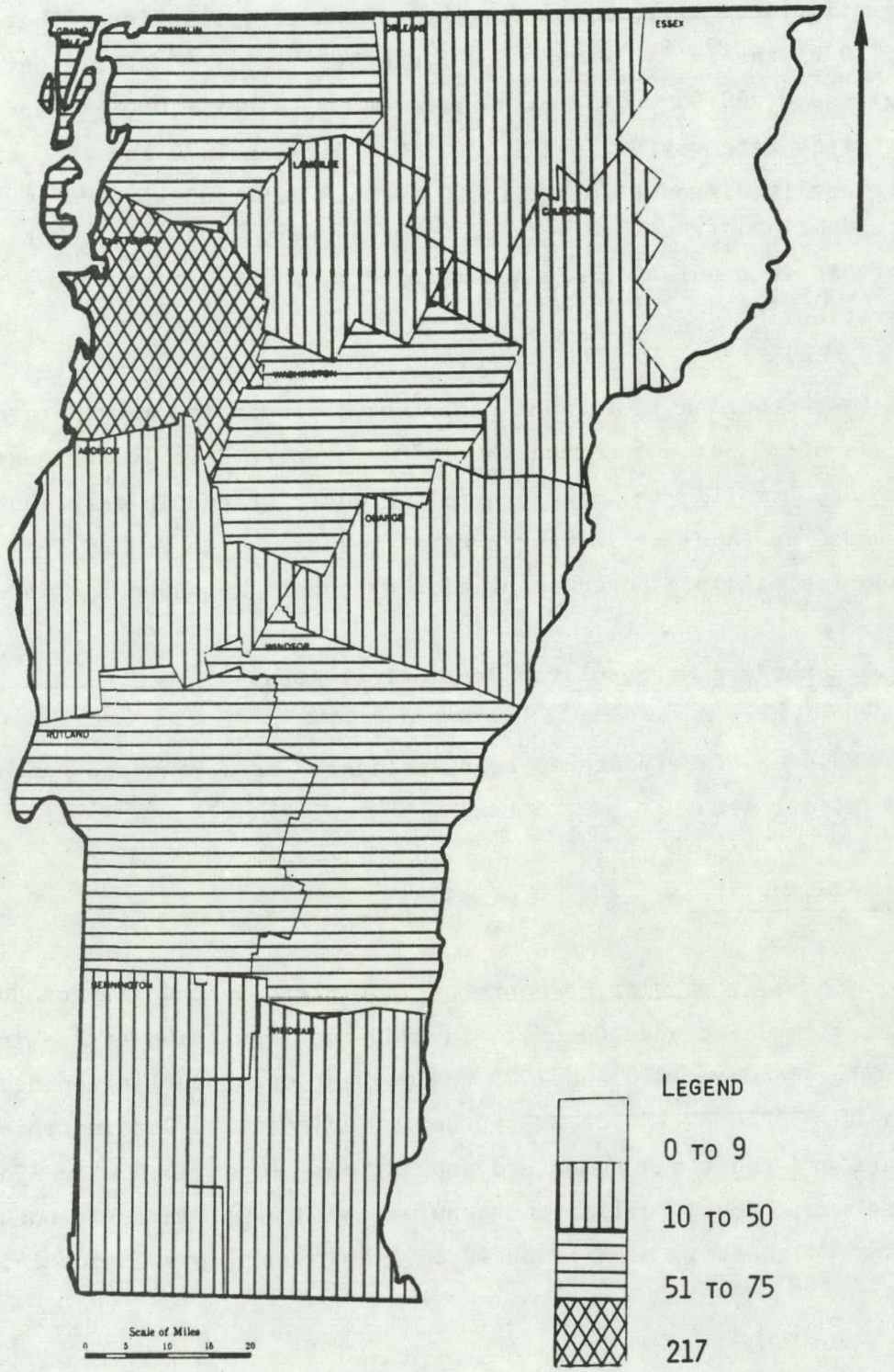


FIGURE 3-3. POPULATION DENSITY BY COUNTY: VERMONT (1980) (33)

511,299 or 15.1 percent compared to a national increase of 9 percent.[6] During the period 1970 to 1980 both natural increase and migration were responsible for the growth in population. There were 78,039 births[7, 8, 9] and 48,085 deaths[10, 11, 12] for a net increase of 29,954. The birth rate was 15.0 per 1,000[13] and the mortality rate was 9.2 per 1,000.[14] Between 1970 and 1980 the birth rate declined from 18.8 per 1,000 to 14.9 per 1,000[15] and mortality rate declined from 10.0 per 1,000 to 8.4 per, 1,000.[16] The natural increase in population was accompanied by a 5.0 percent net migration.[17]

Four counties in Vermont experienced population growth rates in excess of 20 percent during the 1970's: Grand Isle in northwestern Vermont, Lamoille in north central Vermont, Orange in east central Vermont, and Addison in west central Vermont. (See Figure 3-4) Historical and projected population by county is shown in Table 3-1.

3.4.1 Standard Metropolitan Statistical Area.[18]

No area of Vermont has been designated as a Standard Metropolitan Statistical Area.

3.4.2 Major Cities

The major population center of the State is the city of Burlington, located in Chittenden County. In 1980 the population of Burlington was 37,727. Between 1970 and 1980 the population of Burlington declined from 38,633 to 37,727 or 2.3 percent. Adjacent to Burlington are two cities and two towns which had populations of over 5,000 in 1980. These are: South Burlington, population 10,694; Winooski, population 6,319; Colchester, population 12,624; and Essex, population 14,418.

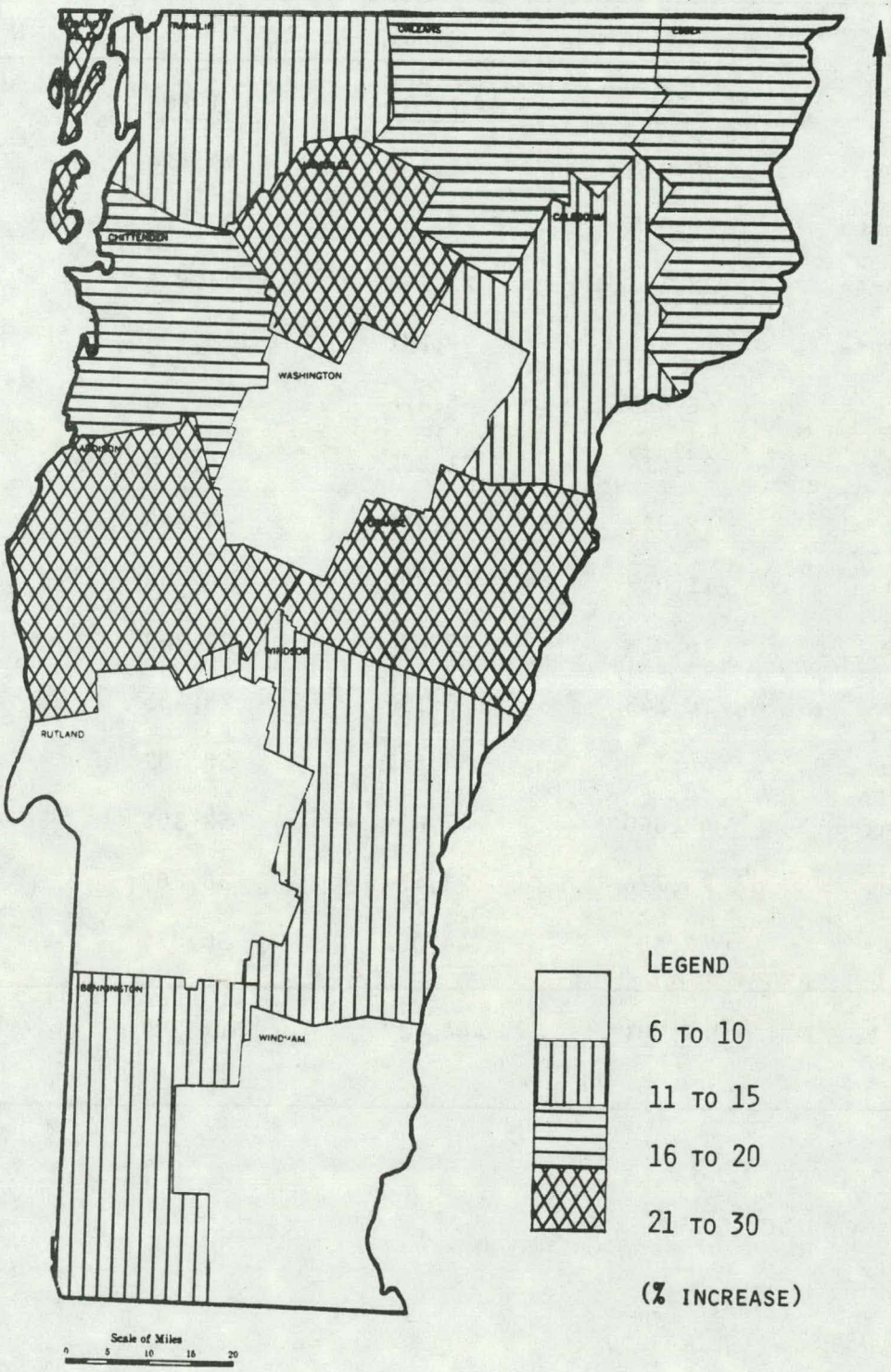


FIGURE 3-4. POPULATION INCREASE BY COUNTY: VERMONT (1970-1980)[34]

TABLE 3.1 HISTORICAL AND PROJECTED POPULATION FOR COUNTIES IN THE STATE OF VERMONT (1960-1990)[41]

County	Population			
	1960	1970	1980	1990
Addison	20,076	24,266	29,420	32,766
Bennington	25,088	29,282	33,310	37,139
Caledonia	22,786	22,789	25,814	30,305
Chittenden	74,425	99,131	115,598	133,293
Essex	6,083	5,416	6,300	9,250
Franklin	29,474	31,282	34,800	38,782
Grand Isle	2,927	3,574	4,593	5,618
Lamoille	11,027	13,309	16,769	22,667
Orange	16,014	17,676	22,763	29,304
Orleans	20,143	20,153	23,455	27,489
Rutland	46,719	52,637	58,332	63,288
Washington	42,860	47,659	52,391	55,437
Windham	29,776	33,476	36,880	38,519
Windsor	42,483	44,082	50,874	53,533
State Total	389,881	444,732	511,299	575,400

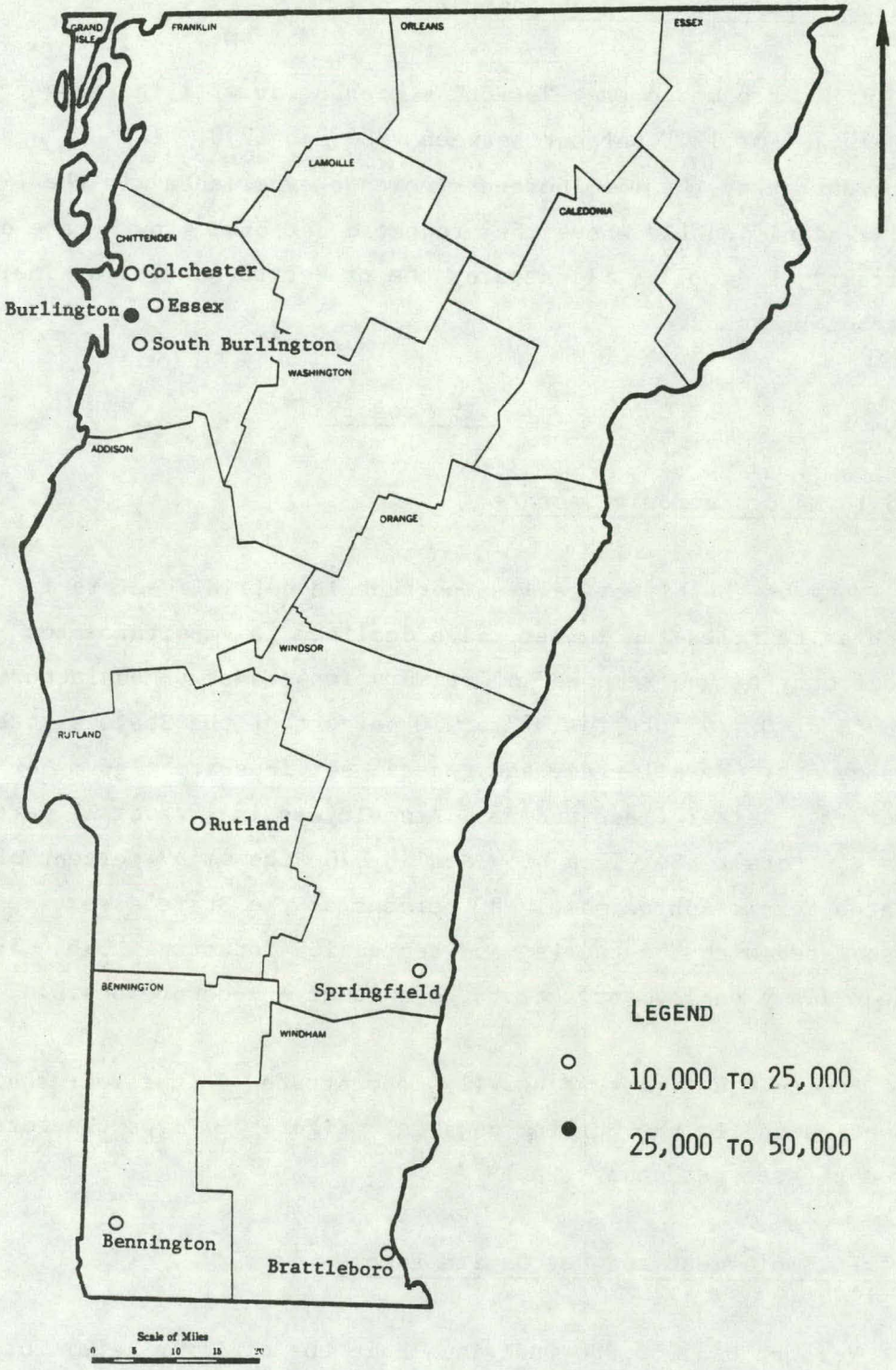


FIGURE 3-5. CITIES AND TOWNS WITH POPULATIONS OF 10,000 OR OVER: VERMONT (35)

3.4.3 Population Projections[19]

It is projected that Vermont's population will increase from 511,299 to 575,400 or 12.5 percent between 1980 and 1990. This is a slower rate of growth than the 15.1 percent increase experienced in the 1970's but still significantly above the projected national growth rate of 9.6 percent. Figure 3-6 illustrates the projected population increase for Vermont by county.

3.5 Economy[20]

3.5.1 Major Economic Sectors

Many of the historically important industrial sectors in Vermont, such as textiles and lumber, have declined in importance but manufacturing has remained of primary importance. Manufacturing provided 40,729 jobs in 1977 or 30 percent of the State's total employment. Retail trade and general services are also major economic sectors. Retail trade had 28,732 employees in 1977 or 21 percent of the State's total. Services provided 38,940 jobs or 29 percent of the State's total. Approximately 20 percent of the State's service jobs are associated with the tourist and recreation industry. Table 3-2 outlines the primary employment sectors on a county-by-county basis.

Economic activity is heavily concentrated in the four southern counties and in the Burlington area. Figure 3-7 maps the total number of employees per county in 1977.

3.5.2 Employment and Per Capita Income[21]

Vermont had 236,000 individuals in the civilian labor force in 1978 of which 134,000 were male and 102,000 were female. This yields a labor force participation rate of 66.7 percent or 3.5 percentage points below

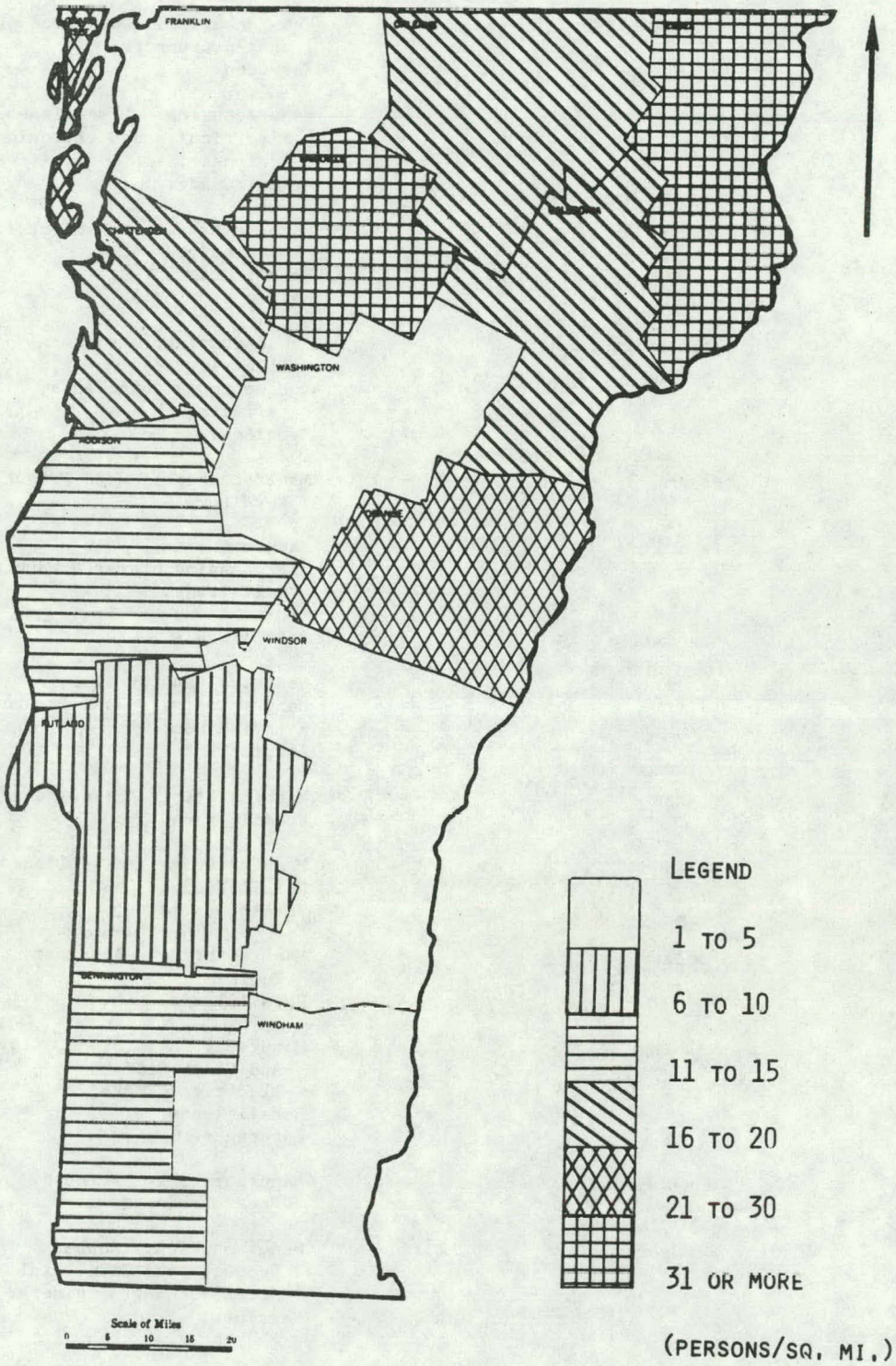


FIGURE 3-6. PROJECTED POPULATION INCREASE BY COUNTY: VERMONT (1980-1990)[36]

TABLE 3-2. MAJOR EMPLOYMENT SECTORS IN VERMONT BY COUNTY[42]

Counties	Major Economic Sector
Addison	Manufacturing: Wood Products and Instruments; Services.
Bennington	Manufacturing: Miscellaneous, Electrical and Electronic Equipment; Retail Trade.
Caledonia	Manufacturing: Non-Electrical Machinery; Retail Trade; Services.
Chittenden	Manufacturing: Ordnance; Electrical Equipment, Electronic Components; Retail Trade; Services.
Essex	Manufacturing: Wood Products, Furniture.
Franklin	Manufacturing: Food Processing, Paper Products; Retail Trade.
Grand Isle	Retail Trade.
Lamoille	Contract Construction; Manufacturing: Wood Products; Retail Trade; Tourism.
Orange	Manufacturing: Miscellaneous Retail Trade.
Orleans	Manufacturing: Miscellaneous; Retail Trade; Health Services.
Rutland	Manufacturing: Aircraft Engines; Retail Trade.
Washington	Manufacturing: Stone, Clay and Glass Products Electrical Parts; Retail Trade; Insurance.
Windham	Manufacturing: Printing Paper Products.
Windsor	Manufacturing: Rubber Products and Industrial Metal Working Machinery; Services.

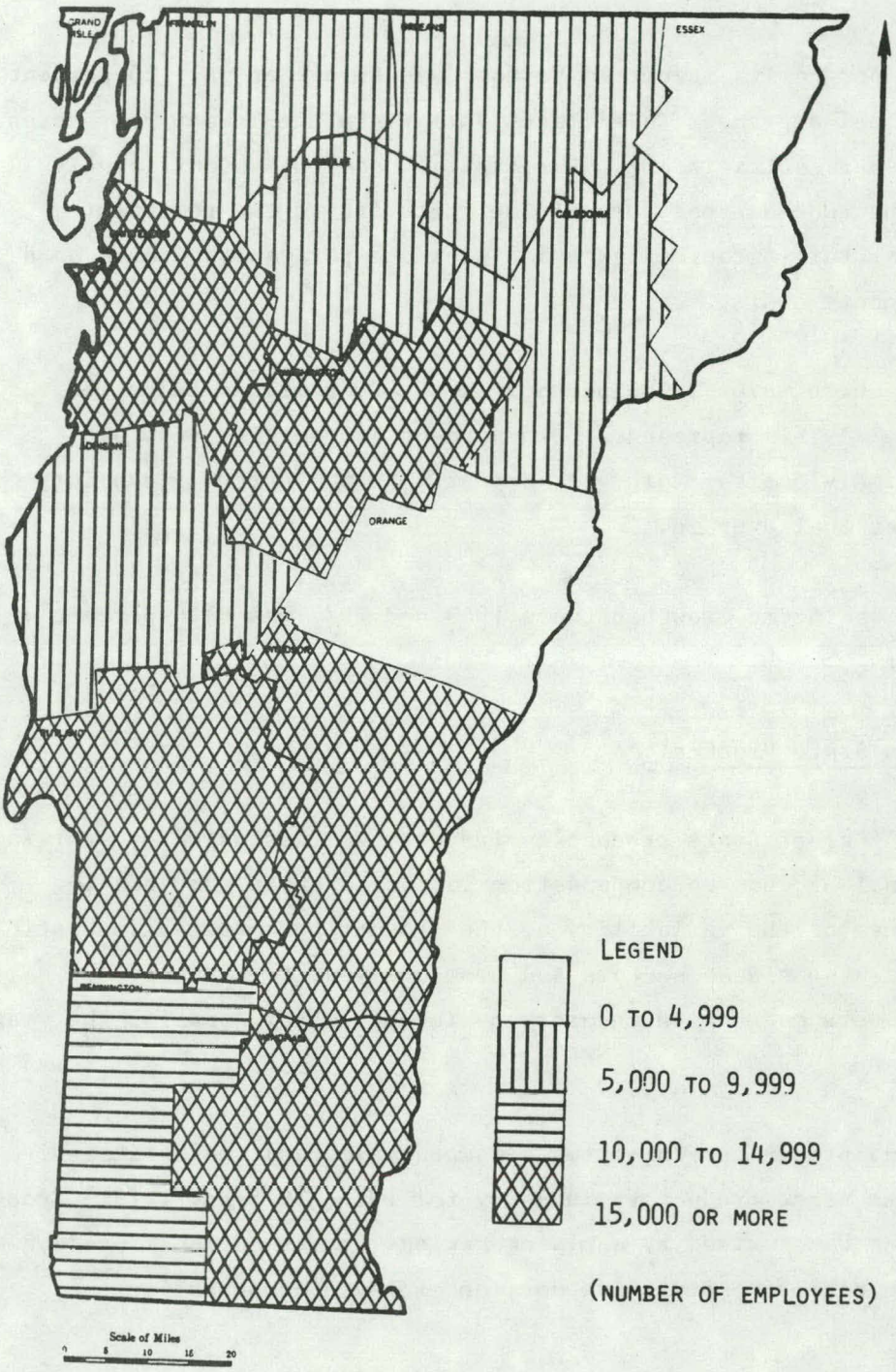


FIGURE 3-7. EMPLOYMENT BY COUNTY: VERMONT (1977)[37]

the national average. The female participation rate was 55.7 percent compared to a national average of 50 percent. The male participation rate was 78.4 percent in 1978 and was .5 percent above the national average.

In 1978 per capita income in Vermont was $6,541 or only 85 percent of the national average. This places Vermont in the lowest ten states in terms of per capita income. Per capita income was significantly greter in the southern portions of the state and in the northwest counties near Burlington. Figure 3-8 presents per capita income on a county-by-county basis.

In 1975 there were 63,000 persons or 13,000 families below the poverty level. This represents 13.5 percent of families and 10.8 percent of individuals. Both were approximately 2 percentage points above the national average.

Per capita income growth between 1969 and 1977 was 81.6 percent or 10.2 percent.

3.5.3 Gross State Product[22,23]

Vermont's gross state product by industry was estimated by applying gross national product to compensation ratios to state compensation data. Because of the variability of the product to compensation ratio among different business sectors and from one year to the next, projections were made on an industry by industry basis and for the years 1977, 1978 and 1979.

Table 3-3 presents both employee compensation and the estimated Vermont gross state product by industry for 1977, 1978 and 1979. Gross State product was derived by applying national gross national product to compensation ratios to statewide data on employee compensation by

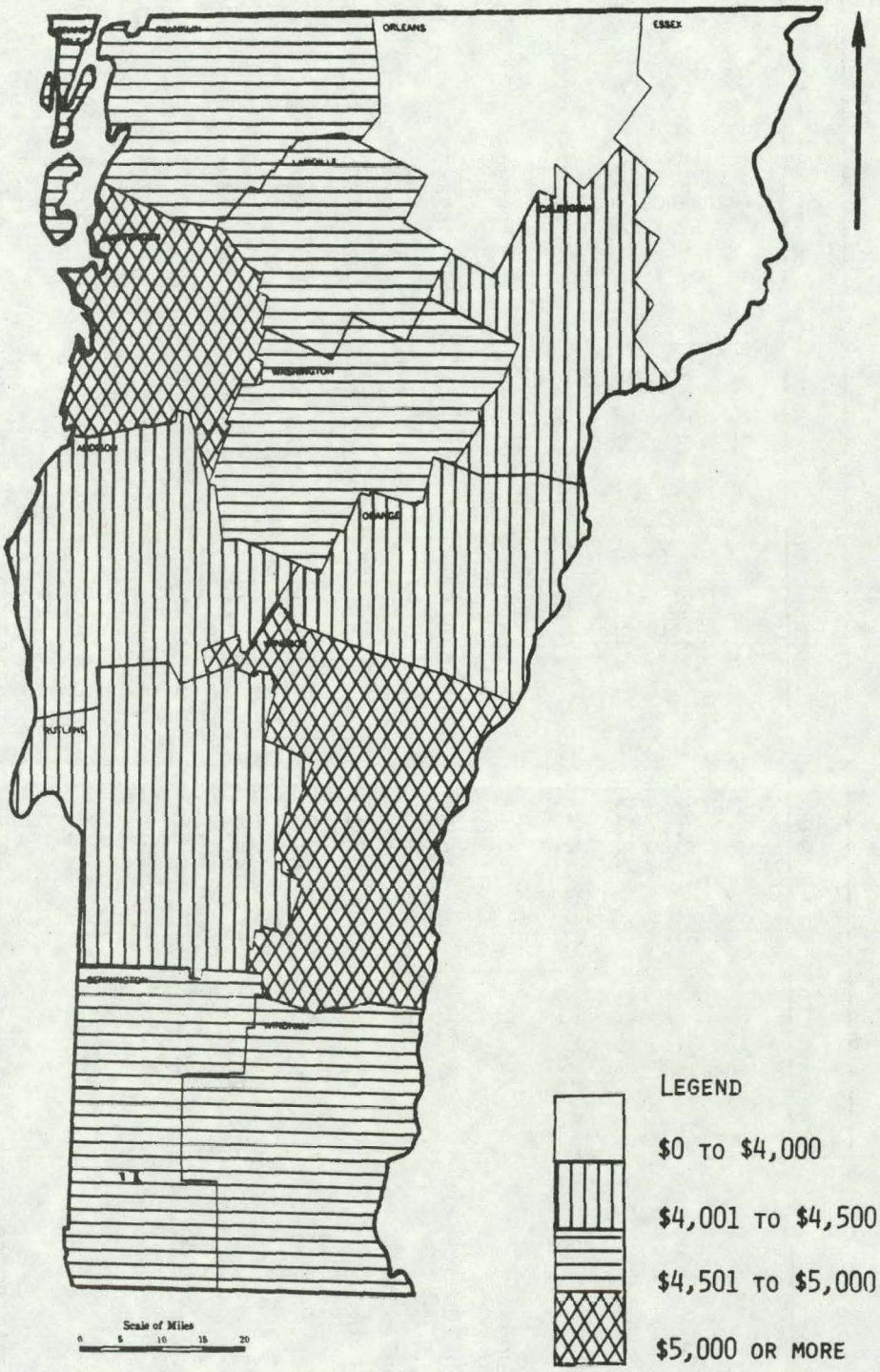


FIGURE 3-8. PER CAPITA INCOME BY COUNTY: VERMONT (1977)[38]

TABLE 3-3. EMPLOYEE COMPENSATION AND ESTIMATED GROSS STATE PRODUCT BY INDUSTRY FOR VERMONT[43]
(Millions of Dollars)

	1977		1978		1979	
Industry	Compensation	GSP	Compensation	GSP	Compensation	GSP
Agriculture	75	167.99	105.25	215.93	110	230.65
Agricultural Services	10	13.54	12.25	17.23	13.5	18.26
Mining	9.5	26.29	11	28.66	13	33.33
Construction	129	162.35	157.5	246.49	171.75	213.97
Non-Durable Goods	145.25	244.56	166.5	275.06	183.25	299.71
Durable Goods	437.25	616.30	529	776.04	626.75	865.67
Transportation and Public Utilities	139	267.10	158	302.33	179.5	331.41
Wholesale Trade	95	165.73	108.25	180.36	127	217.97
Retail Trade	225.5	365.20	254.75	374.13	286	430.72
Finance, Insurance and Real Estate	93.5	390.83	109	442.80	117.5	477.46
Services	407.75	490.20	453.75	539.19	503.25	600.08
Government and Government Enterprises	339	399.95	367.75	434.68	394	466.26
Total	2,105.25	3,310.04	2,433.0	3,832.94	2,725.5	4,185.49

industry. Vermont's gross state product is projected at 4.19 billion for 1979 or 0.173 percent of the gross national product of $2,413.9 billion.

Between 1977 and 1979, gross state product increased from $3.31 to $4.19 or by 26.4 percent. This growth rate was identical to the gross national product growth rate and Vermont's contribution to gross natinal product remained constant at .173 percent.

During the same three year period, personal income in Vermont rose from $2.814 billion to $3.622 or by 28.7 percent. This is slightly greater than the national average for this period. Figure 3-9 represents percent of gross national product by industry, for the United States and Vermont for 1979.

3.5.4 Agriculture[24, 25]

In 1978 there were 7,304 farms in Vermont with a total of 1,756,082 acres. This accounts for 28 percent of the land area in the State but is limited by the State's rough terrain and forests. The average farm size in 1978 was 240 acres and is the largest average farm size in New England. The average farm size is 42 acres less than in 1974. Total agricultural sales were $275 million in 1978 and averaged $37,616 per farm.

3.6 Schools, Hospitals, and Federal Laboratories

Vermont's schools, hospitals, and Federal laboratories are potential low-level radioactive waste generators. This section identifies the number of NRC licensees among those institutions and provides background information.

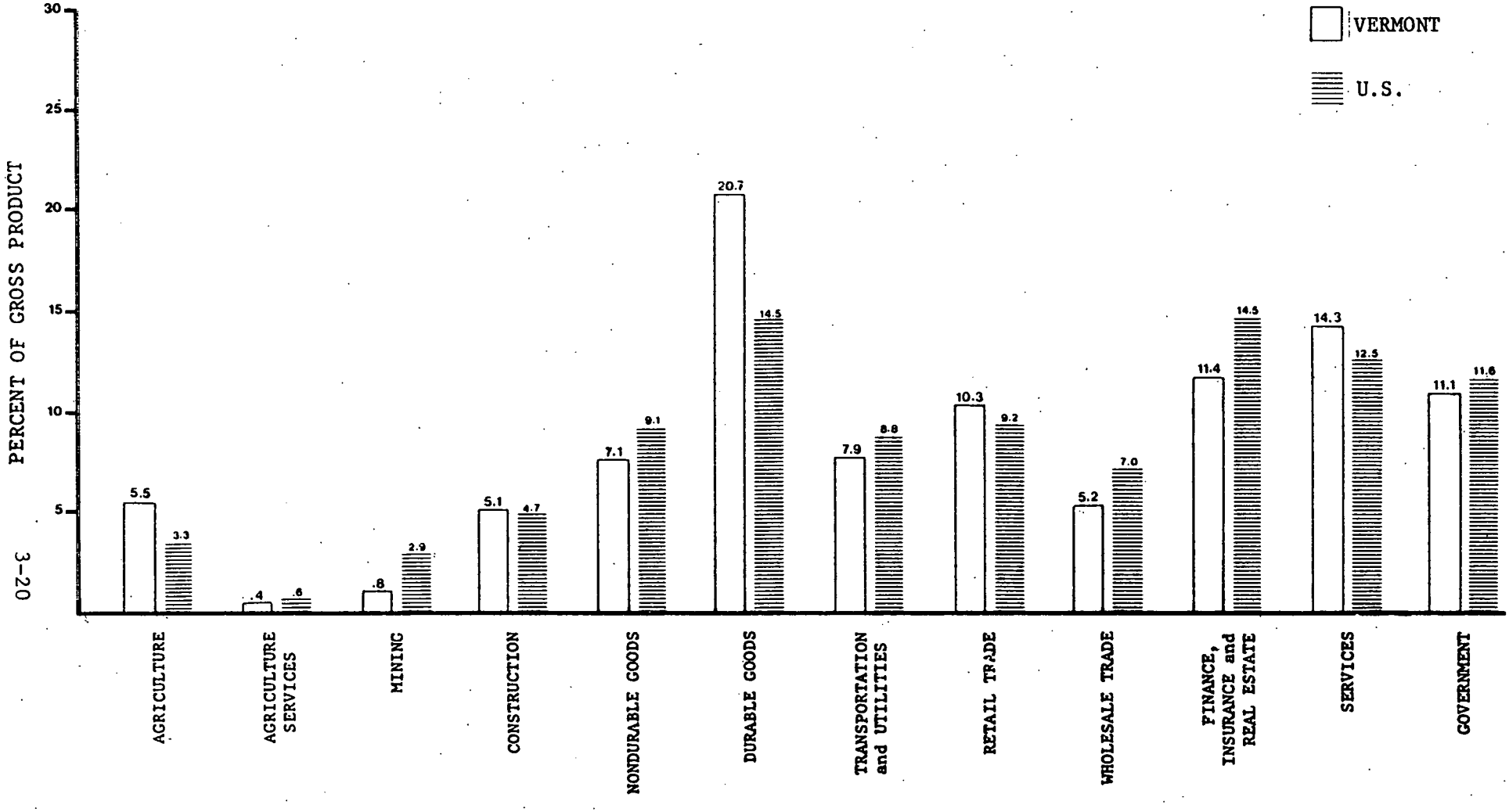


FIGURE 3-9. PERCENT OF GROSS PRODUCT BY INDUSTRY FOR 1979: UNITED STATES AND VERMONT[39]

3.6.1 Schools

Four colleges and universities have Nuclear Regulatory Commission licenses to use radioactive materials. Two are located in Chittendon County, while Addison and Washington Counties each have one.

In the fall of 1980, there were 105,306 students enrolled in public and private elementary and secondary schools in Vermont.[26] (See Table B-1 for enrollments by county.) In addition, there were 360,628 students enrolled in public and private schools of higher education[27] (See Table B-1 for enrollments by county), for a total of 1,359,034 students of all types enrolled throughout the State. Table 3-4 presents enrollments per 1,000 population by county and by type of school.

3.6.2 Hospitals[28]

Twenty hospitals provide health care services in Vermont. (See Table B-2 for a list of hospital services and number of beds by county.) Twelve of the twenty hospitals have Nuclear Regulatory Commission licenses to use radioactive materials.

3.6.3 Federal Laboratories[29]

One of the two Federal laboratories in Vermont, the Veterans Administration Medical and Regional Office Center at White River Junction, has a Nuclear Regulatory Commission license. The second Federal laboratory is a sugar maple research facility operated by the U.S. Department of Agriculture.

TABLE 3-4. ENROLLMENT PER 1,000 PERSONS[a]

County	Elementary and Secondary Students per 1,000 Persons	Higher Education Students per 1,000 Persons	Total Students per 1,000 Persons
Addison	197	66	262
Bennington	200	32	232
Caledonia	202	43	245
Chittenden	204	13	217
Essex	165	0	165
Franklin	194	0	194
Grand Isle	146	0	146
Lamoille	192	85	277
Orange	209	35	244
Orleans	203	0	203
Rutland	177	47	223
Washington	196	94	290
Windham	188	27	215
Windsor	199	8	206
State Total	188	60	248

a. The student/population ratios were derived from Tables B-1, which details school enrollment by county and by type, and from Table 3-1, which provides 1980 population by county.

b. Numbers do not add due to rounding.

3.7 Land Use[30, 31]

Eight urban areas with populations ranging from 10,180 to 37,727 are located in Vermont, as shown in Figure 3-10. Four of these are clustered in Chittenden County, near Lake Champlain. The other four are located in the southern half of the State. See section 3.4 for a disscussion of population.

Farms cover about a fourth of Vermont's land area. Forests cover three-fourths of Vermont and much of the farm-land is covered by trees. Paper and paper products are manufactured in the State from these trees. Mining is also important in many counties in Vermont. The largest granite quarries in the United States are located near Barre.

Vermont has 40 State Parks and 34 State Forests covering 141,000 acres. The Green Mountain National Forest occupies 262,000 acres, and the Missisquoi National Wildlife Refuge in Grand Island County accounts for another 5,651 acres.

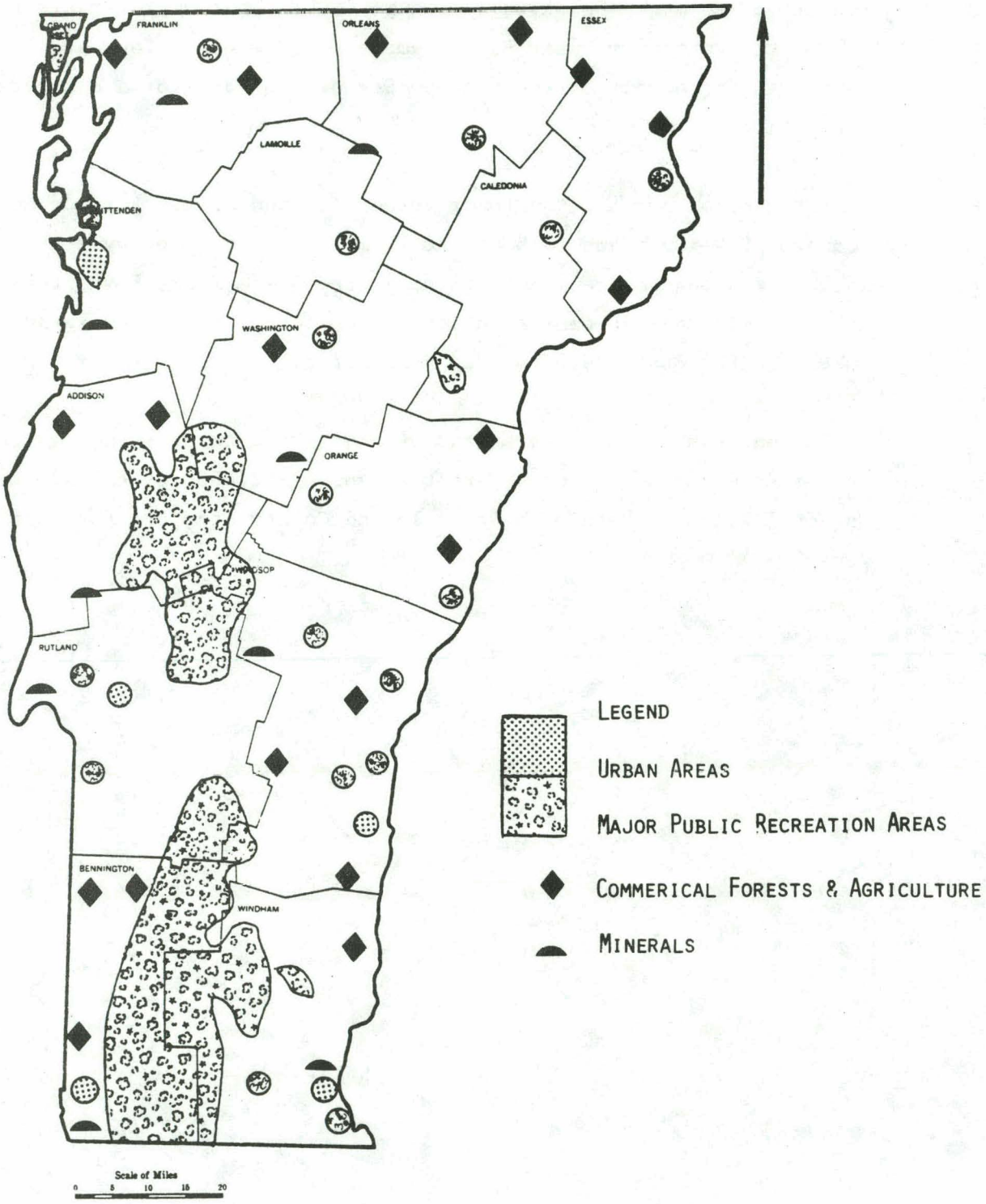


FIGURE 3-10. LAND USE: VERMONT[40]

REFERENCES

Text

1. National Oceanic and Atmospheric Administration, Environmental Data Service, National Climatic Center, Climatography of the United States Number 60-43, Climate of Vermont, Asheville, N.C.: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1976

2. (See Reference 1.)

3. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing: Vermont, Preliminary Reports, PHC80-P-8, January 1981.

4. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population, Volume 1, Part 47-8, Characteristics of the Population: Vermont, Washington, D.C.: U.S. Government Printing Office, 1973.

5. U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1979, Washington, D.C.: U.S. Government Printing Office, 1979.

6. Linda Kehn, private communication, U.S. Department of Commerce, Bureau of the Census, Division of Population, March 3, 1981.

7. U.S. Department of Health, Education and Welfare, National Center for Health Statistics, Vital Statistics of the United States, Volume 1, Natality, Washington, D.C.: U.S. Government Printing Office, 1972-1978.

8. U.S. Department of Health and Human Resources, National Center for Health Statistics, Vital Statistics of the United States, Volume 1, Natality, Washington, D.C.: U.S. Government Printing Office, 1979.

9. Judy Thorne, private communication, U.S. Department of Health and Human Services, National Center for Health Statistics, Division of Vital Statistics, March 20, 1981.

10. (See Reference 9.)

REFERENCES (continued)

11. U.S. Department of Health, Education and Welfare, Vital Statistics of the United States, Volume 2, Mortality, Washington, D.C.: U.S. Government Printing Office, 1972-1978.

12. U.S. Department of Health and Human Services, Vital Statistics of the United States, Volume 2, Mortality, Washington, D.C.: U.S. Government Printing Office, 1979.

13. (See References 7,8,9.)

14. (See References 10,11,12.)

15. (See References 7,8,9.)

16. (See References 10,11,12.)

17. U.S. Department of Commerce, Bureau of the Census, Annual Estimates of the Population of States: July 1, 1970 to 1979, with Components of Changes, 1970 to 1979, Current Population Reports, Population Estimates and Projections, Series P-25, No. 876, February 1980.

18. A Standard Metropolitan Statistical Area is an area designated by the Office of Management and Budget, consisting of a county or group of counties containing at least one city (or "twin cities") of 50,000 or more population plus any adjacent counties which are metropolitan in character and economically and socially integrated with the central county or counties.

19. State of Vermont, Planning Office, The People Book, Montpelier, VT, February, 1980.

20. U.S. Department of Commerce, Bureau of the Census, County Business Patterns, 1977, Vermont, CBP-77-46, April 1979.

21. (See Reference 5.)

22. Bureau of Economic Analysis, Regional Economic Information System Computer Output, "Major Sources of Personal Income in the United States-Table A-2," Washington, D.C.: Department of Commerce, April 1981.

23. Bureau of Economic Analysis, National Income Accounts by Industry Computer Output, "Gross National Product by Industry Table 6-1" Washington, D.C.: Department of Commerce.

24. U.S. Department of Commerce, Bureau of the Census, 1978 Census of Agriculture Preliminary Report, Vermont, AC 78-P-50-000, May 1980, pp. 1-8.

REFERENCES (continued)

25. U.S. Department of Commerce, Bureau of the Census, 1976 Census of Agriculture, 1978.

26. State of Vermont, Department of Education, Statistics and Information, Vermont School Enrollment, 1980-1981, Montpelier, Vt., February 25, 1981.

27. State of Vermont, Department of Education, HEGIS Fall Enrollment Survey, 1980, 1980

28. American Hospital Association, Guide to the Health Care Field, Chicago: American Hospital Association, 1980.

29. Subcommittee on Agriculture and Related Agencies, Committee on Appropriations, House of Representatives, 95th Congress, Second Session, Part 2, Investigative Report on "Utilization of Federal Laboratories," Washington, D.C.: U.S. Government Printing Office, 1978.

30. The World Book Encyclopedia, Volume 20, Chicago: World Book - Childcraft International, Inc., 1979.

31. State of Vermont, Agency of Transportation and Agency of Development and Community Affairs, Vermont Official State Map, 1978-1979, 1978.

FIGURES

32. Hammond Ambassador World Atlas, Maplewood, N.J.: 1977.

33. (See Reference 3.)

34. (See Reference 3.)

35. (See Reference 3.)

36. (See Reference 19.)

37. (See Reference 20.)

38. (See Reference 19.)

39. (See References 22 and 23.)

40. (See Reference 30.)

TABLES

41. (See References 3, 4 and 18.)

42. (See Reference 20.)

43. (See References 22 and 23.)

4. GOVERNMENT STRUCTURE

This section presents an overview of Vermont State government and identifies the government institutions and agencies with statutory authority or informal reponsibilities affecting the generation, handling, and disposal of radioactive waste within the State. Federal initiatives pending and relevant local laws are also discussed.

4.1 Major Political Parties[1,2,3]

Republicans hold 16 seats and Democrats 14 seats in the Vermont Senate which consists of 30 senators. In the lower legislative body, totalling 150, Republicans hold 86 and Democrats 64 seats. One of Vermont's Senators and its Congressional Representative belong to the Republican Party; one Senator belongs to the Democratic Party.

4.2 Congressional Delegation[4]

Vermont's two U.S. Senators are Robert T. Stafford and Patrick J. Leahy. Senator Stafford serves on the Energy and Natural Resources Committee which has jurisdiction over legislation relating to nuclear energy and radioactive waste disposal issues as well as Labor and Human Resources and Veterans Affairs Committees. Senator Leahy serves on the Agricultural, Nutrition, and Forestry; Appropriations; Intelligence; and Judiciary Committees.

Vermont's Representative is James M. Jeffords. Congressman Jeffords serves on the Agriculture Committee, the Education and Labor Committee, and the Select Committee on Aging. More information on Vermont's Congressional delegation can be found in Table 4-1.

Table 4-1. Vermont Members of the United States Congress (17)

State Delegate	District	Party Affiliation	Beginning of Present Service	Committee Assignments
Senate:				
Robert T. Stafford	Statewide	Republican	1971	Environment and Public Works Committee - Transportation - Environmental Pollution - Regional and Community Development Labor and Human Resources - Labor - Education Arts and Humanities - Handicapped Veterans Affairs Committee
Patrick J. Leahy	Statewide	Democrat	1975	Agriculture, Nutrition and Forestry Committee - Nutrition - Agricultural Production, Marketing, and Stablization of Prices - Rural Development, Oversight and Investigations Appropriations Committee - Foreign Operations - HUD Independent Agencies - Interior and Related Agencies Intelligence Committee - Budget Authorization - Intelligence and Rights of Americans Judiciary Committee - Regulatory Reform - Constitution - Security and Terrorism
House of Representatives				
James M. Jeffords	Statewide	Republican	1979	Agriculture Committee - Conservation Credit and Rural Development - Livestock, Dairy and Poultry Education and Labor Committee - Elementary, Secondary and Vocational Education - Employment Opportunities Select Committee on Aging

Congressional interest in radioactive waste issues has continued in the 97th Congress with ten house bills and two Senate bills pending at the committee level. Table 4-2 summarizes the objectives and status of this legislation and includes a summary of the Vermont delegation's potential ties to the legislation.

The Vermont delegation has tended to place a greater emphasis on high-level than on low-level radioactive waste. For example, Senator Leahy has expressed concern over a Federal study of possible high-level waste sites that included locations in Vermont. These concerns included sitings in rural areas, high costs of such a site, and safety aspects.(5) Congressman Jeffords introduced legislation in 1979 to regulate the disposal of nuclear waste resulting from mining and energy production and co-signed a letter critical of U.S. Department of Transportation for not allowing sufficient State and local input into regulations governing the transportation of radioactive material. The Congressman further supports a strong State role in any solution to nuclear waste problems.(6)

4.3 State Government

4.3.1 Executive Department(7)

The executive department, headed by the Governor, includes four other elected officials: the Lieutenant Governor, Secretary of State, Treasurer, and Attorney General. It is supported by the State departments and numerous related agencies, boards, and commissions.

Governor. The governor of the State of Vermont is Richard A. Snelling, Republican. His term expires in January 1983.

TABLE 4-2. SUMMARY OF LEGISLATION RELATING TO RADIOACTIVE WASTE INTRODUCED IN THE 97TH CONGRESS[18]

Bill Number	Title of Legislation	Description of Legislation	Sponsoring Member	Committee Jurisdiction	Legislative Status
HR 29	A Bill to Require a Study of the Effects of Past Ocean Dumping of Radioactive Waste	Requires the Dept. of Commerce to conduct a study on the effects of radioactive waste disposal in ocean waters from 1946-1970 on marine and human life. Requires that the sites be located and surveyed.	Anderson (CA)	1) Merchant Marine and Fisheries Subcommittee on Oceanography 2) Science and Technology Subcommittee on Agricultural Research and Environment	Referred to committees-no action. Received favorable comment from Dept of Commerce.
HR 751	Nuclear Energy Reappraisal Act of 1981	Requires the blocking of new licenses and the termination of renewal licenses for nuclear power plants pending a 5-year study to OTA. Study is to include safety and environmental hazards and waste disposal problems.	Fish (NY)	1) Foreign Affairs Subcommittee on International Security and Subcommittee on International Economic Policy and Trade 2) Interior and Insular Affairs Subcommittee on Energy and Environment 3) Energy and Commerce Subcommittee on Energy Conservation and Power	Referred to committees-no action.
HR 1106	Radioactive Waste Management Act of 1981	Requires the Secretary of Energy to notify any State of any investigation to construct a radioactive waste storage site and allow the State to prevent siting by a State referendum or action by the State Legislature.	Hinson (MS)	1) Energy and Commerce Subcommittee on Energy Conservation and Power 2) Interior and Insular Affairs Subcommittee on Energy and Environment	Referred to committees-no action.
HR 1412	New Jersey Radium Pollution Control Act of 1981	Authorizes DOE to determine sites in NJ where radium pollution has occurred. Remedial action is to be undertaken to limit health hazards of identified sites.	Minish (NJ)	1) Interior and Insular Affairs Subcommittee on Energy and Environment	Referred to committees-no action.

TABLE 4-2. SUMMARY OF LEGISLATION RELATING TO RADIOACTIVE WASTE INTRODUCED IN THE 97TH CONGRESS (continued)

Bill Number	Title of Legislation	Description of Legislation	Sponsoring Member	Committee Jurisdiction	Legislative Status
HR 1720	A Bill to Require a Task Force to Identify Ocean Sites and Nature of Radioactive Waste Dumped in the Ocean	Establishes an Interagency Task Force to prepare an inventory of ocean sites at which radioactive waste has been dumped, assess adverse effects, and develop a plan for monitoring such sites.	Hughes (NJ)	1) Merchant Marine and Fisheries Subcommittee on Oceanography 2) Science and Technology Subcommittee on Natural Resources and Subcommittee on Energy Research and Production	Referred to committees-no action. Received comment from GAO and NRC.
HR 1993	Radioactive Waste Research, Development and Policy Act	Provides for the development of a plan for disposal of radioactive waste. Requires construction of a demonstration dry storage facility, establishment of Federal waste policy, and development of a disposal siting study.	Lundine (NY)	1) Energy and Commerce Subcommittee on Energy Conservation and Power and Subcommittee on Energy Research and Production 2) Interior and Insular Affairs Subcommittee on Energy and Environment	Referred to committees-no action.
HR 1909	Nuclear Waste Research, Development and Demonstration Act of 1981	Accelerates DOE research, development, and technology demonstration of radioactive waste disposal. Includes the establishment of a high-level demonstration storage site.	Goldwater (CA)	1) Science and Technology Subcommittee on Energy Research and Production	Hearing held by full committee Feb. 26, 1981
HR 2800	Nuclear Reactor Moratorium and Nuclear Waste Prohibition Act	Prohibits NRC from issuing new or renewal licenses for power reactors until an OTA study is completed. Prohibits any nuclear disposal site near densely populated areas.	Oaker (OH)	1) Energy and Commerce Subcommittee on Energy Conservation and Power 2) Interior and Insular Affairs Subcommittee on Energy and Environment	Referred to committees-no action.

TABLE 4-2. SUMMARY OF LEGISLATION RELATING TO RADIOACTIVE WASTE INTRODUCED IN THE 97TH CONGRESS (continued)

Bill Number	Title of Legislation	Description of Legislation	Sponsoring Member	Committee Jurisdiction	Legislative Status
HR 2840	Nuclear Waste Policy Act	Establishes a program of Federal storage of fuel from power plants including a Federal interim storage and disposal facility	Huckaby (LA)	1) Interior and Insular Affairs Subcommittee on Energy and Environment 2) Energy and Commerce Subcommittee on Energy Conservation and Power	Referred to committee-no action.
HR 2881	Nuclear Waste Management Policy Act	Establishes permanent repositories for transuranic and high-level waste and fuel.	Derrick (SC)	1) Energy and Commerce Subcommittee on Energy Conservation and Power 2) Interior and Insular Affairs Subcommittee on Energy and Environment 3) Science and Technology Subcommittee on Natural Resources, Agricultural Research and Environment	Referred to committee-no action.
Senate 95	Nuclear Waste Management Reorganization Act of 1981	Reorganizes Federal gov. to strengthen programs and policy with respect to Nuclear Waste Management Planning Council.	Percy (IL)	Government Affairs Subcommittee on Energy, Nuclear Proliferation and Government Processes	Referred to committee-no action.
Senate 637	Nuclear Waste Policy Act	Establishes a program for Federal storage of spent nuclear fuel and develops a program to address nuclear waste disposal issues.	Johnson (LA)	Energy and Natural Resources Committee	Referred to committee no action.

Lieutenant Governor. The Lieutenant Governor is Madelaine M. Kunin, Democrat. She serves as president of the State Senate. She has voting privileges and may participate in debates when the Senate is in full session. Elected separately from the Governor, the Lieutenant Governor succeeds the Governor upon his death. Her term runs until January 1983.

Secretary of State. The Secretary of State is responsible for a variety of governmental activities. James H. Douglas, Republican, whose term ends in January 1983, is currently Secretary of State.

Treasurer. The State Treasurer is custodian of and responsible for all State funds. He receives the cash receipts of the State from its various departments and institutions. Elected to a two-year term in 1980, the current Treasurer is Emory H. Hebard, Republican.

Attorney General. The Attorney General supervises all legal matters on which the State is an interested party with the exception of issues over which prosecuting officials have responsibility. He provides legal counsel to the General Assembly, legislative committees, and State officials. John J. Easton, Republican, serves until January 1983.

State Departments. Several of the State departments have direct responsibility in low-level radioactive waste management.

Department of Health, Division of Occupational and Radiological Health. The Division is the primary regulatory agency in the Vermont State government for controlling sources of radiation and low-level radioactive waste. It also provides support to the Nuclear Regulatory Commission which licenses and inspects all facilities which use radioactive material. A major part of the Division activities are involved in the monitoring of radioactive emissions from Vermont Yankee. Any shipper of low-level radioactive waste must provide two weeks notice to the Division. The Division provided major technical support to the State Agency of Transportation in responding to recent U.S. DOT regulations on the transportation of hazardous materials (including low-level radioactive waste).

In cases relevant to low-level radioactive waste where inter-agency efforts are required, the Division plays the primary role in providing technical knowledge. Such cases include the Vermont Emergency Response Plan for Radioactive Incidents and recent discussions on the development of a New England compact for low-level radioactive waste disposal.(8)

Agency of Transportation. The Agency has adopted regulations identical to U.S. Department of Transportation's (49 CFR Parts 170-199 and 390-397) governing the shipment of low-level radioactive waste and other hazardous materials. A bill now before the Vermont legislature would give the Agency the power to set routes for these shipments. The Agency also has specific responsibilities for emergency response to transportation incidents involving low-level radioactive waste.(9)

Agency of Environmental Conservation. The Agency's formal role in low-level radioactive waste is limited to the issuance of permits to Vermont Yankee for discharges into the Connecticut River. The primary concern of these discharges is thermal and chemical pollution; however, a small quantity of radioactivity is also discharged. Otherwise the Agency is excluded by statute from responsibility for low-level radioactive waste. On an informal basis the Agency has participated in recent discussions concerning a New England compact for low-level radioactive waste disposal.(10)

Attorney General. The Attorney-General by virtue of being a party to an agreement with Vermont Yankee may have a role in low-level radioactive waste management. This agreement also signed by four interest groups seeks to limit radioactive emissions from Vermont Yankee. Although the agreement potentially affects low-level radioactive waste, it has not been used to that effect.(11)

Department of Public Service. As Vermont's utility regulatory agency the Department has regulatory authority over Vermont Yankee. Through an informal agreement with the Division of Occupational and Radiological Health, the Department is concerned with onsite low-level

radioactive waste activities while the Division regulates offsite activities. In practice the Department monitors onsite operations and has helped to coordinate some activities affecting low-level radioactive waste. The Department tries to maintain a dialogue with the power plant and to use persuasion rather than its regulatory powers.(12)

Vermont State Nuclear Advisory Panel. The Advisory Panel is a multi-agency organization originally created by executive order of the Governor and confirmed by statute in 1978. Its purposes are to educate State agencies, the legislature, and the public on matters relating to nuclear power. It has created a subcommittee to deal with high-level waste. It has not to date been concerned with low-level radioactive waste. Should low-level waste become a major concern, it was considered likely that the Advisory Panel would establish a subcommittee to deal with the subject.(13)

4.3.2 Legislative Department

The Legislative power in the State of Vermont is vested in the Senate and House of Representatives. Together they form the State's General Assembly. The Senate has 30 members elected biennially from 13 districts. The House of Representatives has 150 members. They are also elected biennially from 72 districts. (See Appendix C for a list of current members of the Vermont General Assembly.) Figures 4-1 and 4-2 show the districts for the Vermont Senate and House, respectively.

The General Assembly has taken an active interest in nuclear power and high-level waste. State laws have been enacted that require legislative approval for new nuclear power plants (1975) and facilities for waste storage, disposal, or reprocessing (1977). The latter law was amended in 1980 to include low-level radioactive waste. In 1980 the legislature banned the mining or processing of uranium and thorium ores in the State. Additional bills have been proposed, though not enacted, that (1) would exclude the State from financial responsibility for

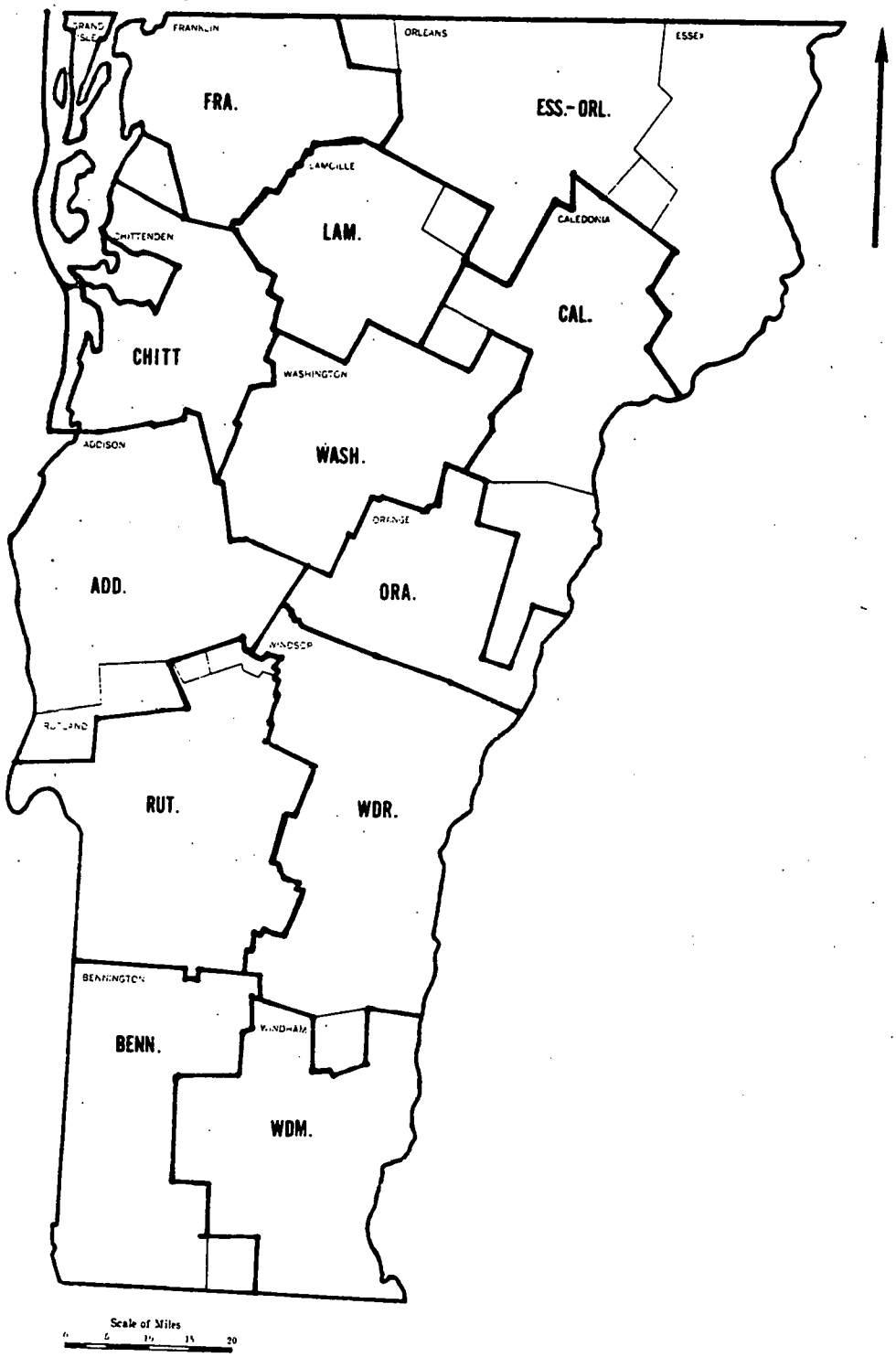


FIGURE 4-1. SENATORIAL DISTRICTS: VERMONT[19]

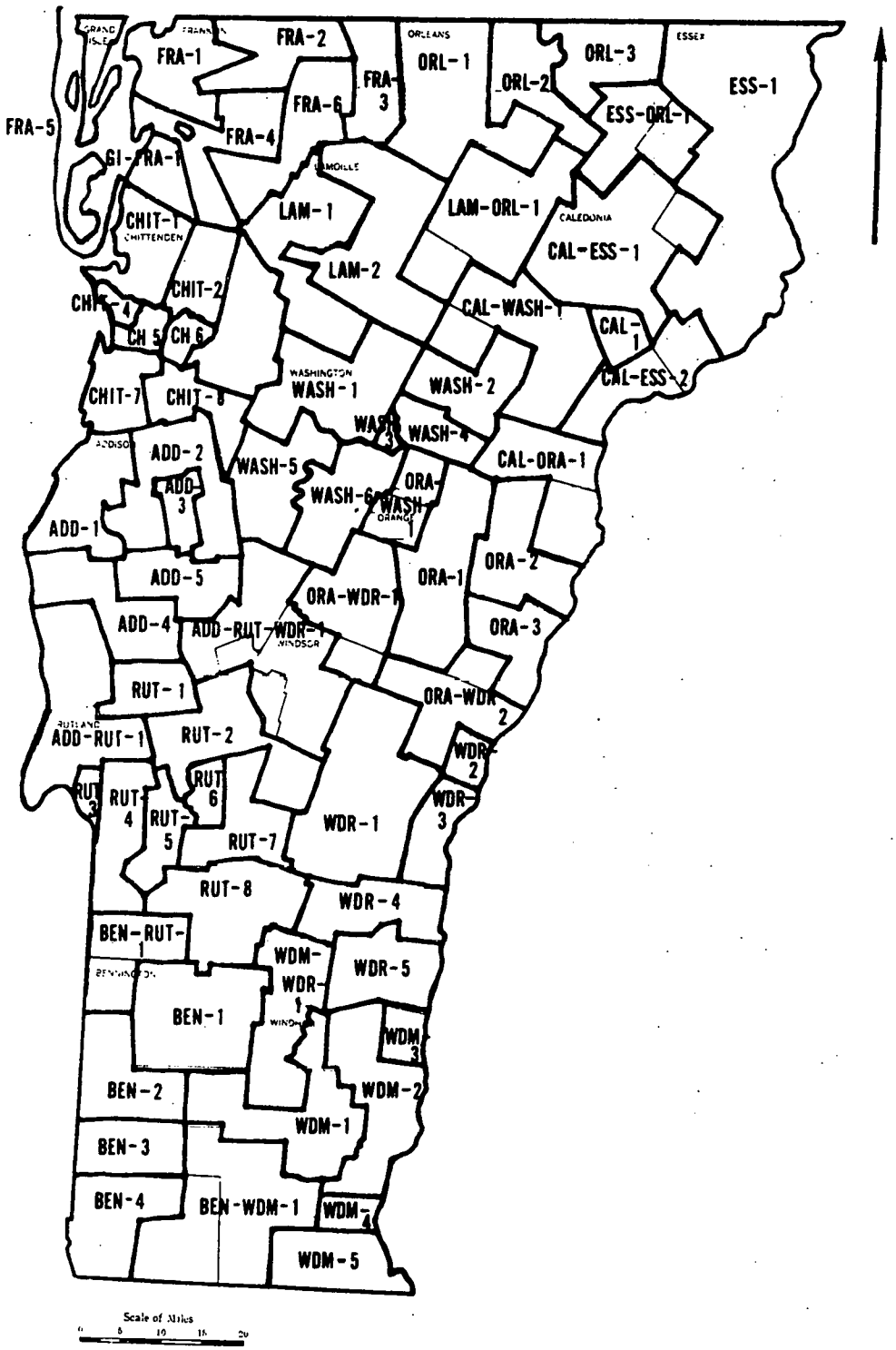


FIGURE 4-2. REPRESENTATIVE DISTRICTS: VERMONT[20]

decontaminating and decommissioning nuclear facilities by creating a perpetual core trust fund and (2) to expand the powers of the Vermont State Nuclear Advisory Panel and transform it into a nuclear regulatory review board for ionizing radiation. The committees that are assigned responsibility for low-level waste or that might have a role in legislation dealing with low-level waste include the Committee on Natural Resources, the Energy Committee, the Institutions Committees (if a State-operated facility were involved), and the Appropriations Committee in the House of Representatives. In the Senate these would be the Committee on Energy and Natural Resources, the Institutions Committee, and the Appropriations Committee.(14)

4.3.3 Judicial Branch

Judicial power in Vermont is vested in a Supreme Court and a Superior Court; lower courts may be established by the General Assembly.

4.4 Statutory Regulations

Enabling legislation for the Division of Occupational and Radiological Health and other statutues relevant to low-level radioactive waste management in Vermont are found in Appendix D.

4.5 Federal Activities on Low-Level Radioactive Waste Management in Vermont

The Federal government is considering Vermont as a possible site for the permanent storage of high-level radioactive wastes. Vermont is one of 16 States under consideration and will be studied as to its capacity to store nuclear wastes in granite formations.

As a non-agreement State, the Federal Nuclear Regulatory Commission licenses all users of radioactive materials in Vermont. The Nuclear Regulatory Commission also has the power to inspect its licensees.

4.6 Local Activities Affecting Low-Level Radioactive Waste Management in Vermont

In 1977, after substantial effort by environmental organizations, about three dozen Vermont towns passed local laws banning the shipment of radioactive waste or the development of radioactive waste disposal sites within their boundaries. These laws, however, are preempted by State law and have no legal authority. Nevertheless, the State has tried to accommodate local sentiment whenever possible, especially when routing shipments of radioactive waste.[15,16]

REFERENCES

Text

1. Private communication, Office of the Clerk of the Vermont House of Representatives, May 24, 1981.

2. Private communication, Office of the Vermont Senate, May 24, 1981.

3. Joint Committee on Printing, Congressional Directory 1981, 97 Congress, Washington, D.C.: U.S. Printing Office.

4. (See Reference 2.)

5. Bruce Simons, "Leahy Questions Nuke Waste Plan Over Safety, Cost," Brattleboro Reformer, October 14, 1980.

6. Margaret Downs, private communication, Legislative Director for Congressman Jeffords.

7. Secretary of State, Civil Government State of Vermont, Montpelier, May 1981.

8. Raymond McCandless, private communications, Vermont Department of Health, April 13 and 18, 1981.

9. Robert Merchant, private communication, Vermont Agency of Transportation, April 13, 1981.

10. Larry Miller, private communication, Agency of Environmental Conservation, April 14, 1981.

11. Agreement between and among Vermont Yankee Nuclear Power Corporation, State of Vermont, et al.

12. Phil Paull, private communication, Department of Public Service, April 14, 1981.

13. (See Reference 12.)

14. Peter Bluhm, private communication, Legislature Counsel's Office, April 13, 1981.

15. (See Reference 8.)

16. (See Reference 9.)

Tables

17. (See Reference 3.)

18. House Legislative Office, computer printout, "Pending Legislation Relating to Radioactive Waste," Washington, D.C.: U.S. Capitol, May 8, 1980, pp. 1-25.

Figures

19. James A. Guest, Vermont Legislative Directory and State Manual, Montpelier, 1979-80.

20. (See Reference 19.)

5. INTEREST GROUPS CONCERNED WITH LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

A number of national, State, and local interest groups are concerned about the management of low-level radioactive waste. This section identifies some of these energy, environmental, and professional organizations and their particular areas of concern.

5.1 National Groups

National groups were contacted for two reasons, first, to assist in the development of a list of Vermont interest groups, and second, to assess some of the national concerns surrounding low-level radioactive waste management. Groups were identified through the use of the Encyclopedia of Associations[1] and through the Library of Congress' National Referral Service. The national groups contacted made referrals to other national as well as State and local groups with a potential interest in the low-level radioactive waste issue. Ultimately, 22 national groups were contacted (see Appendix E for a listing).

Most of the groups contacted were concerned with the issue of radioactive waste, particularly high-level waste. However, few had an official position on low-level radioactive waste management. Only two groups, the League of Women Voters of the United States and the American Public Health Association, supplied position papers. These papers are discussed below:

League of Women Voters of the United States.[2] The paper states the League's position on nuclear issues and is designed to supply guidance to State and local Leagues. The paper makes no specific mention of low-level radioactive waste management, although the management of high-level waste is discussed at some length. In a related activity, the League's Education Fund recently published a booklet entitled "A Nuclear Waste Primer" which offers the lay person an introduction to the

issues of nuclear waste.[3] It provides information on the issues and highlights key points of view, but does not advocate any one choice for managing nuclear waste. Low-level radioactive waste, its transportation and other management issues, are addressed in the primer as part of the nuclear waste question.

American Public Health Association.[4] The Association supplied a 1978 Position Paper entitled "The Public Health Impact of Energy Policy" which represents the current consensus of the Association's membership. The paper makes no mention of low-level radioactive waste management, but states that "waste disposal activities should either be operated by or very closely supervised by the Federal government."

5.2 State and Local Groups

The list of State and local groups identified as potentially having an interest in low-level radioactive waste management issues is included in Appendix E. The following discussion identifies the background, concerns, and activities of some of these organizations.

Central Vermont Safe Energy Coalition.[5] The Coalition, organized in 1977, is primarily concerned with the development of alternatives to nuclear power. It is in support of the phasing out of all nuclear power plants and, thus, centers most of its efforts on the operations of Vermont Yankee. Low-level radioactive waste has not been a major priority of the Coalition. It did, however, actively support the enactment of local laws prohibiting the transportation of radioactive materials. While the Coalition has not taken an official position on low-level radioactive waste a spokesman was sure that it would actively and vigorously oppose any attempt to site a low-level radioactive waste disposal site in Vermont.

New England Coalition on Nuclear Pollution.[6] The Coalition is a not-for-profit public education and legal intervention organization formed in 1971. The Coalition's concerns include activities not only in Vermont but also the other New England States. The Coalition's efforts focus on public education and information and include the distribution

of documents and materials on a wide variety of radiation issues and the provision of speakers to groups and organizations. The Coalition advocates the safe and adequate disposal of low-level radioactive waste and the disposal in Vermont of only that waste generated in the State. More specifically the Coalition is concerned about proposals for an onsite incinerator for low-level radioactive waste at Vermont Yankee. They feel that Vermont Yankee should not develop a disposal facility especially if that facility might be used by other New England nuclear power plants. Despite the current suspension of planning for an incinerator the Coalition feels that future restrictions on commercial disposal sites could revive this planning.

Non-power plant low-level radioactive waste has not been a Coalition concern because the volume is relatively minor and because of the Coalition's limited resources. Other issues and concerns identified by a Coalition spokeswoman were the shipment of radioactive materials through small towns and the failure of the State, at times, to make relevant information public. (The State was considered to be doing a good job of regulating and monitoring but not as good a job of passing along information to interested organizations.)

Vermont Public Interest Research Group.(7) The Vermont Public Interest Research Group is one of the most active political organizations in Vermont in the field of nuclear energy and nuclear waste. It was actively involved in the development and enactment of three State laws relating to nuclear power: a 1975 law requiring legislative approval of any new nuclear power plant, a 1977 law requiring legislative approval of any site for the storage, disposal, or reprocessing of nuclear waste (amended in 1980 to include low-level radioactive waste), and a 1980 law banning the mining or processing of uranium or thorium ore. Low-level radioactive waste itself has not been a major concern of the Research Group. It was explained that the Research Group tends to react to events and that there had been no major incidents to raise low-level radioactive waste as a major issue in the State. Nevertheless the Research Group has monitored various related activities including the work of the Health Department's advisory committee in 1979-80, Vermont Yankee's considerations of an onsite incinerator, and discussions of a New England compact for

low-level radioactive waste disposal. The Research Group supports State control (both administrative and legislative) over low-level radioactive waste management.

Other Groups. There are a relatively large number of groups in Vermont critical of or opposed to nuclear power. The presence of Vermont Yankee assures that nuclear power will continue to be a major public issue. To the extent that all low-level radioactive waste is perceived to be linked with nuclear power and its waste (according to the Vermont Public Interest Research Group's executive director the public does not distinguish between low-and high-level waste) there is the strong potential for low-level radioactive waste to become a major issue for such organizations.

REFERENCES

Text

1. Encyclopedia of Associations: National Organizations of the U.S., Volume I, Detroit: Gale Research, 1979.

2. League of Women Voters of the United States, "Guidance on Nuclear Issues Under Positions of the League of Women Voters of the United States," memorandum, April 1, 1980.

3. League of Women Voters Education Fund, "A Nuclear Waste Primer," Pub. #391, 1980.

4. American Public Health Association, "The Public Health Impact of Energy Policy," Washington, D.C., 1978.

5. John Warshaw, private communication, Central Vermont Safe Energy Coalition, April 14, 1981.

6. Sue Coakley, private communication, New England Coalition on Nuclear Pollution, April 16, 1981.

7. David White, private communication, Vermont Public Interest Research Group, April 14, 1981.

6. PRINTED MEDIA REVIEW OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT ISSUES

The purpose of the printed media review was to identify the types of issues related to low-level radioactive waste management discussed in general circulation newspapers. Newspaper articles were collected from three sources: the clipping files of The Burlington Free Press, Rutland Daily Herald, and the Nuclear Regulatory Commission. These sources covered relevant articles from newspapers throughout the State. The time period covered by the search was approximately one year, April 1980 through March 1981, although the review of the clipping files at the Nuclear Regulatory Commission only covered the six-month period from late September 1980 through early March 1981. Articles written prior to 1980 were noted only if they discussed issues or material not represented in later stories.

Four basic observations can be made about the coverage of low-level radioactive waste issues by Vermont newspapers. First, low-level radioactive waste issues appear in articles devoted solely to low-level waste concerns, as well as in articles of broader scope (e.g., nuclear energy and radiation safety), where specific low-level issues can become linked with the broader issues in the public's mind. The broader scoped articles are more frequent, but it is important to note that in Vermont, direct reporting on low-level issues does occur. Second, although national and regional stories are reported, stories which cover State or local interests are more numerous. Third, articles on low-level radioactive waste and related issues focus on many aspects of the topic, e.g., generic, regulatory, and specific studies. Fourth, with some exception low-level radioactive waste was not the subject of extensive press coverage in the time period studied for this report.

During the period in question, Vermont newspaper coverage of low-level radioactive waste management issues focussed on the following topics:

- Transportation: The effect of U.S. Department of Transportation regulations on shipping nuclear waste, particularly the fact that State notifications are more stringent than the Department of Transportation's but would be preempted by Federal rules; the routing of shipments and the role of States and localities in determining routes; the use of railroads for shipments of radioactive material through Vermont.

- Low-level radioactive waste management at Vermont Yankee: General practices and the need for Vermont Yankee to ship waste to Nevada; an incident where a barrel of low-level radioactive waste from Vermont Yankee arrived at the Nevada site with a hole in it that was undetected by inspectors at Vermont Yankee; consideration by Vermont Yankee of using an onsite incinerator to reduce low-level radioactive waste volume; renewal of Vermont Yankee's permit to discharge effluent, including some radioactive water, into the Connecticut River.

- Local bans on shipment of nuclear waste: Stowe voters faced this issue in 1980, some three years after over 30 Vermont towns banned shipments.

- Regional low-level radioactive waste disposal site: The enactment of Federal legislation encouraging regional compacts for disposal and the progress of New England meetings called to consider a compact.

Examples of the articles are presented in Appendix F.

Several other topics related to radioactive material have received newspaper coverage. These are linked either directly or by implication to low-level radioactive waste issues and indicate the broader context in which the subject is presented and discussed in newspapers. Examples of articles on ancillary topics are also included in Appendix F.

7.0 PROFILE OF LOW-LEVEL RADIOACTIVE WASTE GENERATORS

This section presents results of the survey of Nuclear Regulatory Commission licensees in Vermont. A discussion of the survey methodology and a copy of the survey instrument can be found in Appendix G. Appendix A includes a list of all facilities identified as licensees by the Nuclear Regulatory Commission.

Table 7-1 presents data on the response to the survey. Survey packets were sent to all licensees listed by the Nuclear Regulatory Commission. Of those identified licensees that responded, one indicated that it is not in fact licensed.

7.1 Source of Shipped Waste

7.1.1 Type of Facility Shipping Waste

It was possible to identify ten facilities that had shipped waste during the period 1978 through 1980. Eight of these shippers were identified via the survey used for this report. An additional two facilities were identified as shippers by reviewing data obtained by the Nuclear Regulatory Commission in its 1979 national survey of facilities licensed to use radioactive material. Because these latter two facilities did not respond to the survey used for this report, no further information that could describe their waste management was available. A breakdown of all identified shippers by type of facility is presented in Table 7-2.

7.1.2 Source of Radioactivity in Shipped Waste

Three sources of radioactivity account for the majority shipped waste: nuclear reactors, sealed sources, and unsealed radioactive material. In contrast, one governmental agency shipped waste

TABLE 7-1. RESPONSE TO SURVEY BY TYPE OF FACILITY

Type of Facility	No. of Licensees	Respondents			
		Number	Percent of Facility Type	Percent of Subtotal Licensees	Percent of Total Licensees
Medical	16	12	75.0	32.4	31.6
Educational	3	3	100.0	8.1	7.9
Industrial	11	6	54.5	16.2	15.8
Commercial Power Reactor	1	1	100.0	2.7	2.6
Governmental	6	6	100.0	16.2	15.8
Subtotal A	37	28	--	75.7	73.7
Terminated/Inactive NRC License	1	1	--	100.0	2.6
Not Active in State	0	0	--	0.0	0.0
Questionnaire Returned by Post Office	0	0	--	0.0	0.0
Subtotal B	1	1	--	100.0	2.6
Total	38	29	--	--	76.3

TABLE 7-2. TYPE OF FACILITY SHIPPING WASTE

Type of Facility	Shippers No.	Shippers Percent	Percent of All Shippers
Medical			
Hospital	4[a]	80	40
Research/Education	1	20	10
Other	0	0	0
Total	5	100	50
Educational			
University	1	100	10
High School	0	0	0
Other	0	0	0
Total	1	100	10
Industrial			
Product Use	0	0	0
Process Control	1	50	10
Pharmaceutical	0	0	0
Other	1	50	10
Total	2	100	20
Commercial Power Reactor	1	100	10
Governmental			
Federal	0	0	0
Military	0	0	0
State	1	100	10
Local	0	0	0
Total	1	100	10
Total	10	---	100

a. Includes two hospitals identified as shippers by the Nuclear Regulatory Commission survey of 1979, but not identified by Centaur Survey.

originating from a variety of sources. The agency not only ships its own waste but is also responsible for the emergency disposal of a wide range of radioactive materials that are periodically discovered in the state. The sources of radioactivity for shipped waste are listed in Table 7-3.

7.2 Volumes of Shipped Waste

Data on the volumes of shipped waste in the period 1978 through 1980 are presented in table 7-4. Estimated volumes of shipped waste for the years 1981, 1985, and 1990 are shown in Table 7-5. All facilities which shipped in 1978, 1979, and 1980 also expect to ship in 1981, 1985 and 1990. In addition one educational facility which has used onsite facilities for disposal expects to begin shipping waste to commercial disposal sites in 1981. The vast majority of the volume of waste shipped is generated by Vermont's commercial power reactor. There is a consistent trend towards the shipment of greater volumes of waste.

7.3 Activity of Shipped Waste

Data on the total radioactivity of shipped waste and on radioactivity by isotope was collected. These data are shown in Tables 7-6 and 7-7, respectively. Vermont's commercial power reactor accounts for the majority of activity in shipped waste. In 1978 that reactor shipped poison curtains which had an activity level of about 53,600 curies. The poison curtains are used as an additional control during the initial fuel cycle and are removed at the end of the initial fuel cycle. Thus this 1978 shipment was an event that will not reoccur and the sharp increase in curies shipped by the reactor that year was an anomaly.

7.4 Physical Characteristics of Shipped Waste

A majority of Vermont Shippers do not use onsite processing of waste to reduce volume or to improve shipping or disposal of that waste (e.g., by removing liquids). Four shippers have used or will use onsite

TABLE 7-3. ORIGIN OF RADIOACTIVITY RESULTING IN SHIPPED WASTE

Type of Facility	No. of Shippers Respond-ing	Nuclear Reactor		Sealed Sources		Unsealed Radioactive Material		Natural Ores of Mill Tailings	
		No.	Percent of Shippers Respond-ing	No.	Percent of Shippers Respond-ing	No.	Percent of Shippers Respond-ing	No.	Percent of Shippers Respond-ing
Medical	3	2	25.0	0	0.0	1	12.5	0	0.0
Educational	1	1	12.5	0	0.0	0	0.0	0	0.0
Industrial	2	1	12.5	1	12.5	1	12.5	0	0.0
Commercial Power Reactor	1	1	12.5	1	12.5	0	0.0	0	0.0
Governmental	1	0	0.0	1	12.5	1	12.5	1	12.5
Total[a]	8	5	62.5	3	37.5	3	37.5	1	12.5

a. Some facilities receive radioactive materials from more than one source; thus the columns indicating the number of respondents add to more than the total number of respondents.

TABLE 7-4. VOLUME OF SHIPPED WASTE
(1978, 1979, 1980)

Type of Facility	No. of Shippers Responding	Volume Shipped					
		1978		1979		1980	
		Cubic Meters	Percent of Total	Cubic Meters	Percent of Total	Cubic Meters	Percent of Total
Medical	3	2.4	0.7	1.6	0.3	0.5	0.1
Educational	1	6.0	1.7	10.5	2.3	21.9	4.3
Industrial	2	8.8	2.5	177.7	38.6	0.2	0.0
Commercial Power Reactor	1	331.4	95.1	270.4	58.8	483.2	95.5
Governmental	1	0.0[a]	0.0	0.0[a]	0.0	0.0[a]	0.0
Total	8	348.6	100.0	460.2	100.0	505.8	100.0

a. Annual average shipment equals approximately 0.01 cubic meter.

TABLE 7-5. PROJECTED VOLUMES OF SHIPPED WASTE (1981, 1985, 1990)

Type of Facility	No. of Shippers Responding	Projected Volume Shipped 1981 Cubic Meters	1981 Percent of Total	1985 Cubic Meters	1985 Percent of Total	1990 Cubic Meters	1990 Percent of Total
Medical	3	1.2	0.3	1.2	0.3	1.2	0.3
Educational	2	31.2	8.3	41.6	10.9	62.3	15.4
Industrial	2	2.3	0.6	0.7	0.2	0.7	0.2
Commercial Power Reactor	1	339.6	90.7	339.6	88.6	339.6	84.1
Governmental	1	0.0[a]	0.0	0.0[a]	0.0	0.0[a]	0.0
Total	9	374.3	100.0	383.1	100.0	403.8	100.0

a. Annual average shipment equals approximately 0.01 cubic meter.

TABLE 7-6. ACTIVITY OF SHIPPED WASTE
(1978, 1979, 1980)

Type of Facility	No. of Shippers Responding	Activity Shipped 1978 Curies	1978 Percent of Total	1979 Curies	1979 Percent of Total	1980 Curies	1980 Percent of Total
Medical	3	0.44	0.00	0.52	0.05	0.01	0.00
Educational	1	0.25	0.00	0.25	0.03	0.25	0.03
Industrial	2	0.13	0.00	0.28	0.03	0.00[a]	0.00
Commercial Power Reactor	1	53,934.00	100.00	963.00	99.91	842.00	99.97
Governmental	1	0.00[a]	0.00	0.00[a]	0.00	0.00[a]	0.00
Total	8	53,934.82	100.00	964.05	100.00	842.26	100.00

a. Less than 1 milli curie.

TABLE 7-7. RADIOISOTOPES IN SHIPPED WASTES
(1978, 1979, 1980)

	TOTAL			MEDICAL			EDUCATION		
	1978	1979	1980	1978	1979	1980	1978	1979	1980
^{140}Ba	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
^{14}C	<0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000
^{57}Co	0.098	0.098	0.000	0.098	0.098	0.000	0.000	0.000	0.000
^{58}Co	0.000	5.000	11.000	0.000	0.000	0.000	0.000	0.000	0.000
^{60}Co	16,141.000	135.000	140.000	0.000	0.000	0.000	0.000	0.000	0.000
^{51}Cr	47.048	1.048	0.000	0.048	0.048	0.000	0.000	0.000	0.000
^{134}Cs	62.000	292.000	234.000	0.000	0.000	0.000	0.000	0.000	0.000
^{137}Cs	16,167.000	507.000	383.000	0.000	0.000	0.000	0.000	0.000	0.000
^{67}Ga	0.037	0.037	0.003	0.037	0.037	0.003	0.000	0.000	0.000
^{3}H	0.213	0.213	0.201	0.013	0.013	<0.001	0.200	0.200	0.200
^{125}I	0.000	0.000	<0.001	0.000	0.000	<0.001	0.000	0.000	0.000
^{131}I	37.188	1.188	3.000	0.188	0.188	0.000	0.000	0.000	0.000
^{54}Mn	10,720.000	2.000	13.000	0.000	0.000	0.000	0.000	0.000	0.000
^{56}Mn	0.000	<1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
^{32}P	0.020	0.095	<0.001	0.020	0.095	<0.001	0.000	0.000	0.000
^{201}Tl	0.036	0.036	0.000	0.036	0.036	0.000	0.000	0.000	0.000
^{238}U	0.128	0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{65}Zn	10,759.000	7.000	55.000	0.000	0.000	0.000	0.000	0.000	0.000
^{95}Zr	<1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Mixtures	<0.053	<0.053	<0.053	<0.001	<0.001	<0.001	0.050	0.050	0.050
Total	56,934.822	964.046	842.260	0.442	0.516	<0.008	0.250	0.250	0.250

TABLE 7-7. RADIOISOTOPES IN SHIPPED WASTES
(1978, 1979, 1980) (continued)

	INDUSTRIAL			POWER REACTORS			GOVERNMENT		
	1978	1979	1980	1978	1979	1980	1978	1979	1980
^{140}Ba	0.000	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000
^{14}C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{57}Co	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{58}Co	0.000	0.000	0.000	0.000	5.000	11.000	0.000	0.000	0.000
^{60}Co	0.000	0.000	0.000	16,141.000	135.000	140.000	0.000	0.000	0.000
^{51}Cr	0.000	0.000	0.000	47.000	<1.000	0.000	0.000	0.000	0.000
^{134}Cs	0.000	0.000	0.000	62.000	292.00	234.000	0.000	0.000	0.000
^{137}Cs	0.000	0.000	0.000	16,167.000	507.000	383.000	0.000	0.000	0.000
^{67}Ga	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{3}H	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{125}I	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{131}I	0.000	0.000	0.000	37.000	1.000	3.000	0.000	0.000	0.000
^{54}Mn	0.000	0.000	0.000	10,720.000	2.000	13.000	0.000	0.000	0.000
^{56}Mn	0.000	0.000	0.000	0.000	<1.000	1.000	0.000	0.000	0.000
^{32}P	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{201}Tl	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{238}U	0.128	0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000
^{65}Zn	0.000	0.000	0.000	10,759.000	7.000	55.000	0.000	0.000	0.000
^{95}Zr	0.000	0.000	0.000	1.000	0.000	1.000	0.000	0.000	0.000
Mixtures	<0.001	<0.001	<0.001	0.000	0.000	0.000	<0.001	<0.001	<0.001
Total	<0.129	<0.279	<0.001	53,934.000	963.000	842.000	<0.001	<0.001	<0.001

processing of waste prior to shipping. The procedures being used are identified in Table 7-8. The other category includes the separation of radioactive from non-radioactive material by one industry, the dewatering of resin filters with a centrifuge by the commercial power reactor, and neutralization by a governmental agency.

The majority of Vermont shippers use either 55-gallon or 30-gallon drums. Shielded casks, wooden boxes, and (for one shipment of radium) lead containers have also been used. See Table 7-9.

The physical form of shipped waste varies although seven of respondents ship dry waste. Table 7-10 shows data on the physical form of waste shipped by type of facility.

Radioactive waste may pose hazards other then radioactivity. The most common nonradioactive hazard is combustibility often present because of contaminated paper. See Table 7-11.

7.5 Cost of Shipping Waste

Data on the cost of shipping tended to be more difficult to collect than other data requested in the survey. It was clear, however, that per unit shipping costs increased sharply during the 1978 through 1980 period and that per unit costs were lower for large volume shippers than for small volume shippers. The rising cost of shipping was cited by several shippers as a major reason for implementing volume reduction procedures.

7.6 Destination of Shipped Waste

Four Vermont shippers indicated the destination of their shipped waste. For three of these, waste has been shipped to the Hanford, Washington site. The other shipper, the commercial power reactor, has shipped waste to all currently operating commercial sites: South

TABLE 7-8. ONSITE PROCESSING OF SHIPPED WASTE

Type of Facility	No. of Shippers Responding	None		Mechanical Compaction		Solidification/ Evaporation		Absorption		Other	
		No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding
Medical	3	3	33.3	0	0.0	0	0.0	0	0.0	0	0.0
Educational	2[a]	1	11.1	0	0.0	1	11.1	0	0.0	0	0.0
Industrial	2	1	11.1	1	11.1	0	0.0	0	0.0	1	11.1
Commercial Power Reactor	1	0	0.0	1	11.1	0	0.0	0	0.0	1	11.1
Governmental	1	0	0.0	0	0.0	1	11.1	1	11.1	1	11.1
Total[a]	9	5	55.5	2	22.2	2	22.2	1	11.1	3	33.3

a. Includes data on one university that will begin shipping in 1981.

TABLE 7-9. TYPE OF SHIPPING CONTAINER USED

Type of Facility	No. of Shippers Responding	55-gal. Drums		30-gal. Drums		Shielded Casks		Wooden Boxes		Other	
		No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding
Medical	3	3	37.5	0	0.0	0	0.0	0	0.0	0	0.0
Educational	1	1	12.5	0	0.0	0	0.0	0	0.0	0	0.0
Industrial	2	1	12.5	1	12.5	0	0.0	0	0.0	0	0.0
Commercial Power Reactor	1	1	12.5	0	0.0	1	12.5	1	12.5	0	0.0
Governmental	1	0	0.0	1	12.5	0	0.0	0	0.0	1	12.5
Total[a]	8	6	75.0	2	25.0	1	12.5	1	12.5	1	12.5

a. Some facilites use more than one type of shipping container; thus the columns indicating number of respondents add to more than the total number of respondents.

TABLE 7-10. PHYSICAL FORM OF SHIPPED WASTE

Type of Facility	No. of Shippers Responding	Dry		Solidified or Absorbed Liquids, Sludges, and Resins		Biological Waste		Sealed Sources		Other	
		No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding	No.	Percent of Shippers Responding
Medical	3	2	25.0	1	12.5	1	12.5	0	0.0	1	12.5
Educational	1	1	12.5	0	0.0	0	0.0	0	0.0	1	12.5
Industrial	2	2	25.0	1	12.5	0	0.0	0	0.0	0	0.0
Commercial Power Reactor	1	1	12.5	1	12.5	0	0.0	1	12.5	0	12.5
Governmental	1	1	12.5	0	0.0	0	0.0	0	0.0	0	0.0
Total[a]	8	7	87.5	3	37.5	1	12.5	1	12.5	2	25.0

a. Waste at some facilities takes more than one form; thus the columns indicating the number of respondents add to more than the total number of respondents.

TABLE 7-11. NONRADIOLOGICAL HAZARD CHARACTERISTICS OF SHIPPED WASTE

Type of Facility	No. of Respondents	Type of Potential Hazard: Chemically Toxic		Type of Potential Hazard: Combustible	
		No. of Shippers	Percent of All Shippers	No. of Shippers	Percent of All Shippers
Medical	3	0	0.0	2	25.0
Educational	1	0	0.0	1	12.5
Industrial	2	0	0.0	0	0.0
Commercial Power Reactor	1	0	0.0	1	12.5
Governmental	1	1	0.0	1	12.5
Total	8	1	12.5	5	62.5

Carolina, Nevada, and Washington. Other Vermont shippers indicated that, because brokers did the actual shipping to disposal sites, they were uncertain of the final destination.

7.7 Summary

A minority of Vermont facilities licensed to used radioactive material have needed to ship waste to commercial disposal sites. Based on available data less then one-third (ten of 37) licensees shipped waste in the period 1978 through 1980. The number of shippers is expected to increase by one in the future.

Waste management in Vermont has changed in recent years in response to increased shipping costs and increased sensitivity of shippers to public relations. For the medical and industrial sectors the net effect of these changes is to reduce the volume of future shipments. For other sectors the trend is either stable or towards an increased volume of shipments. The presence of a commercial power reactor in Vermont, however, insures that the overall trend in shipments of low-level radioactive will be dominated by the waste shipped by the reactor. When viewing total waste shipped in Vermont either in terms of volume or level of rdioactivity, it is clear that the vast majority of this waste is generated by the commercial power reactor.

APPENDIX A
RADIOACTIVE MATERIAL LICENSE HOLDERS: SUPPORTING DOCUMENTATION

APPENDIX A

Uses of Radioactive Material in Vermont

Potential Generators of Low-Level Radioactive Waste	Not Present in State	Small User of Nuclear Radioactive Material	Major User of Radioactive Material
Medical Therapy (including research)		X	
Medical Diagnosis (including research)			X
Commercial Reactor			X
Experimental or Research Reactor	X		
Industrial Irradiation	X		
Dismantling of Accelerators (includes medical, research and industrial)	X		
Well Logging	X		
Industrial Radiography		X	
Industrial Gauges and Measurement Devices			X
Non-Medical Research		X	
Smoke Detector Manf.	X		
Luminous Paints and Dial Lighting Manf.	X		
Educational Laboratory Aids		X	
Uranium Enrichment, Fabrication and Reprocessing	X		
Nuclear Laundry	X		
"Other" Uses[a]	X		

a. "Other" includes analytical services, gas chromatography, pollution monitoring, carbon 14 dating and civil defense training, etc.

RADIOACTIVE MATERIAL LICENSE HOLDERS

Nuclear Regulatory Commission	Type of Facility
*American Red Cross 32 North Prospect Street Burlington, VT 05401	Medical
*Aquatec, Inc. Chemistry Department 75 Green Mountain Drive S. Burlington, VT 05401	Industrial
Brattleboro Memorial Hospital 9 Belmont Avenue Brattleboro, VT 05301	Medical
*Central Vermont Hospital P.O. Box 547 Berlin, VT 05641	Medical
*Civil Engineering Associates, Inc. P.O. Box 485 Shelburne, VT 05482	Industrial
*Copley Hospital Washington Highway Morrisville, VT 05661	Medical
*General Electric Company Armament Systems Department Lakeside Avenue Burlington, VT 05401	Industrial
*Gifford Memorial Hospital, Inc. Randolph, VT 05060	Medical
*Knight Consulting Engineers, Inc. P.O. Box 2304 S. Burlington, VT 05402	Industrial
Henry W. Putnam Memorial Hospital Dewey Street Bennington, VT 05201	Medical
*IBM Corporation P.O. Box A Essex Junction, VT 05452	Industrial

---

* Responded to survey.

Nuclear Regulatory Commission	Type of Facility
Industrial & Environmental Analysis 1775 Williston Road, Suite 4 South Burlington, VT 05401	Industrial
*Institute for Medical Research of Bennington 110 Hospital Drive Bennington, VT 05201	Medical
*Medical Center Hospital of Vermont Mary Fletcher Unit Department of Radiology Collchester Avenue Burlington, VT 05401	Medical
*Middlebury College Middlebury, VT 05753	Educational
North County Hospital & Health Center, Inc. Prouty Drive Newport, VT 05855	Medical
*Northeastern Vermont Regional Hospital, Inc. Hospital Drive St. Johnsbury, VT 05819	Medical
*Northwestern Medical Center, Inc. P.O. Box 868 Fairfield Street St. Albans, VT 05478	Medical
*Norwich University Northfield, VT 05663	Educational
*Occupational & Radiological Health Administration Building 10 Baldwin Street Montpelier, VT 05602	Governmental
Oyma, Inc. Division of Pluess Stauffer Industries 61 Main St. Proctor, VT 05765	Industrial

* Responded to survey.

Nuclear Regulatory Commission	Type of Facility
*Porter Medical Center, Inc. South Street Middlebury, VT 05753	Medical
*Rutland Hospital, The 160 Allen Street Rutland, VT 05701	Medical
*Saint Michael's College Chemistry Department Winooski, VT 05404	Educational
*Six States Engineering, Inc. 201 Commonwealth Avenue Springfield, VT 05156	Industrial
Spectrum Research, Inc. 5 Court Street Montpelier, VT 05602	Industrial
*Springfield Hospital, Inc. Springfield, VT 05156	Medical
Trutom (U.S.) Ltd. Avenue C Griswold Industrial Burlington, VT 05401	Industrial
*Union Carbide Corporation Battery Products Division 401 Gage Street Bennington, VT 05201	Industrial
*University of Vermont School of Applied Health Sciences Burlington, VT 05401	Educational
*Vermont Yankee Nuclear Power Corporation 77 Grove Street Rutland, VT 05701	Commercial Power Reactor

---

* Responded to survey.

Nuclear Regulatory Commission	Type of Facility
Vermont Marble Company 61 Main Street Proctor, VT 05765	Industrial
*Vermont, State of Department of Public Safety Civil Defense Division Montpelier, VT 05602	Government
*Vermont, State of Health Department Bureau of Laboratories 115 Colchester Avenue Burlington, VT 05401	Government
*Vermont, State of Vermont Department of Water Resources c/o State Office Building Montpelier, VT 05602	Government
*Vermont State Highway Department Montpelier, VT 05602	Government
*Vermont Department of Agriculture 116 State Street Montpelier, VT 05602	Government
Veterans Administration Medical and Regional Office Center Medical, Surgical, and Research Departments White River Junction, VT 05001	Medical

---

* Responded to survey.

APPENDIX B
DEMOGRAPHY: SUPPORTING DOCUMENTATION

Table B-1. School Enrollment in Vermont, Fall 1980 (1,2)

County	Elementary[a]		Secondary[b]		Higher Education		Total
	Private	Public	Private	Public	Private	Public	
Addison	58	3,068	16	2,607	1,924	0	10,373
Bennington	211	3,393	440	2,632	1,076	0	7,752
Caledonia	6	2,623	1,323	1,268	0	1,114	6,334
Chittenden	980	10,510	1,032	11,093	4,265	10,988	38,868
Essex	0	628	0	409	0	0	1,037
Franklin	30	4,067	1,019	2,675	0	0	7,791
Grand Isle	0	528	0	143	0	0	671
Lamoille	4	1,694	88	1,526	0	1,431	4,743
Orange	23	2,730	399	2,023	0	793	5,968
Orleans	241	2,471	606	2,296	0	0	5,614
Rutland	481	5,492	623	4,809	893	1,842	14,140
Washington	523	5,195	179	5,059	3,112	1,816	15,884
Windham	536	3,778	651	3,151	989	0	9,105
Windsor	23	4,992	17	5,117	385	0	10,534
Total	2,936	51,169	6,393	44,808	12,644	17,984	138,814

a. Prekindergarten through sixth grade plus special education.

b. Seventh grade through twelfth grade.

TABLE B-2. HOSPITAL BEDS IN VERMONT BY COUNTY[3]

County	Number of Beds
Addison	45
Bennington	180
Caledonia	100
Chittenden	610
Essex	0
Franklin	139
Grand Isle	0
Lamoille	50
Orange	53
Orleans	80
Rutland	301
Washington	452
Windham	315
Windsor	375
Total	2,700

TABLE B-3. FEDERAL LABORATORIES IN VERMONT[4]

Agency: U.S. Department of Agriculture - Forest Service

Name of Facility: Sugar Maple Laboratory

Location: Burlington

Major Mission: Sugar maple research

Personnel as of FY 1977:

	Professional	Other	Total
Authorized	19	3	22
Assigned	19	3	22

Agency: Veterans Administration Medical Research Service

Name of Facility: Veterans Administration Center

Location: White River Junction

Major Mission: Conduct biomedical research, health services research and development, and rehabilitative engineering research and development.

Personnel as of FY 1977:

	Professional	Other	Total
Authorized	9	16	25
Assigned	9	16	25

REFERENCES

1. State of Vermont, Department of Education, Statistics and Information, Vermont School Enrollment, 1980-1981, Montpelier, Vt., February 25, 1981.

2. State of Vermont, Department of Education, HEGIS Fall Enrollment Survey, 1980, 1980.

3. American Hospital Association, Guide to the Health Care Field, Chicago: American Hospital Association, 1980.

4. Subcommittee on Agriculture and Related Agencies, Committee on Appropriations, House of Representatives, 95th Congress Second Session, Part 2, Investigative Report on "Utilization of Federal Laboratories," Washington, D.C.: U.S. Government Printing Office, 1978.

APPENDIX C

GOVERNMENT STRUCTURE: SUPPORTING DOCUMENTATION

VERMONT STATE DEPARTMENTS[1]

AGENCY OF ADMINISTRATION
William Gilbert, Secretary
109 State St.
Montpelier, VT 05602
(802) 828-3322

DEPARTMENT OF BUDGET AND MANAGEMENT
Francis Hoermann, Commissioner
109 State St.
Montpelier, VT 05602
(802) 828-2376

AGENCY OF DEVELOPMENT AND COMMUNITY AFFAIRS
Harry Behney, Secretary
109 State St.
Montpelier, VT 05602
(802) 828-3231

ENVIRONMENTAL CONSERVATION AGENCY
Brendan Whittaker, Secretary
79 River St.
Heritage I and II
Montpelier, VT 05602
(802) 828-3357

DISTRICT ENVIRONMENTAL COMMISSIONS
81 River St., Heritage I
Montpelier, VT 05602
(802) 828-3304

DEPARTMENT OF FINANCE
Stephen MacPherson, Commissioner
133 State St.
Montpelier, VT 05602
(802) 828-2311

DEPARTMENT OF FISH AND GAME
Edward Kehoe, Commissioner
79 River St., Heritage Bldg.
Montpelier, VT 05602
(802) 828-3371

DEPARTMENT OF FORESTS PARKS AND RECREATION
Leo Laferriere, Commissioner
79 River St., Heritage II Bldg.
Montpelier, VT 05602
(802) 828-3375

AGENCY OF HUMAN SERVICES
Elizabeth Candon, Secretary
Osgood Bldg.
Waterbury, VT 05676
(802) 241-2220

DEPARTMENT OF PERSONNEL
Jacquel-Anne Chouinard, Commissioner
110 State St.
Montpelier, Vt. 05602
(802) 828-3483

DEPARTMENT OF PUBLIC SERVICE
Richard Saudeck, Commissioner
120 State St.
Montpelier, VT 05602
(802) 828-2321

DEPARTMENT OF TAXES
Harriet King, Commissioner
109 State St.
Montpelier, VT 05602
(802) 828-2501

AGENCY OF TRANSPORTATION
Thomas Evslin, Secretary
133 State St
Montpelier, VT 05602
(802) 828-2657

DEPARTMENT OF WATER RESOURCES
John Ponsetto, Commissioner
79 River St., Heritage II
Montpelier, VT 05602
(802) 828-3361

VERMONT SENATE MEMBERS
ALPHABETICALLY BY COUNTY (2)

ADDISON COUNTY

*R Gibb, Arthur, RD #2, Middlebury 05753.....545-2174

*R Reynolds, S. Seeley, Jr., RD, Salisbury 05769.....352-4565
(Summer phone) 352-4433

BENNINGTON COUNTY

R Haley, Thomas R., Sr., 610 Gage St., Bennington 05201.....442-8030
Tom Haley Motor Sales, 228 Northside Dr., Bennington 442-3512

*R Harwood, Madeline, Manchester Center 05255 362-1244

CALEDONIA COUNTY

*R Morse, Gerald, Groton 05046..... 584-3434, 584-3353

D Parker, Scudder H., P.O. Box 22, East. St.Johnsbury 05838.....748-8644
Third Congregational Church, UCC, East St. Johnsbury 05838

CHITTENDEN COUNTY

*D Crowley, Thomas M., P.O. Box 505, Burlington 05401 862-9502
(Residence) 36 North Willard Street
Crowley Ins. Agency, Inc., 100 N. Willard St., Burlington 05401 863-3416

*D Daniels, Robert V., 195 S. Prospect St., Burlington 05401.....864-7645
University of Vermont, Burlington 05405 656-3180

*D Kaplan, Mark A., 16 Prospect Hill, Burlington 05401.....864-5611
Kaplan and Kaplan, Attorneys, 109 S. Winooski Ave.,
Burlington 05401 (use for mailing) 864-5611

*D McSweeney, Dr. E. Douglas, Jr., Sunset Cliff, Burlington 05401 862-9160
University of Vermont, 292 Pearl St., Burlington 05401 862-8281
(use for mailing)

*D Sorrell, Esther H., 23 Hickok Place, Burlington 05401.....862-2723

D Soule, Sarah T. (Sallie), Thompson Rd., Shelburne 05482.....985-3932
Bygone Books, Inc., 91 College St., Burlington 05401 862-4397

ESSEX-ORLEANS COUNTY

R Illuzzi, Vincent, 645 E. Main St., Newport 05855 .....334-5457, 754-2200

D Smith, Kermit A., Box 43, Derby 05829.....766-2219

FRANKLIN COUNTY

*D Howrigan, D. Francis, Route #2, Enosburg Falls 05450 827-3751

*D Soule, Richard C., Fairfax 05454 849-6728
Mass. Mutual Life Insurance Co., Fairfax 05454 849-3551

GRAND ISLE COUNTY

*D McGregor, Thomas E., 33 Bonanza Park, RFD #3, Colchester 05446 863-6853
Tom's Pharmacy, RFD #3, Colchester 05446 863-2048

LAMOILLE COUNTY

*R Manchester, R. Henry, Box 27, Johnson 05656.....644-5580

ORANGE COUNTY

*R Avery, Allen D., Box 48, Fairlee 05045 333-9156
Lake Morey Inn, Fairlee 05045 333-4311

RUTLAND COUNTY

*R Bloomer, Robert A., 6 Hillcrest Road, Rutland 05701.....773-3924
Bloomer & Bloomer, Attorneys, 22 Cottage St., Rutland 05701 775-4040
P.O. Box 276, Rutland 05701 (use for mailing)

D Godnick, Gilbert G., 168 Grove St., Rutland 05701.....775-5162
City of Rutland, City Hall, Rutland 05701 773-2000

*R Smith, Stewart A., 62 Litchfield Ave., Rutland 05701 773-3090

WASHINGTON COUNTY

*R Doyle, William T., Murray Road, Montpelier 05602 223-2851
Johnson State College, Johnson, 05656 635-2356

*D Skinner, Mary Just, RFD #3, Montpelier 05602 223-7123
Skinner & Skinner, Attorneys, P.O. Box 412 229-0200
17 State St., Montpelier 05602

R Smith, Peter, RFD #3, Montpelier 05602 223-6902
Hunger Mountain Associates, Box 885, Montpelier 223-5298

WINDHAM COUNTY

*R Gannett, Robert T., RFD #2, W. Brattleboro 05301 254-4451
153 Main St., Brattleboro 05301 254-4588

*R Gibson, David A., P.O. Box 558, Brattleboro 05301.....254-5486
Weber, Fisher, Perra and Gibson, P.O. Box 558, 254-4568
139 Main St., Brattleboro 05301

WINDSOR COUNTY

*R Howland, John H., P.O. Box 44, Windsor 05089 484-7769
Independent Ins. Agents of Vt., Inc., 15 State St., Windsor 05089 674-5862

*R Scott, Chester P., Jr., RFD #1 - Box 193, Springfield 05156.....885-5050
(Residence) Breezy Hill Rd., Springfield
Bryant Grinder Corporation, 257 Clinton St., Springfield 05156 885-5156

D Welch, Peter, Box 47, Hartland 05049 436-2110
Briggs Building, White River Junction 05001 295-9347

VERMONT HOUSE MEMBERS
ALPHABETICALLY BY COUNTY (3)

ADDISON-1

*R Allen, William G., 73 School St., Vergennes 05491.....877-2210

*R Spencer, Marion W., RD #1 - Box 72, Vergennes 05491.....759-2179

ADDISON-2

*R Cota, Arthur, RD - Box 292, Bristol 05443.....453-3214
Starksboro 05487 453-2244

ADDISON-3

*R Hise, John A., Jr., Pilgrim Farms, Box 5, Bristol 05443.....453-3681

ADDISON-4

R Arnold, Maurice D., Box 95, Whiting 05778.....623-8281

ADDISON-5

*R Deppman, Elizabeth, RD #3, Middlebury 05753.....388-2439
John Deppman, Attorney, Drawer 688, Middlebury 05753 388-6337

D Nuovo, Betty A., Box 347, Middlebury 05753 388-2024
20 So. Pleasant St., P.O. Box 347, Middlebury 05753 388-6464

ADDISON-RUTLAND-1

*R Pyle, Walter M., Pocantico Farms, Shoreham 05770 897-7685
Pocantico Farms, Shoreham 897-7689

ADDISON-RUTLAND-WINDSOR-1

R Martin, Wallace A., Box 126, Rochester 05767 767-4783

BENNINGTON-1

R Bongartz, Seth, Box 308, Manchester Center 05255 362-1179
Manchester Woodcraft, Box 836, Manchester Center 05255

*R Hinkley, Stanley S., Manchester Center 05255 362-1078
Eastman's Market, Manchester Center 05255 362-1203

BENNINGTON-2

*D Gardner, Jane, Bentley Road, Arlington 05250 375-2735

BENNINGTON-3

*R Colvin, Edwin A., Holliday Drive, Shaftsbury 05262 375-6331

BENNINGTON-4-1

D Condon, Marie Powers, 10 Main St., No. Bennington 05257.....442-3305

*D Wright, Ralph G., Matteson Road, North Bennington 05257.....442-2366
Mt. Anthony Union High School, Park Street Ext., Bennington 05201 442-2811

BENNINGTON-4-2

D Kearns, Robert F, 961 Gage St., Bennington 05201.....442-5862

BENNINGTON-4-3

D Corcoran, Timothy R., 703 Jefferson Heights, Bennington 05201 442-8419

*D Shaffe, David B., 229 Union Street, Bennington 05201.....442-5203
Shaffe's Men Shop, 475 Main Street, Bennington 05201 442-2521

BENNINGTON-4-4

R Tucker, Carl, Pownal 05261 823-7758

BENNINGTON-RUTLAND-1

*R Graf, Robert E., Pawlet 05761.....325-3450
South Wind Farm, Pawlet 05761 325-3045, 325-3048

BENNINGTON-WINDHAM-1

*R Hamilton, G. William, Hamilton Inn, Wilmington 05363 464-8861

R Kimack, Michael A., Ramblewood, Wilmington 05363 464-8240
Kestner Engineers P.C., 1 Kestner Lane, Troy, N.Y. 12180 518-273-7446

CALEDONIA-1-A

*R Crane, Edward T., Box 19, E. St. Johnsbury 05838 748-3452

CALEDONIA-1-B

R Crosby, George M., 7 Cliff St., St. Johnsbury 05819.....748-3653

R Zuccaro, Edward R., 4 Summer St., St. Johnsbury 05819.....748-8634
Zuccaro & Willis, 101 Eastern Ave., St. Johnsbury 05819 748-8958

CALEDONIA-ESSEX-1

*R Hudson, Cola H., Box 511, Lyndonville 05851.....626-9428
Campus School, Lyndon Center, 05850 626-3209

*R Simpson, Leland J., RFD #1, Lyndonville 05851.....626-3249

CALEDONIA-ESSEX-2

R Faris, Elmer L., Mosquitoville, Groton 05046 592-3252

CALEDONIA-ORANGE-1

*D Zampieri, John J., RFD #1, Rt. 302, South Ryegate 05069.....584-3604

CALEDONIA-WASHINGTON-1

R Batten, Anne K., P.O. Box 128, E. Hardwick 05836 472-6066

R Gadapee, Wayne, RFD #1, Danville 05828 684-3820
Fairbanks Weighing Division, St. Johnsbury 05819 748-5111
Ext. 440

CHITTENDEN-1-1

*D Duffy, V. Michael, RFD #2, Milton 05468.....893-4063

CHITTENDEN-1-2

*R Coy, George S., Box 345, Milton 05468.....893-2154

CHITTENDEN-1-3

*D Feeley, Theresa G., 8 Biscayne Heights, Colchester 05446 863-4906

D Lambert, Paul, Church Rd., Colchester 05446.....863-2010

CHITTENDEN-2-1

D Harroun, Ann, 14 Wildwood Dr., Essex Jct. 05452.....879-0591

*R Powell, Martin E., Box 3, Essex 05451.....878-0161

CHITTENDEN-2-2

*D Kroger, Althea, 10 Church Street, Essex Junction 05452 879-7421

*R Taft, Chester M., 9 Church Street, Essex Junction 05452.....878-8543

CHITTENDEN-3

*R Conant, Gloria, Box 52, Richmond 05477 434-2258

*R Fay, Donald B., Barber Farm Rd. - Box 215, Jericho 05465 878-4461

CHITTENDEN-4-1

D Peters, William L., 46 Orchard Terrace, Winooski 05404 655-3743

D Picher, Paul J., 243 Weaver St., Winooski 05404.....655-2606

CHITTENDEN-4-2

*D Niquette, J. Randall, 41 East Allen Street, Winooski 05404 655-2402
Pomerleau Real Estate Co., 184 So. Winooski Ave., Burlington 05401 863-2841

CHITTENDEN-4-3

D Bloomberg, Arthur H., 123 Mansfield Ave., Burlington 05401 862-5339

CHITTENDEN-4-4

*D Graham, Lorraine H., P.O. Box 471, Burlington 05402.....862-0390
(Residence) - 280 N. Winooski Avenue, Burlington 05401

*D Reuschel, Barbara A., 18 Cloarec Court, Burlington 05401 862-9018

CHITTENDEN-4-5

*D Rowland, Polly, 57 Farrington Parkway, Burlington 05401.....862-7501
Thayer Elementary School, North Ave., Burlington 05401 863-4521

CHITTENDEN-4-6

*D Babcock, Carmel A., 12 Sky Drive, Burlington 05401 658-3381

*D Stephany, Judith B., 108 Oakland Terrace, Burlington 05401 658-3804

CHITTENDEN-4-7

D Charboneau, Elaine M., 21 Peru St., Burlington 05401 864-4854

*D Couture, Alfred V., 29 Murray St., Burlington 05401.....864-4080

CHITTENDEN-4-8

*D Erkson, Pamela J., 1099 Pine Street, Burlington 05401.....863-2491
Student, University of Vermont, Burlington 05401 656-4455

*D Evelti, Mary M., 4 Scarff Ave., Burlington 05401 864-5858

CHITTENDEN-4-9

*R Carpenter, Torrey C., 55 Cliff Street, Burlington 05401.....862-0226
Blanch & Jameson (Real Estate), Box 100, Alburg 05440 863-6306

*R Riehle, Theodore M. III, 145 Robinson Parkway, Burlington 05401.....864-5460
Browns River Middle School, Underhill 05489 899-3711

CHITTENDEN-5-1

R Kaufman, David A., Meadowbrook, Joy Dr., S. Burlington 05401 864-4357

CHITTENDEN-5-2

D Kennedy, Jeanne B., 28 Heath St., S. Burlington 05401.....863-4968

*D Maher, Mary Barbara, Box 2331, S. Burlington 05401 862-2840

CHITTENDEN-6

*R Lunderville, Howard P., Maple Dr., Williston 05495 878-2358
Town of Williston, Williston 05495 878-5121

CHITTENDEN-7

R Bronson, Gwendolyn T., RD #1, Box 283, Shelburne 05482 985-2817

*R Morse, Gretchen B., Lewis Creek Rd., Charlotte 05445 425-2870

CHITTENDEN-8

*R Carse, Henry H., RFD, Hinesburg 05461.....482-2294

ESSEX-1

*R Brunette, Walter, P.O. Box 146, Gilman 05904 892-5525

ESSEX-ORLEANS-1

*R Manning, Francis J., Pleasant St., Island Pond 05846 723-4715
Canadian National Railways, Main St., Island Pond 05846 723-4775

FRANKLIN-1

*D DaPrato, Frank, 9 New Street, Swanton 05488.....868-3374

D Fosgate, David M., Sr., P.O. Box 121, Swanton 05488.....868-4022

FRANKLIN-2

*D Bouchard, L. Philip, Franklin 05457.....868-7070, 285-6726

FRANKLIN-3

D Rowley, Robert C., 67 River St., Richford 05476.....848-3671

FRANKLIN-4-1

*D Dunsmore, Elizabeth M., RD #1, Swanton 05488 524-4819

FRANKLIN-4-2

*D Callan, Herbert Q., Route 1, Sheldon 05483 827-4413

FRANKLIN-5-1

R Brown, Robert H., 18 Messenger St., St. Albans 05478 524-4630
Brown, Cahill & Gawne, P.O. Box 810, 42 N. Main St. 524-5211

FRANKLIN-5-2

D Allard, Stephan J., 20 Thorpe Ave., St. Albans 05478 524-6230
Johnson Painting Corp., P.O. Box, Plattsburg, N.Y.

*D Regan, Walter J., 60 Ferris St., St. Albans 05478.....524-2683

FRANKLIN-6

R Perley, Merrill E., Main St., Enosburg Falls 05450 933-4466
IBM, Essex Junction, 05452

GRAND ISLE-FRANKLIN-1

*R Nye, Randall, South Hero 05486 372-8366

R Smith, Norman F., Grand Isle 05458 372-5050

LAMOILLE-1

R Farmer, John M., RD #2, Stowe 05672.....253-8619

*I Hooper, Franklin J., P.O. Box 236, Johnson 05656 635-2960
Hooper's Sugar Place, French Hill, Johnson 05656

LAMOILLE-2

*R Earle, Ernest J., (Stub), Eden 05652 635-7733

*R Miller, McDonald, RD #3, Morrisville 05661 888-5769

LAMOILLE-ORLEANS-1

*R Kinsey, Robert E., Craftsbury Common 05827 755-6134

*R Russell, Wallace C., Jr., RFD #1, Barton 05822 754-6312

ORANGE-1

R Betts, Richard, Box 177, Chelsea 05038 685-4839

ORANGE-2

*D Kenyon, Wayne G., Bradford 05033 222-4068

ORANGE-3

*R Keefe, Webster W., Ely 05044 333-9171

ORANGE-WASHINGTON-1-1

*R Booth, Gordon J., RD #3, Barre 05641 476-4423
Business phone 476-4256

R Dicker, Gordon K., Route 1, Barre 05641.....479-0618
Vermont Technical College, Randolph Center 05061

ORANGE-WASHINGTON-1-2

D Poirier, Paul N., 33 Abbott Ave., Barre 05641 476-7870
Spaulding High School, Ayer St., Barre 05641 476-4811

ORANGE-WASHINGTON-1-3

*D Valsangiacomo, Oreste V., Sr., P.O. Box 893, Barre 05641 476-7300
(Residence) 31 Sheridan Street, Barre 05641
King's Grant, Realtors, 1 Campbell Place, Barre 05641 479-2555

ORANGE-WASHINGTON-1-4

D Gino Sassi, 40 Willey St., Barre 05641 476-3429

ORANGE-WASHINGTON-1-5

*R Ashe, Harry B., RFD #3, Barre 05641 433-6665

ORANGE-WINDSOR-1

*R Baker, Harold A., 1 Belle-Fred Drive, Randolph 05060 728-5734

R Wood, Barbara C., Woodland Rd., Bethel 05032 234-9877

ORANGE-WINDSOR-2-1

*D Hoyt, Norris, P.O. Box L, Norwich 05055 649-1671
Brownell & Hoyt, P.O. Box L, Norwich 05055 649-1200

ORANGE-WINDSOR-2-2

*R Neely, Noel, Woodstock 05091 457-2689
Dr. Donald Neely, Woodstock 05091 457-2278, 649-1718

ORLEANS-1

*D Starr, Robert A., Jr., RFD #2, North Troy 05859 988-2877
Starr's Transportation, Inc., North Troy 05859 988-2282, 988-4307

ORLEANS-2

D Farrell, William F., P.O. Box 168, Bluff Rd., Newport 05855 334-2444

*R Spates, Frank H., Sr., P.O. Box 485, The Bluffs, Newport 05855 334-2454

ORLEANS-3

R Selby, Lloyd O., Box 144, Derby Line 05830 873-3174

RUTLAND-1

R Wood, Robert H., Jr., RFD #3, Brandon 05733.....247-6576

RUTLAND-2

D Candon, Mark J., 21 Gibbs St., Proctor 05765 459-2729

*R Giddings, Raymond W., Route U.S. #7, Pittsford 05763 483-2292
Giddings Manufacturing Co., Route U.S. #7, Pittsford 05763

RUTLAND-3

*R Wilson, Albert C., 13 Grape St., Fair Haven 05743.....265-3093

RUTLAND-4

*D DeBonis, Daniel V., Jr., RD #1, Poultney 05764 287-9089

*R Rampone, Alfred F., Frisbie Hill, Castleton 05735.....468-2218
Castleton State College, Castleton 05735 468-5611

RUTLAND-5

*D Orzell, John J., RFD, Box 184, North Lane, W. Rutland 05777.....438-5546
Main Street Cash Market, 192 Main St., W. Rutland 05777 438-9880

RUTLAND-6-1

*D Durkee, Irene, 116 Bellevue Ave., Rutland 05701.....775-5278

*R Goodwin, Mary W., 234 Grove St., Rutland 05701 773-9270

RUTLAND-6-2

D Moore, Walter M., 12 Engram Ave., Rutland 05701.....773-9018
Mt. St. Joseph Academy, Convent Ave., Rutland 05701 775-0151

*R Rice, Lyle K., 15 Harvard St., Rutland 05701 773-8639

RUTLAND-6-3

R Walbridge, Ruth T., 105 Robbins St., Rutland 05701 773-3925

RUTLAND-6-4

*D Candon, Thomas H., Box 23, 5 Royce St., Rutland 05701.....773-6559
56-1/2 Merchants Row, Box 23, Rutland 05701 773-8343

*D Keefe, Alexander F., 43 Morse Place, Rutland 05701 773-9652

RUTLAND-6-5

*I Billings, Harold E., Creek Road, North Clarendon 05759 775-4407

RUTLAND-7

*R Moore, Donald A., Old Plymouth Road, Shrewsbury 05738.....492-3363

RUTLAND-8

*R Weidman, Harold D., 11 North Main St., Wallingford 05773 446-2332
Key Realty, South Main St., P.O. Box 177, Ludlow 05149 228-5111

WASHINGTON-1

*R Auld, Susan D., Shady Rill - Middlesex, RFD #1, Worcester 05682.....229-0105

R Wallace, Keith A., RD #2, Box 144, Waterbury 05676 244-7587

WASHINGTON-2

D Marsh, Donald, Marshfield 05658.....426-3585
Marshfield Engineering Service, Marshfield 05658 426-3585

WASHINGTON-3-1

*R Corskie, John C., 21 Pinewood Road, Montpelier 05602 223-2613

WASHINGTON-3-2

*R Giuliani, Peter, 15 College Street, Montpelier 05602 223-3236

WASHINGTON-3-3

R Clifford, Everett "Pat", 59 E. State St., Montpelier 05602 223-3686
State Equipment Corp., P.O. Box 336, Montpelier 05602 229-9177

WASHINGTON-4

D Youngbaer, Peter, RFD #2, Plainfield 05667 454-7752

WASHINGTON-5

*D Just, Anne, RR #1, Box 141, Warren 05674 496-2825

WASHINGTON-6

R Falzarano, L. Domenic, 41 Water St., Northfield 05663.....485-3621
Falzarano Trucking, 41 Water St., Northfield 05663 485-3621

*R King, Glendon N., 3 Hill Street, Northfield 05663.....485-7070
Norwich University, Northfield 05663 485-5011 - Ext. 236

WINDHAM-1

*R Morse, Stephan, Box 95, Newfane 05345.....365-4255

WINDHAM-2

*D Toby Young Price, RFD #3, Putney

*R Wright, Norman E., P.O. Box 253, Putney 05346.....387-6660
Appraisal Associates, P. O. Box 253, Putney 05346 387-5925

WINDHAM-3

*D Ashcroft, Mary C., 6 Chase Park, Bellows Falls 05101 463-3706

*D Obuchowski, Michael J., 72 Atkinson St., Bellows Falls 05101 463-3415
Ponek Movers, 24 Square St., Bellows Falls 05101 463-4645

WINDHAM-4-1

*D Buraczynski, Anthony, RFD #1, 92 Putney Rd., Brattleboro 05301 254-5463

WINDHAM-4-2

*D Emond, Robert J., 30 Fairview St., Brattleboro 05301 254-6707

WINDHAM-4-3

R Hansen, Christian, Jr., 2 Shadow Lawn, Brattleboro 05301 254-2626
Avenue Grocery, 24 Western Ave., Brattleboro 05301 257-1846

WINDHAM-4-4

*D Switzer, Verne B., RFD #2, Box 12, Brattleboro 05301 254-4807
Book Press, Putney Road, Brattleboro 05301 257-7701

WINDHAM-5

*R Hunt, Stuart W., Sr., RFD #4, Box 300, W. Brattleboro 05301.....254-9707

WINDHAM-WINDSOR-1

R Bernhardt, Michael, RR #1, Box 21, So. Londonderry 05155 824-5221
Qualitad Sales Corp., P.O. Box 681, Rutland 05701 773-9141

WINDSOR-1

R Lancaster, Virginia, P.O. Box 2, Woodstock 05091 457-1792
Green Mountain Horse Assoc., Box 8, So. Woodstock 05071 457-1509

*R Lucas, Edward C., Bridgewater 05034.....672-3331
Cabot Company, U.S. Rt. 4, Woodstock 05019 457-1950

WINDSOR-2

*D Reed, Norman "Joe" E., Chandler Rd., White River Jct. 05001.....295-7876
Box 372, Wilder 05088

R Small, Millie, Box 136, 12 River St., Quechee 05059.....295-2240
Quechee Lakes Corp., Quechee 05059 295-7527 or 295-7525

WINDSOR-3

*R Hood, Louise B., Star Route #1, Windsor 05089.....674-2726

R Hammond, Sidney M., RFD Mace Hill Road., Hartland 05048.....436-2408

WINDSOR-4

*D Murphy, John F., RFD #1 - Box 125, Ludlow 05149.....228-5291
General Electric Co., Rutland 05701 773-9121

D Tofferi, Leigh J., 72 Main St., Ludlow 05149 228-8000
The Black River Tribune, 72 Main St., Ludlow 05149 228-8817

WINDSOR-5-1

D Lawlor, Bruce M., 38 Reed St., Springfield 05156 885-3258
Richards and Lawlor, P.C., 17 Pleasant St.....885-5131
P.O. Box 200, Springfield 05156

*D May, Edgar, Charlestown Road, Springfield 05156.....885-4243

WINDSOR-5-2

D Warren, Richard, 22 Fairground Heights, Springfield 05156.....885-5568
Fellows Corp., Precision Dr., N. Springfield 05150 886-8333

WINDSOR-5-3

*R Bates, Mayolyn H., Chester 05143 875-2305

REFERENCES

1. Secretary of State, Civil Government State of Vermont, May 1981.

2. (See Reference 1.)

3. (See Reference 1.)

APPENDIX D
STATE LEGISLATION AND REGULATIONS

IONIZING AND NONIONIZING RADIATION CONTROL
Title 18, Vermont Statutes Annotated
Chapter 32, § 1651-1657

§ 1651. DEFINITIONS

In this chapter:

(1) Ionizing radiation means gamma rays and x-rays, alpha and beta particles, high speed electrons, neutrons, protons and other nuclear particles.

(2) Nonionizing radiation means radiations of any wavelength in the entire electromagnetic spectrum except those radiations defined above as ionizing. Nonionizing radiations include, but are not limited to: Ultraviolet, visible, infrared, microwave, radiowave, low frequency electromagnetic radiation; infrasonic, sonic and ultrasonic waves; electrostatic and magnetic fields.

(3) Radioactive material means any radioactive material, be it solid, liquid or gas, which emits ionizing radiation spontaneously.

(4) Byproduct material means any radioactive material, except special nuclear material, yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

(5) General license means a license effective under regulations promulgated by the state radiation control agency without the filing of an application to transfer, acquire, own, possess or use quantities of, or devices or equipment utilizing byproduct, source or special nuclear materials or other radioactive material occurring naturally or produced artificially.

(6) Specific license means a license, issued after application to use, manufacture, produce, transfer, receive, acquire, own, or possess quantities of, or devices or equipment utilizing byproduct, source or special nuclear materials or other radioactive material occurring naturally or produced artificially.

(7) The Department of Health is the state radiation control agency, called the agency herein.

(8) Source material means:

(A) uranium, thorium, or any other material which the Governor declares by order to be source material after the United States Nuclear Regulatory Commission, or any successor thereto, has determined the material to be such; or

(B) ores containing one or more of the foregoing materials, in such concentration as the Governor declares by order to be source material after the United States Nuclear Regulatory Commission, or any successor thereto, has determined the material in such concentration to be source material.

(9) Special nuclear material means:

(A) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Governor declares by order to be special nuclear material after the United States Nuclear Regulatory Commission, or any successor thereto, has determined the material to be such, but does not include source material; or

(B) any material artificially enriched by any of the foregoing, but does not include source material.

§ 1652. STATE RADIATION CONTROL

(a) The Commissioner of Health may designate the director of occupational health as the individual who shall perform the functions vested in the agency.

(b) The agency shall, for the protection of the occupational and public health and safety, develop programs for the control of ionizing and nonionizing radiation compatible with federal programs for regulation of byproduct, source and special nuclear materials.

(c) The agency may adopt, amend and repeal rules under chapter 25 of Title 3:

(1) which may provide for licensing and registration for the control of sources of ionizing radiation;

(2) for the control and regulation of sources of nonionizing radiation.

(d) The agency shall advise, consult and cooperate with other agencies of the state, the federal government, other states and interstate agencies, political subdivisions, industries, and with groups concerned with control of sources of ionizing and nonionizing radiation.

§ 1653. Federal-state agreements.

(a) The Governor, on behalf of the State of Vermont, may enter into agreements with the federal government providing for discontinuance of certain of the federal government's responsibilities with respect to byproduct, source and special nuclear materials and the assumption thereof by the State of Vermont.

(b) In the event of such agreement,

(1) The agency shall provide by rule for general or specific licensing of byproduct, source, special nuclear materials or devices or equipment utilizing such materials. The rule shall provide for amendment, suspension or revocation of licenses.

(2) The agency shall be authorized to exempt certain byproduct, source or special nuclear materials or kinds of uses or users from the licensing or registration requirements set forth in this section when the agency makes a finding that the exemption of such materials or kinds of uses or users will not constitute a significant risk to the health and safety of the public.

(3) Any person having a license immediately before the effective date of an agreement under subsection 3 (a) from the federal government or agreement state relating to byproduct material, source material or special nuclear material and which on the effective date of this agreement is subject to the control of this state shall be considered to have a like license with the State of Vermont until the expiration date specified in the license from the federal government or agreement state or until the end of the ninetieth day after the person receives notice from the agency that the license will be considered expired.

(4) The agency shall require each person who possesses or uses byproduct, source or special nuclear materials to maintain records relating to the receipt, storage, transfer or disposal of such materials and such other records as the agency may require subject to such exemptions as may be provided by rule.

(5) Violations

(A) It shall be unlawful for any person to use, manufacture, produce, transport, transfer, receive, acquire, own or possess any byproduct, source or special nuclear material unless licensed by or registered with the agency in accordance with the provisions of this chapter.

(B) The agency shall have the authority in the event of an emergency to impound or order the impounding of byproduct, source and special nuclear material in the possession of any person who is not equipped to observe or fails to observe the provisions of this chapter or any rules or regulations issued thereunder.

(6) The provisions of this section relating to the control of byproduct, source and special nuclear materials shall become effective on the effective date of an agreement between the federal government and this state as provided in this chapter.

§ 1654. Inspection

The agency or its duly authorized representatives may enter at all reasonable times upon any private or public property for the purpose of determining whether or not there is compliance with or violation of this chapter and rules and regulations issued thereunder, except that entry into areas under the jurisdiction of the federal government shall be made only with the concurrence of the federal government or its duly designated representative.

§ 1655. Hearings and judicial review

(a) In any proceeding under this chapter for the issuance or modification of rules relating to control of byproducts, source and special nuclear materials; or for granting, suspending, revoking or amending any license; or for determining compliance with or granting exemptions from rules and regulations of the agency, the agency shall hold a public hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to the proceeding, subject to the emergency provisions in subsection (b).

(b) Whenever the agency finds that an emergency exists requiring immediate action to protect the public health and safety, the agency may, without notice or hearing, issue a regulation or order reciting the existence of the emergency and requiring that such action be taken as is necessary to meet it. Notwithstanding any provisions of this chapter, the regulation or order shall be effective immediately. Any person to whom the regulation or order is directed shall comply therewith immediately, but on application to the agency shall be afforded a hearing within ten days. On the basis of the hearing, the emergency regulation or order shall be continued, modified or revoked within ten days after the hearing.

(c) Any final order entered in any proceeding under subsections (a) and (b) above shall be subject to judicial review in the appropriate court.

§ 1656. Injunction proceedings

Whenever, in the judgment of the agency, any person has engaged in or is about to engage in any acts or practices which constitute or will constitute a violation of any provision of this chapter, or any rule issued thereunder, the Attorney General shall make application to the appropriate court for an order enjoining such acts or practices, or for an order directing compliance, and upon a showing by the agency that such person has engaged or is about to engage in any such acts or practices, a permanent or temporary injunction, restraining order, or other order may be granted.

§ 1657. Penalties

Any person who violates this chapter or rules in effect pursuant thereto shall, upon conviction thereof, be imprisoned not more than six months, or fined not more than $500.00 or less than $100.00, or be both imprisoned and fined.

Sec. 3. This act or any section thereof may be amended and further considered at any time during the 1977 biennial session of the general assembly.

Sec. 4. Articles of merchandise for personal or household use which comply with federal laws or regulations pertaining to the subject matter of this chapter shall be deemed to be in compliance with the provisions of this chapter.

Sec. 5. 18 V.S.A. § 1658 is repealed.

Approved by Governor Snelling: April 27, 1977
Effective Date: July 1, 1977

Chapter 157. Storage of Radioactive Material

SECTION

6501. Storage of radioactive material.
6502. Petition procedure.
6503. Legislative approval.
6504. [Repealed.]
6505. Exemption.
6506. Definitions.

§ 6501. Storage of radioactive material

(a) No facility for deposit, storage, reprocessing or disposal of spent nuclear fuel elements or radioactive waste material shall be constructed or established in the state of Vermont unless the general assembly first finds that it promotes the general good of the

state and approves, through either bill or joint resolution, a petition for approval of the facility.

(b) The construction or establishment after the effective date of this act of a low-level, temporary storage facility is exempted from subsection (a) of this section. For the purposes of this subsection, the term "low-level, temporary storage" means storage of material:

(1) which is produced by research, educational, industrial or medical uses not involving a fission reactor; and

(2) which has an overall radioactivity level, before any dilution, of less than one curie per cubic foot; and

(3) which either:

(A) is awaiting transfer to a commercial disposal site; or

(B) is of a material which spontaneously decreases its radioactivity level by one-half in 90 days or less.—Added 1977, No. 77, § 1, eff. April 26, 1977; amended 1979, No. 191 (Adj. Sess.), § 1.

1979 (Adj. Sess.) amendment. Subsection (a): Designated existing section as subsec. (a) and deleted the comma following the word "reprocessing" and the words "high level" preceding "radioactive waste material".

Subsection (b): Added.

Savings clause. 1977, No. 77, § 2, eff. April 26, 1977, provided: "This act [which added this chapter] shall not apply to any temporary storage by Vermont Yankee Nuclear Power Corporation of its spent nuclear fuel elements at its present site."

§ 6502. Petition procedure

(a) A petition for approval by the general assembly of a facility under section 6501 of this title shall be submitted to the speaker of the house and the president of the senate. The petition shall be referred forthwith to the joint energy committee.

(b) The committee shall hold a public hearing on each petition for approval. Notice of the public hearing shall be published two weeks successively in a newspaper of general circulation in the county in which the proposed facility is to be located, the last publication to be at least 12 days before the day appointed for the hearing. Any agency or person may submit recommendations relating to the proposed facility to the committee. The committee shall be authorized to examine all records and information relevant to the petition in the possession of the petitioner or any state agency.

(c) Upon receipt of the petition, notice shall be given by the committee to the chairman of the public service board, the commissioner of health, the secretary of the agency of environmental conservation and the attorney general. Each public official so

notified shall, prior to the public hearing under subsection (b) of this section, submit to the committee his agency's evaluation of the impact of the facility on the state and any other information deemed relevant to the petition.

(d) Notice, by certified mail, shall be given to the chairman or director of the municipal and regional planning commissions and the board of selectmen for each town, in which the proposed facility is to be located and each contiguous town not less than 30 days prior to the public hearing under subsection (b) of this section.—Added 1977, No. 77, § 1, eff. April 26, 1977; amended 1979, No. 191 (Adj. Sess.), § 2.

Revision note. The words "of this title" were inserted following "section 6501" to conform to the general style of V.S.A.

1979 (Adj. Sess.) amendment. Subsection (a): Deleted the phrase "In the event that the joint energy committee to be established by Senate bill 44 of the 1977 session of the general assembly is in existence on the date of receipt of the petition", from the beginning of the second sentence and deleted the last sentence which read "If the joint energy committee is not in existence on the date of the receipt of a petition, the petition shall be referred forthwith to the joint legislative committee on radioactive material established for this purpose under section 6504 of this title."

§ 6503. Legislative approval

(a) The committee shall report to the general assembly its recommendation to approve or not to approve the petition for the facility together with such additional information and comment it deems appropriate.

(b) Any bill or joint resolution approving a facility under section 6501 of this title shall include findings that the proposed facility:

(1) will promote the general welfare and will not have an undue adverse effect on health, safety, aesthetics, historic sites, air and water purity, the natural environment and the economy; and

(2) will not unduly interfere with the orderly development of the region with due consideration having been given to the recommendations of the municipal and regional planning commissions and the municipal legislative bodies.

(c) Unless the proposed facility is approved by the general assembly, no state officer, agency or department shall undertake to approve or license the proposed facility or undertake to cause or obtain the approval or licensing from any other state or federal governmental agency or board. The appropriate state officers and

agencies shall use every proper and available legal means to prevent siting and licensing of such facility until the approval of the general assembly is obtained.

(d) No temporary storage facility which is a part of a nuclear fission plant approved by the general assembly pursuant to section 248(c) of Title 30 shall be required to obtain the additional approval required by this section.—Added 1977, No. 77, § 1, eff. April 26, 1977.

§ 6504. Repealed. 1979, No. 191 (Adj. Sess.), § 5.

Former section 6504 related to a joint legislative committee on radioactive material and was derived from 1977, No. 77, § 1.

§ 6505. Exemption

This chapter does not apply to any temporary storage by Vermont Yankee Nuclear Power Corporation of spent nuclear fuel elements or other radioactive waste at its present site.—Added 1979, No. 191 (Adj. Sess.), § 3.

§ 6506. Definitions

As used in this chapter, "radioactive waste" means waste material:

(1) Technologically enhanced for the purpose of increasing the concentration of radioactive elements; or,

(2) Contaminated with such technologically enhanced material to a radioactive level above background.—Added 1979, No. 191 (Adj. Sess.), § 4.

PART V. CHAPTER III.

RADIOLOGICAL HEALTH

SUBSECTION I. RADIATION PROTECTION

Section
5-301. Purpose.
5-302. Scope.
5-303. Definitions.
5-304. Exemptions.
5-305. Standards.
5-306. Inspections.
5-307. Notice of violation in writing.
5-308. Enforcement.
5-309. Appeal.
5-310. Registration.
5-311. Transportation.

SUBSECTION II. X-RAY SHOE FITTING

5-321. Prohibition of X-ray shoe fitting devices.

SUBCHAPTER I. RADIATION PROTECTION

5-301. Purpose.

The Board of Health finds that ionizing radiation and sources thereof relate to public health and the preservation of public health requires the promulgation of rules and regulations pertatining to such radiation and sources thereof.

This regulation establishes standards for protection against radiation hazards associated with sources of ionizing radiation.

Source. Regulation for Radiation Protection. Effective December 10, 1977.
Authority. 18 V.S.A. Sec. 102 and 18 V.S.A. Chapter 32.

Section 5-302. Scope.

This regulation applies to all persons who recevie, possess, use or transfer sources of ionizing radiation except that nothing in these regulations shall be construed to limit the kind or amount of radiation that may be applied intentionally to a patient for diagnostic or therapeutic purposes by or under the direction of a practitioner of the healing arts licensed by the State of Vermont as follows:

(A) A person licensed to practice chiropody.
(B) A person licensed to practice chiropractic.
(C) A person licensed to practice dentistry.
(D) A person licensed to practice medicine and surgery.
(E) A person licensed to practice osteopathy.

Section 5-303. Defintions.

(A) "As low as is reasonably achievable", for the purpose of this regulation means as low as is reasonably achievable taking into account the state of technology at or available to Vermont Yankee and the economics of improvemetns in relation to the benefits to the public health and safety and in realtion to the utilization of atomic energy in the public interest.

(B) "Background radiation", for the purpose of this regulation, means the natural radioactivity of the atmosphere that results from the presence of radioactive materials which originate either from radioactive minerals in the earth's crust or from the interaction of cosmic radiation with the gases of the atmosphere. It also includes the radioactivity contributed by atmospheric nuclear weapons testing programs.

(C) "Board" means Vermont State Board of Health.

(D) "Curie" (Ci) is defined as 3.7×10^{10} disintigrations per second. Commonly used in submultiples of the curie are millicurie (mCi) and the microcurie (μCi):

1. One millicurie = 0.001 curie
2. One microcurie = 0.000001 curie

(E) "Dose" means the quantity of radiation absorbed per unit of mass by the body or any portion of the body.

(F) "Individual" means any human being.

(G) "Unrestricted Area" means any area, access to which is not controlled by the owner or person having possession of any source of ionizing radiation, for the purposes of protection of individuals from exposure to radiation and radioactive materials, or to any area used for residential quarters.

(H) "Ionizing radiation" means gamma rays and X-rays, beta and alpha particles, high speed electrons, neutrons, protons and other nuclear particles, but not sound or radiowaves or visible, infrared, or ultraviolet light.

(I) "Radioactive materials" means all materials that are determined to be a source of ionizing radiation.

(J) "Radioactive materials" (radioactivity) is commonly, and for purposes of this regulation, measured in terms of disintigrations per unit time or in curies.

(K) "Rem" means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of one roentgen (r) of X-rays. A commonly used submultiple of the rem is the millirem (mrem):

1. One millirem (mrem) = 0.001 rem

For the purpose of this regulation any of the following is considered to be equivalent to a dose of one rem:

1. A dose of 1 r due to X-ray or gamma radiation.
2. A dose of 1 rad due to X-ray, gamma or beta radiation.
3. A dose of 0.1 rad due to neutrons or high energy protons.
4. A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.

Section 5-304. Exemptions.

The following materials, machines and conditions are exempt from these regulations:

(A) Radioactive materials of an equivalent specific radioactivity not exceeding that of natural potassium. (10^{-9} curies per gram of potassium).

(B) (1) Quantities of byproduct materials exempted from licensing requirements of the U.S. Nuclear Regulatory Commission as defined in Code of Federal Regulations, Title 10, Parts 30.15, 30.16, 30.18 and 30.71.

(2) Sealed sources of Radium of one microcurie or less, and unsealed sources of Radium of 0.1 microcurie or less, providing the user does not possess more than 10 such quantities.

(3) Quantities of source material for which the U.S. Nuclear Regulatory Commission has issued a general license in Code of Federal Regulations, Title 101, part 40.22.

(4) Quantities of accelerator-produced radionuclides not exceeding the quantities listed in Code of Federal Regulations, Title 10, part 30.71, or for nuclides not listed therein, not exceeding 10 microcuries.

(C) Domestic television receivers, providing the dose rate at 5 cm from any outer surface is less than 0.5 mrem per hour.

(D) Other electrical equipment that produces radiation incidental to its operation for other purposes, providing the dose rate to the whole body at the point of nearest approach to such equipment when any external shielding is removed does not exceed 0.5 mrem per year. The production testing or factory servicing of such equipment shall not be exempt.

(E) Radiation machines which cannot be used in such a manner as to produce radiation. (For example, X-ray machines in transport or electrical equipment in storage.)

(F) Radioactive material, except as specified in Section 5-311, being transported across the state in conformance with regulations of any Federal Agency having jurisdiction over safety in interstate commerce.

(G) Excreta from individuals undergoing medical diagnosis or therapy with radioactive materials are exempt from any limitation contained in this regulation.

(H) Other sources of radiation that the agency finds should be exempted.

Section 5-305. Standards.

(A) The Division of Occupational Health, Vermont Department of Health shall use the recommendations contained in the reports of the National Council on Radiation Protection and Measurements and the handbooks of the National Bureau of Standards as the standards and bases for calculations to obtain and maintain safe conditions within the meaning of this regulation.

(1) (a) Entrance Skin Exposure Criteria (ESEC) for non-specialty radiographic examinations shall not be exceeded when technical factors for an average adult patient (Standard person--defined below) are utilized.

1) P.A. Chest: ESEC shall not exceed 30 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 15 milliRoentgens or less per radiograph is strongly recommended.

2) Lateral Skull: ESEC shall not exceed 300 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 200 milliRoentgens or less per radiograph is strongly recommended.

3) A.P. Abdomen: ESEC shall not exceed 750 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 500 milliRoentgens or less per radiograph is strongly recommended.

4) A.P. Cervical Spine: ESEC shall not exceed 250 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 175 milliRoentgens or less per radiograph is strongly recommended.

5) A.P. Thoracic Spine: ESEC shall not exceed 900 milliRoentgens per radiograph. Radiaiton exposure at the patient's skin of 600 milliRoentgens or less per radiograph is strongly recommended.

6) A.P. Lumbar Spine: ESEC shall not exceed 1000 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 675 milliRoentgens or less per radiograph is strongly recommended.

7) A.P. Retrograde Pyelogram: ESEC shall not exceed 900 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 600 milliRoentgens or less per radiograph is strongly recommended.

7) Dental (Bitewing or Periapical): ESEC shall not exceed 700 milliRoentgens per radiograph. Radiation exposure at the patient's skin of 350 milliRoentgens or less per radiograph is strongly recommended.

(b) A standard person, for the purposes of this regulation, is defined as an individual meeting the following anthropemetric guidelines for the radiographic examination projection specified.

Body Part	Thickness of Part	Examination Description
Thorax	23 centimeters	P.A. Chest
Head	15	Lateral Skull
Abdomen	23	A.P. abdomen
Neck	13	A.P. cervical spine
Thorax	23	A.P. thoracic spine
Abdomen	23	A.P. lumbar spine
Abdomen	23	A.P. retrograde pyleogram

(c) Actual patient skin doses may exceed those shown for the standard person or for correlated doses for persons of greater or lesser anthropemetric measurements if the attending practitioner of the healing arts determines that clear and present medical/dental necessity requires such dosage increase. A written, signed statement by the practioner explaining the need for increased patient dosage shall become a permanent part of the patient's medical/dental record.

ADVISORY NOTE: The following Entrance Skin Exposure Criteria measurement protocol will be used by State Health Department personnel to obtain data for regulatory purposes:

1) A calibrated integrating radiation measuring device is placed in the center of the primary X-ray field at the location of entrance skin of a standard person for determination of exposure in the air.

2) Technical factors and other parameters such as field size and source-to-receptor distance are determined for a specific examination of a standard person.

3) For photo-timed X-ray equipment, a phantom designed to simulate attenuation of a standard person is placed between the radiation measuring device and the photo-time sensing element in a manner to minimize backscatter.

4) The radiographic equipment is energized (without patient) and the radiation measuring device reading is recorded for compliance purposes.

(2) (a) Specific area gonad shielding on patients during medical diagnostic X-ray procedures shall have a lead equivalent of at least 0.25 mm and shall be required when the following conditions exist:

1) The gonads will lie within the primary x-ray field or within close proximity (5centimeters) despite proper beam limitation.

ADVISORY NOTE: Specific area testicular shielding also should be used during examinations of the abdominal region in which the testes may lie close to the primary X-ray field. Examples of such examinations include lumbar spine, intravenous pyelogram, and abdomen films.

2) The clinical objectives of the examination will not be compromised.

ADVISORY NOTE: Each X-ray facility should compile a list of radiographic examinations for which gonad shielding is appropriate. Specific area ovarian shielding should be used during any examination of the abdominal region when such shielding will not obscure visualization of adjacent structures required by the examination. Specific area testicular shielding should be used for all examinations of male patients in which the public smphysis will be visualized on the film and when such shielding will not obscure visualization of adjacent structures required by the examination.

3) The patient has a reasonable reproductive potential.

(3) Special dose limiting requirements.

(a) Protection of the embryo or fetus during radiological examination of women known to be pregnant shall be given special consideration.

ADVISORY NOTE: It is recommended that radiologic examinations of abdomen and pelvis which do not contribute to the diagnosis of pregnant or potentially pregnant women in relation to their current illness be restricted to the first 10 days of the menstrual cycle in case of potentially pregnant individuals and avoided entirely during known pregnancy. The attending practitioner of the healing arts retains full and complete discretion to carry out any radiographic examination considered medically necessary without regard for the phase of the menstrual cycle or fetal presence.

(b) During the entire gestation period, the maximum permissible dose equivalent to the fetus from occupational radiation exposure of the expectant mother shall not exceed 0.5 rem.

ADVISORY NOTE: Annual dose accumulation should be kept below 2 or 3 rems acquired at a more or less steady rate. In such cases, the probability of the dose to a fetus exceeding 0.5 rem before a pregnancy is recognized is small.

(c) Maximum Permissible Dose Equivalent for minors under 18 years of age shall not exceed 0.1 rem per year from occupational radiation exposure or from radiation exposure received during educational or training activities. This is to be considered to be part of the annual dose limit of 0.5 rem appropriate for an individual in the general public, and not supplemental to it.

(B) Notwithstanding part (A) of this section, exposure of individuals in unrestricted areas to radiation and radioactive materials from the Vermont Yankee Nuclear Power Station shall be kept as low as is reasonably achievable.

(1) Discharges of radioactive materials and direct gamma radiation to unrestricted areas shall be controlled as follows:

(a) Gaseous Effluents

1) The annual dose objective for the total-body of an individual in an unrestricted area due to plant emissions of radioactive noble gases is 5 millirems. For the purpose of this objective an annual average release rate of 1 oercent of the maximum allowable release rate as defined in (B) (1) (a) 2) will be considered equivalent to a dose of 5 millirems per year.

2) The maximum release of any mixture of radioactive noble gases from the plant shall not exceed $0.08/\overline{E\gamma}$ Ci/sec. where $\overline{E\gamma}$ is the average gamma decay energy for the gaseous effluent mixture in Mev/disintigration.

3) If a routine surveillance check as described in Vermont Yankee Technical Specifications reveals that the maximum release rate limit of Section 5-305 (B)(1)(a) 2) has been exceeded, an orderly shutdown shall be initiated and the reactor shall be in cold shutdown condition within 24 hours.

4) If the release rate of any mixture of radioactive noble gases, averaged over a calendar quarter, exceeds 4 percent of the limit defined in (B)(1)(a) 2) the actions described in (B)(2) shall be taken.

5) If the release rate of any mixture of radioactive noble gases, averaged over a calendar quarter, exceeds 8 percent of the limit defined in (B) (1)(a) 2) the actions described in (B)(3) shall be taken.

(b) Liquid Effluents

1) The annual dose objective for the total-body or any organ of an individual in an unrestricted area, due to plant discharges of liquid effluents is 5 millirems. For the purpose of this objective an annual release rate of 1 percent of the maximum allowable concentrations as defined in (B)(1)(a) 2) through 4) will be considered equivalent to a dose of 5 millirems per year.

2) The maximum concentration of radioactive material, except tritium and dissolved noble gases, at the point of discharge to the Connecticut River shall not exceed 1×10^{-7} μCi/ml unless the discharge is controlled on a radionuclide basis in accordance with Appendix B, Table II, Column 2 of 10 CFR 20 and notes 1.5 thereto.

3) The maximum concentration of tritium at the point of discharge to the Connecticut River shall not exceed 4×10^{-3} μCi/ml.

4) The maximum concentration of dissolved noble gases at the point of discharge to the Connecticut River shall not exceed 4×10^{-5} μCi/ml.

5) If the limits defined in Section 5-305 (B)(1)(b) 2) through 4) cannot be met, radioactive liquid effluents shall not be released.

6) If the concentrations of radioactive materials in liquid effluents, when averaged over a calendar quarter, except tritium and dissolved noble gases, exceeds 2 percent of the limits defined in Section 5-305 (B)(1)(b) 2) the actions described in (B)(2) shall be taken.

7) If the average concentration of tritium exceeds 6×10^{-5} μCi/ml or the average concentration of dissolved noble gases exceeds 8×10^{-7} μCi/ml during a calendar quarter, actions described in Section 5-305 (B)(2) shall be taken.

8) If the concentration of radioactive materials in liquid effluents, when averaged over a calendar quarter exceeds 4 percent of the limits defined in (B)(1)(b) 2) the actions described in (B)(3) shall be taken.

9) If the annual average concentration or radioactive materials released during a calendar quarter exceeds 1×10^{-4} μCi/ml for tritium or 2×10^{-6} μCi/ml for dissolved noble gases, the actions described in Section 5-305 (B)(3) shall be taken.

(c) <u>Radioiodine</u>

1) The annual dose objective for the thyroid of an individual in an unrestricted area due to plant emissions of radioiodine is 5 millirems. For the purpose of this objective, the release rate of radioiodine--131 shall be determined from the sum of analyses of the stack charcoal cartridge and the stack particulate filter for iodine--131. Furthermore, an annual average release rate of 1 percent of the maximum release rate as defined in (B)(1)(c) 2) will be considered equivalent to a thyroid dose of 5 millirems, based on the above analyses.

2) The maximum release rate of iodine--131 from the plant shall not exceed .057 μCi/sec.

3) If a routine surveillance check as described in Vermont Yankee Technical Specifications reveals that the maximum release rate limit of Section 5-305 (B)(1)(c) 2) has been exceeded, an orderly shutdown shall be initiated and the reactor shall be in cold shutdown condition within 24 hours.

4) If the release rate of iodine--131, averaged over a calendar quarter, exceeds 2 percent of the limit defined in (B)(1)(c) 2), the actions described in (B)(2) shall be taken.

5) If the release rate of iodine--131, averaged over a calendar quarter, exceeds 4 percent of the limit defined in (B)(1)(c) 2) the actions described in (B)(3) shall be taken.

(d) Radioactive Particulates

1) The annual dose objective for any organ of an individual in an unrestricted area due to plant emissions of radioactive particulates is 5 millirems. For the purpose of this objective an annual average release rate of 1 percent of the maximum release rate as defined in Section 5-305 (B)(1)(d) 2) will be considered equivalent to a dose of 5 millirems per year.

2) The maximum release rate of radioactive particulate with half-lives greater than 8.1 days, shall not exceed 1.6×10^3 MPCa Ci/sec. where MPCa is the composite maximum permissible concentration in air as determined in Appendix B, Table II, Column I of 10 CFR Part 20 and notes 1-5 thereto.

3) If a routine surveillance check, as described in Vermont Yankee Technical Specifications, reveals that the maximum release rate limit of Section 5-305 (B)(1)(d) 2) has been exceeded, an orderly shutdown shall be initiated and the reactor shall be in cold shutdown condition within 24 hours.

4) If the release rate of radioactive particulates with half-lives greater than 8.1 days, averaged over a calendar quarter, exceeds 2 percent of the limits specified in Section 5-305 (B)(1)(d) 2) the actions described in (B)(2) shall be taken.

5) If the release of radioactive particulates with half-lives greater than 8.1 days, averaged over a calendar quarter, exceeds 8 percent of the limits defined in Section 5-305 (B)(1)(d) 2), the actions described in (B)(2) shall be taken.

(e) Direct Gamma Radiation

1) The annual dose objective for the total-body of an individual in an unrestricted area due to plant emanations of gamma radiation is 5 millirems. For the purpose of this objective 20 millirems per year at any point on the site boundary bordered by land shall be considered

equivalent to a 5 millirem dose at the nearest residences in Vermont.

2) If any site boundary, bordered by land, quarterly average dose exceeds 10 millirems above background radiation, the actions described in (B) (3) shall be taken.

3) If any site boundary, bordered by land, quarterly average dose exceeds 20 millirems above background radiation, the actions described in (B)(3) shall be taken.

(B) (2) If the radioactive materials discharged from Vermont Yankee exceed the rates, concentrations, or quantities as defined in Subsections (B)(1)(a) 4), (B)(1)(b) 6), (B)(1)(b) 7), (B)(1)(c) 4), or (B)(1)(e) 2) of Section 5-305 of these regulations, Vermont Yankee management shall, as soon as it is evident that the quarterly average of any discharge will exceed these levels:

(a) Make an investigation to identify the causes of such release rates or radiation levels.

(b) Define and initiate a program to reduce such releases to within the objectives defined in (B)(1)(a) 1), (B)(1)(b) 1), (B)(1)(c) 1) and (B)(1)(e) 1).

(c) Report these actions to the State of Vermont Board of Health within 14 days of the date it became evident that the levels listed in (B)(2) would be exceeded, but in no event later than 10 days after the end of the calendar quarter; the report shall include submission of the plan for corrective action, to be approved by the Board of Health.

(d) Implement the approved plan with all reasonable speed.

(3) If the radioactive materials discharged from Vermont Yankee exceed the rates, concentrations, or quantities defined in Subsections (B)(1)(a) 5), (B)(1)(b) 8), (B)(1)(b) 9), (B)(1)(c) 5), (B)(1)(d) 5), or (B)(1)(e) 3) of Section 5-305 of these regulations, Vermont Yankee shall take the following actions as soon as it becomes evident that the quarterly average of discharges will exceed these levels, but in no event later than the last day of the calendar quarter in which the average discharge exceeds these levels:

(a) Make an investigation to identify the causes of the discharge which exceeded the levels listed in (B)(3) above, and initiate a program designed to insure that future discharges will be maintained at or below the levels listed in (B)(2) above.

(b) Immediately report the quarterly average discharge rates to the Vermont Board of Health, together with the action taken or proposed to be taken to achieve immediate reduction of the discharges.

(c) Within 14 days, but in no event later than 10 days after the end of the calendar quarter, report the actions described in (B)(3)(a) above to the Vermont Board of Health for the Board's

approval.

(C) Persons within the scope of this regulation, other than as described in Section 5-305 (A) and (B), shall control all sources of radiation by using the spplicable recommendations contained in the reports of the National Council on Radiation Protection and Measurements and the National Bureau of Standards handbooks as standards and bases for calculations.

Section 5-306. Inspections.

(A) All persons who receive, possess, use or transfer sources of ionizing radiation shall:

(1) Provide the Director of the Occupational Health Division, or his authorized representitive, with copies of all reports furnished the U.S. Nuclear Regulatory Commission related to radioactive effluents discharged under normal or abnormal operating conditions.

(2) Permit the Director of the Occupational Health Division, or his authorized representitive, at all times the opportunity to inspect and evaluate sources of radiation and the premises and facilities wherein such sources of radiation are used or stored, and shall make available pertinent data, as well as records and reports as may be required.

(3) Grant to the Director of the Occupational Health Division, or his authorized representitive, access to all records pertaining to the radiological health and safety of employees, to discharges of radioactive material to the environment, and to any effect of the operation of the facility upon the environment.

(4) Notify the Director of the Occupational Health Division, or his authorized representitive, of any radiological incident and reports thereof and in the same manner as defined and referred to in 10 CFR 20.403 and 20.405.

(5) Permit the Director of the Occupational Health Division, or his authorized representitive, to make unscheduled visits to the plant for the purpose of obtaining samples of liquid or gaseous effluents for analysis.

(6) Upon request by the Director of the Occupational Health Division, Vermont Yankee Nuclear Power Station management shall furnish advance notification of each scheduled calibration of effluent monitors and will permit the Director, or his authorized representitive, to be present during such calibration.

(7) Upon request by the Director of the Occupational Health Division, Vermont Yankee Nuclear Power Station management shall share samples of environmental media for purposes of data correlation.

Section 5-307. Notice of violation in writing.

If an inspection indicates that the source of radiation is not in compliance with the radiation-protection standards herein adopted, the operator or user shall be notified in writing, with full particulars regarding any deficiencies.

Section 5-308. Enforcement.

(A) Whenever there are reasonable grounds to believe that there has been a violation of any of the provisions of this regulation, the Board may (1) refer the matter to the Attorney General for proceedings consistent with 18 V.S.A. §1656, or (2) issue an order after affording the alleged violator a hearing or (3) in the event of an emergency, take action consistent with 18 V.S.A. §1655 (b).

(B) In the event that the Board proceeds under 5-308 (A) (2) above, it shall give written notice of the alleged violation to the violator and shall afford him an opportunity for a hearing. On the basis of the evidence produced at the hearing, the Board shall make findings of fact and conclusions of law and enter such order as in its opinion will best further the purposes of this regulation and shall give written notice of such order to the alleged violator and to such other persons as shall have appeared at the hearing and made written request for notice of the order.

Section 5-309. Appeal.

Any person aggrieved by any decision, order, or decree of the State Board, issued pursuant to this regulation, may, within 30 days after receiving notice of such decision, order, or decree, appeal through the ordinary and usual process of law.

Section 5-310. Registration.

(A) The owner or person having possession of any source of ionizing radiation except those exempted in Section 5-304, or licensed by the U.S. Nuclear Regulatory Commission, shall register each source with the Occupational Health Division, Vermont State Department of Health, within 90 days following the effective date of this regulaiton and shall register each new source within 30 days after the acquisition of such source. Registration shall be on forms provided by the Division.

(B) The registrant shall notify the Division within 30 days after any change in address.

(C) The owner or person having possession of any source of ionizing radiation not exempted in Section 5-304 (a) shall re-register such source every 3 years upon notification by the Director of the Occupational Health Division.

(D) No person, in any advertisement, shall refer to the fact that a source is registered with the Division and no person shall stste or imply that any activity under such registration has been approved by the Division.

Section 5-311. Transportation.

(A) Persons transporting or shipping radioactive materials into, out of, through, or within the state shall provide notificationto the Director of the Occupational Health Division prior to such shipment or transport if such shipment or transport meets any of the following criteria:

(1) Any shipment or package containg a large quantity of radioactive material as defined in Code of Federal Regulations Title 49, Part 173, 389 (b), and Title 10, Part 71.4 (f).

(2) Fuel elements which have been utilized in a nuclear reactor.

(3) Any Fissile Class I, Class II, or Class III package as defined in Code of Federal Regulations, Title 49, Part 173.

(4) Any carload, boatload, planeload or truckload lots of radioactive waste material for disposal.

(B) The shipper shall supply the following information in writing or by telephone to the Director of Occupational Health at least two working days prior to shipment. Schedule changes or additional information must be provided no later than two hours prior to shipment. To avoid undue hardship, the Director may approve other reporting schedules requested by the shipper.

(1) Name of shipper.
(2) Name of carrier.
(3) Type and quantity of radioactive material.
(4) Date and time of shipment.
(5) Starting point, scheduled route, and destination.
(6) Other information required by the Director of Occupational Health.

(C) Shipments shall be made throughout the state with due regard to public health and safety. The Director of Occupational Health may require changes in dates, routes of time of shipment if necessary to maximize protection to public health and safety. Where possible, the Director shall coordinate such changes with his counterparts in adjoining political jurisdictions.

SUBSECTION II. X-RAY SHOE FITTING

Section 5-321. Prohibition of X-ray Shoe Fitting Devices.

The Vermont State Board of Health hereby prohibits the installation or use of X-ray shoe fitting devices in the State of Vermont.

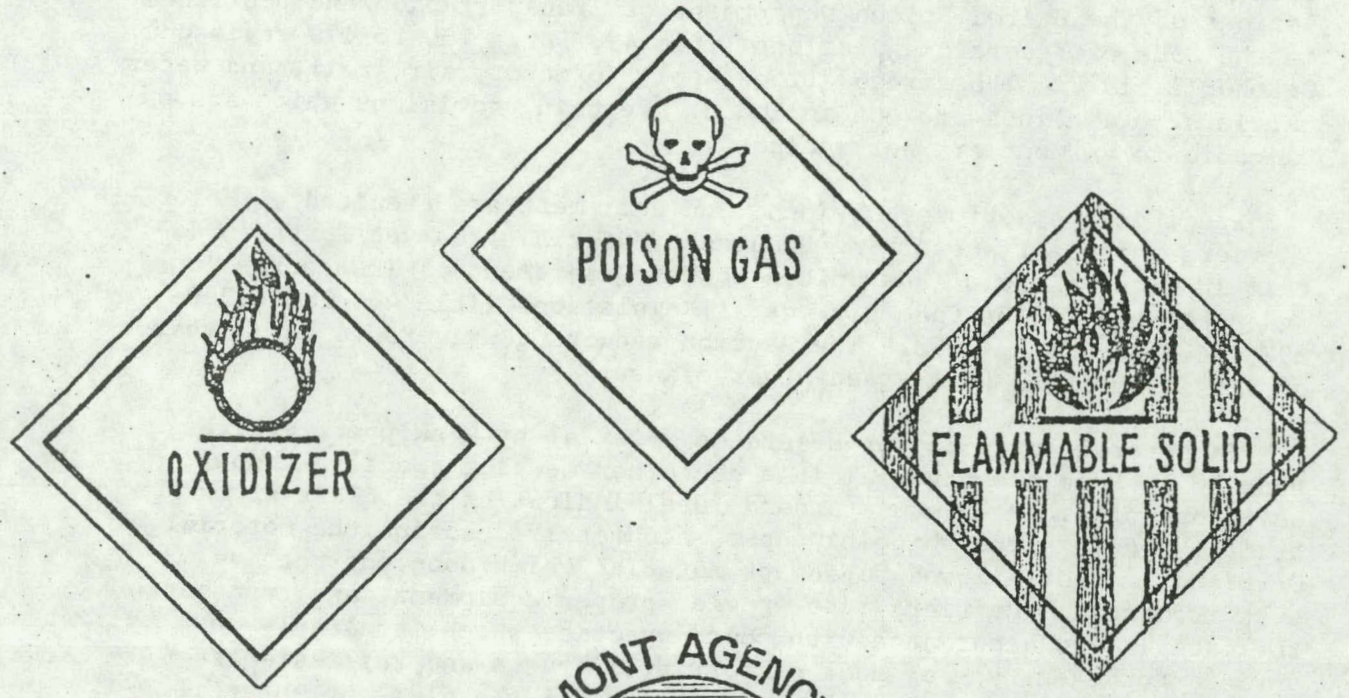
Source: Regulation on X-ray Shoe Fitting.
Authority: 18 V.S.A. Sec. 102.
Effective Date: June 20, 1957.
Preamble: This regulation contained the following preamble:

"WHEREAS, it has been made to appear to the Vermont State Board of Health and the Vermont State Board of Health does hereby find that there is evidence of radiation hazard to the public, particularly to children, from the use of X-ray shoe fitting devices, and

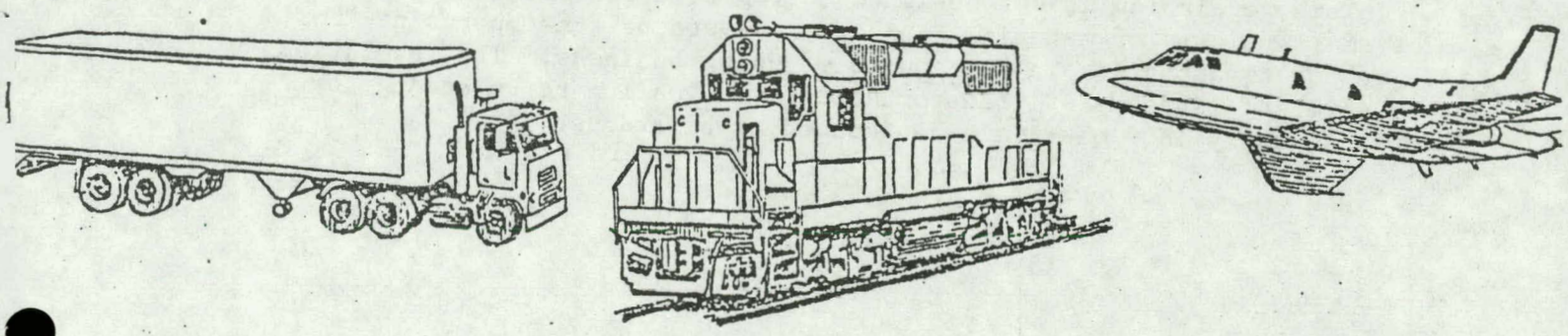
WHEREAS, it has been made to appear to the Vermont State Board of Health and the Vermont State Board of Health does hereby find that the X-ray shoe fitting devices presently being used by retail shoe stores in the State of Vermont represent a radiation hazard to the public, particularly to children."

DIVISION OF OCCUPATIONAL AND RADIOLOGICAL HEALTH
VERMONT STATE HEALTH DEPARTMENT
10 BALDWIN STREET
MONTPELIER, VERMONT 05602

Rules for Transportation of Hazardous Materials



VERMONT AGENCY OF TRANSPORTATION



Revised November 20, 1980

SUMMARY OF HAZARDOUS MATERIALS AND MOTOR CARRIER SAFETY REGULATIONS

Certain notices, containers, and actions are required of shippers offering items and material classified as Hazardous materials, and specific precautions, actions, and equipment are required of persons transporting such Hazardous Materials, as set fourth in detail in regulations of the United States Department of Transportation and published in the Code of Federal Regulations Title 49, Parts 100 to 179 revised October 1, 1977. These regulations apply to motor, air, rail, and water carriers. Pipelines are not included. Certain provisions which are applicable to Vermont are not included.

Specific precautions, actions, and equipment are required of Motor Carriers who are transporting Hazardous Materials, as set forth in detail in regulations of the United States Department of Transportation and published in the Code of Federal Regulations Title 49, Parts 390-397 dated August 1, 1978. The section requiring drivers to be 21 years of age is modified by a grandfather clause.

In general, offering of Hazardous Material by a shipper requires that he package the material in a container meeting specifications, that the container have a standard label indicating the class of material, and that the shipping papers accurately describe the material. Carriers are not allowed to accept material which does not receive such treatment. Carriers must provide proper equipment, and transport the material in accordance with sound practice which is clearly described for each type or mode of carrier. Trucks and rail cars are required to carry standard placards warning of the class of material being carried. Limits on quantity of material which may be carried are specified for aircraft, vessels and vehicles carrying passengers. The regulations are based on common sense and are not unduly restrictive.

The motor carrier safety regulations generally parallel the current state motor vehicle statutes, but provide new restrictions on drivers and vehicle safety devices. The regulations outline driver qualifications, including physical condition and examination, testing, licensing and record keeping. They also present practices for the safe driving of motor vehicles, the equipment, parts, and accessories for safe operation such as electrical, brakes, fuel systems, emergency accessories, inspection and maintenance, and for parking and driving.

This regulation is not designed to regulate private transportation of small volumes of material but does apply to persons operating "for hire" or transporting in the course of doing business. The regulations do cover all aspects of transportation from loading to unloading for approximately 1800 materials designated as hazardous.

Enforcement Provision

1. Any law enforcement officer of the State of Vermont and its municipalities, including but not limited to State Police Officers, Motor Vehicle Inspectors, Sheriffs, Chiefs of Police, and Municipal Police Officers, shall have the authority to enforce the rules and regulations pertaining to the Transportation of Hazardous Materials adopted by the Secretary of the Agency of Transportation.

2. Any law enforcement officer in the course of enforcing these rules and regulations is authorized to enter upon, to inspect, and to examine any and all lands, buildings, and equipment of any person subject to these rules and regulations, and to inspect and copy any and all accounts, books , records, memoranda, correspondence, and other documents.

3. Every person subject to these regulations shall submit their accounts, books, records, memoranda, correspondence, and other documents for inspection and copying and they shall submit their lands, buildings, and equipment for examination and inspection to any member of the Agency of Transportation upon demand and with appropriate identification by that person, and likewise any law enforcement officer acting within the scope of his duties and authority with respect to these rules and regulations.

4. Each carrier who transports hazardous materials and is required to return notices, reports, and information on a periodic or incident basis under the regulations shall likewise notify the Agency of Transportation in the same manner as is required for federal agencies. A copy of written reports furnished to any federal agency will be accepted. Reports shall be made to Director of Operations, Agency of Transportation, 133 State Street, Montpelier, VT 05602. Notices by telephone may be made to the Director at (802)828-2828. (See 49 CFR 171.15, 171.16, 174.45, 177.807). Notification and reports required by CFR 171.17 will be made to the Secretary of Environmental Conservation at (802)828-3395.

Notes:

1. Reference to Environmental Agency rules implies rule 80-70 effective July 16, 1980.

2. All of the regulations adopted shall be construed so that wherever Department of Transportation, Secretary of Transportation, and other federal agencies and titles are referred to, they shall be construed to mean and be in effect as State of Vermont Agency of Transportation and the Secretary of Transportation serving as the administrative head thereof.

   In those instances where the context requires otherwise, appropriate interpretation shall be made, i.e. where there is no comparable state agency, such as Coast Guard, then such shall be the Secretary of Transportation, or his designee. Subsidiary offices of the federal Department of Transportation shall be considered to be the Operations Division of the Agency of Transportation.

APPENDIX E
INTEREST GROUPS

APPENDIX E

NATIONAL INTEREST GROUPS WITH POTENTIAL CONCERN WITH LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

AMERICAN ASSOCIATION
OF PHYSICISTS IN MEDICINE
335 East 45th Street
New York, NY 10017
(212) 661-9404

AMERICAN COLLEGE OF
NUCLEAR PHYSICIANS
1101 Connecticut Avenue, N.W.
Washington, DC 20036
(202) 857-1135

AMERICAN HOSPITAL ASSOCIATION
444 North Capitol Street, N.W.
Suite 500
Washington, DC 20001
(202) 638-1100

AMERICAN NUCLEAR ENERGY COUNCIL
1750 K Street, N.W., Suite 300
Washington, DC 20006
(202) 484-2670

AMERICAN NUCLEAR SOCIETY
2029 K Street, N.W., Suite 501A
Washington, DC 20006
(202) 463-7220

AMERICAN PUBLIC HEALTH ASSOCIATION
1015 15th Street, N.W.
Washington, DC 20005
(202) 789-5600

ATOMIC INDUSTRIAL FORUM
7101 Wisconsin Avenue
Washington, DC 20014
(202) 654-9260

CONSERVATION FOUNDATION
1717 Massachusetts Avenue, N.W.
Washington, DC 20036
(202) 797-4300

CRITICAL MASS ENERGY PROJECT
P.O. Box 1538
Washington, DC 20013
(202) 546-4790

ENVIRONMENTAL ACTION COALITION
157 Fifth Avenue, Suite 1130
New York, NY 10010
(212) 929-8481

ENVIRONMENTAL ACTION, INC.
1346 Connecticut Avenue, N.W.
Room 731
Washington, DC 20036
(202) 833-1845

ENVIRONMENTAL DEFENSE FUND
1525 18th Street, N.W.
Washington, DC 20036
(202) 833-1484

ENVIRONMENTAL LAW INSTITUTE
1345 Connecticut Avenue, NW
Sixth Floor
Washington, DC 20036
(202) 452-9600

LEAGUE OF WOMEN VOTERS
OF THE UNITED STATES
1730 M Street, N.W.
Washington, DC 20036
(202) 296-1770

MOBILIZATION FOR SURVIVAL
3601 Locust Walk
Philadelphia, PA 19104
(215) 563-1512

NATIONAL ASSOCIATION OF
TOWNS AND TOWNSHIPS
1527 18th Street, N.W.
Washington, DC 20036
(202) 452-8100

NATIONAL INTEREST GROUPS WITH POTENTIAL
CONCERN WITH LOW-LEVEL RADIOACTIVE
WASTE MANAGEMENT (continued)

NATIONAL WILDLIFE FEDERATION
1412 16th Street, N.W.
Washington, DC 20036
(202) 797-6800

NATURAL RESOURCES DEFENSE
COUNCIL
122 East 42nd Street
New York, NY 10017
(212) 949-0049

NATIONAL AUDUBON SOCIETY
950 Third Avenue
New York, NY 10022
(212) 832-3200

SIERRA CLUB
530 Bush Street
San Francisco, CA 94108
(415) 981-8634

SOCIETY OF NUCLEAR MEDICINE
475 Park Avenue
New York, NY 10016
(212) 889-0717

UNION OF CONCERNED SCIENTISTS
1208 Massachusetts Avenue
Cambridge, MA 02138
(617) 547-5552

VERMONT STATE AND LOCAL INTEREST GROUPS
WITH POTENTIAL CONCERN WITH LOW-LEVEL
RADIOACTIVE WASTE MANAGEMENT

American Friends Service Committee
Weldin Farm
Route 5
Putney, VT

and

Route 1
Castleton, VT
(802)

Conservation Society of
Southern Vermont
Box 256
Townshend, VT 05353

League of Women Voters
2 Railroad Ave.
Essex Junction, VT 05452

New England Coalition on Nuclear
Pollution
Box 637
Brattleboro, VT 05301

New England Regional Energy Project
P.O. Box 514
Burlington, VT 05402

Public Interest Advocates
Box 412
Montpelier, VT 05602

Vermont Alliance
5 State St.
Montpelier, Vt.

Vermonters for Safe Power
Box 581
Living & Learning Center
Burlington, VT

Vermont Natural Resources
Council
26 State St.
Montpelier, VT

Vermont Public Interest
Reserch Group
43 State St.
Montpelier, VT 05602

Vermont Tomorrow Inc.
5 State St.
Montpelier, VT 05602

Vermont Yankee Decommis-
sioning Alliance
Brattleboro, VT
(802) 254-9883

APPENDIX F
REPRESENTATIVE NEWSPAPER ARTICLES ON LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT ISSUES

Vermonters Oppose Plan on Radioactive Waste

Cole & Nuclear Wastes

By ANNE HYDE
Windsor County Bureau

STRATTON — Vermonters protesting a proposed rule governing the shipment of radioactive wastes told a Department of Transportation panel this week they are vehemently against giving the federal government authority at the expense of state and local controls.

Malvine Cole of Stratton, who led the Vermont delegation to the hearing in Cambridge, Mass., earlier this week, said, "This proposed DOT regulation benefits the truckers and plants but endangers people.

"Until the federal government can protect people, our only recourse lies in local ordinances and state laws," Cole said in her testimony before the DOT panel.

The Vermonters went to the hearing to speak out against a proposed rule which, if adopted, will nullify local bans already passed in some 33 Vermont towns prohibiting the trasportation of radioactive wastes.

Cole, who is chairman of the group known as Stop Uranium Mining, said, "We are fearful lest the seizure of local and state's rights regarding transportation of radioactive waste set a precedent for seizure of authority over disposal of waste, even over the mining and milling of uranium."

The local referendums were voted two years ago after a statewide push to control nuclear waste transportation by the Vermont Public Interest Research Group.

In addition to local ordinances, the state of Vermont requires prior notice when any radiocative waste is to be shipped through the state.

The state Agency of Transportaion has opposed the new federal rule which would also preempt that state requirement.

The hearing on Wednesday is one of six that have been held by the federal government, and a final hearing was scheduled in New York on Friday.

Cole said the Vermonters testified along with people from New Hampshire and Maine who also put up strong objections to the rule.

Cole summarized Wednesday's testimony in a news release Friday.

She said the Vermont contingent made a strong pitch that the federal government require atomic and industrial plants to dispose of radioactive waste "in their own backyard, and not truck it thousands of miles across country, endangering health and the environment."

The proposed DOT rule would preempt any local ordinances and state laws now governing the shipment of radioactive wastes.

Attending the hearing with Cole were Richard Brigham, a beekeeper and inspector for the state Department of Agriculture, and Pat Manheimer, a registered nurse, both of Cuttingsville.

They opposed the federal rule, targeting a provision that would allow the federal government to withhold notice of a radioactive shipment for up to 90 days after it has passed through a state, Cole said.

Noting the local bans now existing in Vermont, Brigham said, "These ordinances were passed by concerned citizens.

"The will of the concerned citizens must be honored and respected. They don't want radioactive cargoes rumbling through their towns. We should eliminate radioactive waste from our highways altogether," said Brigham.

According to Cole, Manheimer urged the federal government to fulfill its obligations first in regard to interstate traffic before preempting state and local authority.

Cole said she noted that "only nine full-time field investigators are on guard over 412,000 tank trucks" carrying radioactive material throughout the country.

Cole said the Vermonters appealed to DOT representatives to track down and stop the "midnight marauders" — or night truckers suspected of illegal dumping of toxic wastes in New England.

The hearings Wednesday and Friday were called by Rep. Edward Markey, D-Mass., who was one of several congressmen to pressure the transportaion agency to hold hearings in New England.

Of the first five hearings held around the country, none were in New England or New York. The lawmakers kept the pressure on until they got the two hearings scheduled in Massachusetts and New York.

The proposed rule would go into effect in November.

Cole said the mayor of Somersvile, Mass., also attended testified at the hearing, calling for advance warning of any shipments of radiactive or hazardous waste.

Witnesses for private utilities, including the Northeast Utility and Maine Yankee Atomic Power, supported the DOT rule, Cole said.

Earlier in the week, Cole said the proposed rule could threaten the local bans and controls on uranium mining and milling passed by nearly 40 Vermont towns.

She suggested that once the federal government "gets a foot in the door," it might eventually be controlling mining and milling in spite of state and local law.

The Vermont Legislature last winter passed law requiring legislative approval of any uranium mining operation in Vermont.

Also, Cole said the federal government could extend the regulation to include transportation of all hazardous waste, in addition to radioactive waste.

Name: Times-Argus
City: Barre
Edition: Evening
Circulation: 12,285
Date: June 14, 1980

States Assured Of Policy Role In Nuclear Wastes Transporting

WASHINGTON — States and cities will have a voice in deciding routes for trucking radioactive wastes, President-elect Reagan's Transportation Secretary-designate promised Tuesday.

Andrew L. Lewis Jr., at the opening hearing on his nomination before the U.S. Senate Environment & Public Works Committee, pledged that the Transportation Department would work with states and towns in devising alternate routes and advance notification for moving radioactive wastes.

Responding to a question from U.S. Sen. Robert T. Stafford, R-Vt., the committee chairman, Lewis stated: "It is a commitment not only of the Reagan administration but of the department under my control to work with state and local government as closely as we can."

The issue is a volatile one in Vermont. A number of communities, particularly those near the Vermont Yankee Nuclear Power Corp. plant in Vernon, have prohibited the trucking of nuclear waste through their towns.

State government in Vermont requires two-day advance notification for moving hazardous material, and there is potential controversy over the role of the federal government in regulating

(Wastes, Page 7)

Wastes

(Continued from Page One)

both notice and route for such transportation.

"One of the most difficult issues in that rule making," Stafford said, "has been the question of federal pre-emption regarding the routing."

Stafford said the Transportation Department, still under control of the Carter administration, is preparing to release its regulations on waste transportation.

Lewis said that if the rules were issued before Reagan takes office next Tuesday, and if federal pre-emption were considered a problem, he would be back before the committee "to see how we can tie local and state government" into the process.

Name: Times-Argus
City: Barre
Edition: Evening
Circulation: 12,285
Date: January 13, 1981

Officials Fear Federal Regulations On Nuke Wastes Undermine State's

By JOE MAHONEY
Free Press Staff Writer

State officials fear new proposed nuclear materials transportation rules advanced by the Nuclear Regulatory Commission could weaken the state's own regulations.

State guidelines governing the shipment of radioactive substances in effect since 1972 are more stringent on notification requirements than those put forward by the federal agency, officials say.

Currently, the state must be warned well in advance before carriers can transport what the government calls low-level radioactive waste on Vermont highways.

"The way I read this proposed regulation is that we would not get this notification," said Raymond McCandless of the state Health Department Occupational and Radiological Health Division. "We would not be aware of these trucks."

McCandless and other state officials fear if the draft rules are approved as they stand, they would pre-empt state and local nuclear transportation guidelines.

"We fully intend to officially comment on the regulations before the end of the comment period," said Deputy Health Commissioner Dean Pinelas, who is opposed to the idea of the federal government usurping all responsibility for regulating the nuclear shipments.

The proposed regulations would retain requirements that carriers tell states when they plan to ship nuclear materials which must be stored in accident-proof drums, officials said.

The Nuclear Regulatory Commission shares responsibility in dealing with the shipment of nuclear waste with the federal Department of Transportation, due to publish its own set of regulations by Tuesday, the final day of the Carter administration.

Vermont officials have criticized the Transportation Department rules because they would negate state jurisdiction over trucking of the material. Gov. Richard A. Snelling registered "a strong protest" with the agency last year, Pinelas said.

Because the Transportation Department has yet to apply finishing touches to the regulations, state officials say they have been unable to find out what the guidelines will mean for Vermont, though they have made attempts in recent days.

"We would like to have some control over this," said Robert Merchant, operations director for the state Transportation Agency.

Thirty Vermont towns enacted ordinances in 1977 restricting or prohibiting the transportation of nuclear wastes within their borders. Those ordinances, similar versions of which were enacted by a number of communities in other states, could be overridden if the federal agencies get their way.

New York City has threatened to challenge the rules in court, but a Transportation Department lawyer has expressed confidence the regulations could clear that hurdle.

Officials who are opposed to the regulations are not sure if they would fare any better once Ronald Reagan's administration takes over.

On one hand, Reagan has encouraged the nuclear industry to reduce dependence on imported oil, making it possible he would ease regulations affecting the atomic industry.

On the other hand, the president-elect has pledged to bolster local and state authority.

Name: Free Press
City: Burlington
Edition: Morning
Circulation: 48,051
Date: January 16, 1981

Why Yankee Ponders Low-Level Waste Incineration

By STEPHEN STOLL

VERNON — Recently there has been growing concern that Vermont Yankee will soon begin incinerating low-level radioactive waste at the Vernon plant. Because of the misinformation and speculation being circulated concerning this topic, I'm taking this opportunity to correct the record and let everyone know exactly what Vermont Yankee is considering in this area.

Vermont Yankee is concerned, as are all utilities and consumers, about the proper, safe and permanent treatment of nuclear waste material, both from the civilian and military nuclear programs. As a member of the commercial nuclear industry, we agree that action is long overdue in this most important area. Steps, previously slowed by government indecision, are finally being taken that will guide us to a safe and certain solution.

On the national scene, a Nuclear Waste Policy Act (S. 2189) has been approved by the Senate and is now before the House of Representatives. Vermont Yankee believes this act recognizes the urgency of waste disposal decisions and addresses this problem constructively so that a permanent, safe national program will soon exist.

It is the belief of many people that nuclear wastes are produced solely by the commercial nuclear plants providing electricity throughout our nation. But in reality, only a very small percentage can be attributed to them. Over 90 percent of our current waste stockpile is the result of our nation's nuclear weapons and defense programs. If we add to that the wastes generated by hospitals, universities and medical research facilities, then and only then do we have the total picture.

These wastes are categorized into two distinct areas. I'm sure we've all encountered the terms "high level" and "low level" wastes. Just what is the distinction? Of course both are radioactive, so a clearer definition must be posed. The Nuclear Regulatory Commission defines the two quite simply. In commercial nuclear power generation, only spent (used) fuel and the by-products of the reprocessing techniques qualify as "high level" wastes. Everything else is considered "low level." An analysis of the wastes generated by a typical nuclear power plant would show only one to two percent fall into the "high level" area. The remaining "low level" wastes consist of organic liquids (oils), resins used in water purification systems and the bulk

Name: Times-Argus
City: Barre
Edition: Evening
Circulation: 12,285
Date: Date unclear, 1980

being plastic boots and buckets, cotton gloves, cardboard and paper.

With today's "state of the art" technology, these "low level" wastes are compacted, put in various styles of containers and buried underground at one of three federally licensed repositories. You can be assured there are numerous regulations set forth by various governmental agencies involved in this process to see that the handling, transportation and final disposition of these materials provide no harmful effects to ourselves or the environment. Yet just the bulk of these materials is an area we must concentrate on with the future in mind.

This brings us to the so-called "incenerator" Vermont Yankee has been considering. First of all, a better description of the program would be "volumetric reduction." When I think of an incinerator, the first thing that comes to mind is a large furnace sitting behind our various business establishments belching out black smoke into the atmosphere, burning the residues of our daily routine. Certainly this is not the type of process we are considering.

Without going into a lot of technical details, the program we are looking into will only concern itself with the "reduction in volume" of the "low level" wastes currently shipped to the approved burial sites. The specific system would be completely internal to the plant, and use high temperature combustion to provide a final reduction ratio of around 40 to 1. (When proven, this same technology may be adapted for use by hospitals, universities and medical research facilities.) The resulting radioactive gases and smoke given off by this process would be routed through our existing filtration and delay systems before being released to the atmosphere. A slight increase in total radioactive gases released would result, but would still be significantly below current specifications set forth by the Nuclear Regulatory Commission and Environmental Protection Agency.

I would like to stress this whole idea is ONLY in the investigative stages at this point and certainly before any commitments are made the necessary approvals, hearings and permits would be sought after.

Again, by even considering this option, Vermont Yankee is only trying to help find solutions that will eventually lead our nation to a safe and permanent answer for waste storage and provide an adequate energy future.

—

(Stephen Stoll is director of communications for the Vermont Yankee Nuclear Power Corp., which operates the nuclear plant at Vernon.)

Yankee Wins Renewal Of Discharge Permits

By ANDREW NEMETHY
Vermont Press Bureau

The Vermont Yankee nuclear power plant in Vernon has won a five-year renewal of its water discharge permits, according to officials at the Agency of Environmental Conservation.

Water Resources Commissioner John Ponsetto confirmed Monday that controversial discharge permits for the 540-megawatt nuclear power plant will be renewed, despite loud objections from a variety of anti-nuclear groups last June at a public hearing in Brattleboro.

A press conference to announce the decision will be scheduled in the near future. Vermont Yankee officials were told of the decision Monday. Exact details of the permit were not available.

Vermont Yankee's discharge permits, which expired last June but have been extended while a decision was pending, allow the reactor to discharge warm cooling water, boiler blowdown water, certain chemicals used for cleaning and low-level radioactive water into the Connecticut River.

At peak operation, Vermont Yankee takes 360,000 gallons of cooling water per hour from the river and discharges the water back into the river at a higher temperature. During summer, the permit allows discharge of up to 9.7 million gallons a day and 543,000 gallons per day in the winter when the cooling towers are not on open cycle. There is also a limitation that sets the maximum allowable temperature of the discharge water at 93 degrees.

Like all power plants, Vermont Yankee requires cooling water to condense the steam it uses to drive its generating turbines. Heated water can be detrimental to aquatic life, as can some of the chemicals included in the discharge. Vermont Yankee falls under the same state discharge regulations as any other facility that discharges into the Connecticut.

Ponsetto said the permit had been "reviewed very carefully" but after extensive study by the Agency of Environmental Conservation. "It's our judgment that the permit should be issued."

Ponsetto said the plant meets "all the state and federal standards that apply to discharge." The state's review found "there won't be any adverse impact on the river," he said.

Vermont Yankee has been shut down since September for its annual refueling but began shipping power into the New England power grid on Saturday evening. Yankee spokesman Stepehn Stoll said Monday the plan is operating at 23 percent capacity and it will be at least another week before the plant is operating at full power since start-up tests have to be conducted.

Initially, the plant was to be down for eight weeks for re-fueling and testing, but the shutdown was extended for unanticipated repairs to a portion of the plant's piping. The extended shutdown has forced many Vermont utilities to replace low-cost Yankee-generated power with more expensive oil-fired power.

Among complaints voiced by anti-nuclear groups at the hearing in Brattleboro on the discharge permit was criticism of the use of the chemical hydrazine, used to inhibited corrosion in water system piping. The chemical is toxic but Yankee officials claim in the amounts used at Vermont Yankee, the discharge meets state standards.

Plant officials also argued during the hearing last sumemr that tests during the past five years showed there was no harmful effect on aquatic life in the River.

Anti-nuclear groups also complained that Vermont Yankee should not be allowed to dsicahrge low-level radioactive liquids into the river. Yankee officials claim those low-level radioactive discharges are rare and very low, containing tritium, which exists naturally in water and are not harmful.

Name:	Times-Argus
City:	Barre
Edition:	Evening
Circulation:	12,285
Date:	December 29, 1980

Hole In A-Plant Waste Barrel Hidden By Tape

By ROD CLARKE
United Press International

A hole the size of a pencil was found in a barrel of low-level radioactive waste shipped from the Vermont Yankee nuclear power plant in Vernon to a disposal site in Nevada, but no leakage occurred, officials said Thursday.

They admitted the hole was not detected before shipping because it was covered with a piece of tape. But Yankee officials said they didn't think anyone had intentionally covered up the hole to avoid detection or had intentionally punctured the barrel.

Yankee did say the incident may mean the plant can't ship wasts to the Nevada burial site any more.

Public Service Board Chairman Richard Saudek called the Jan. 21 incident "extraordinarily careless" and said he has demanded a thorough investigation.

A Vermont Yankee official said it was not uncommon to find pieces of tape on nuclear waste barrels. But he added procedures have been tightened to avoid a recurrence

The shipment consisted of 55-gallon drums, 153 in all, containing low-level materials such as plastic boots and gloves, cardboard boxes and paper.

"Upon arrival and during the unloading (at the Beatty, Nev., burial facility), one barrel was found to have a small hole near its top approximately the size of a pencil ... " Vermont Yankee said in a news release.

"Normal inspection of the shipment, prior to leaving the Vermont Yankee site, failed to point out the hole because of a piece of tape covering it."

Spokesman Stephen Stoll said a plastic bag inside the drum was not punctured, so no radiation escaped.

An inspection in Nevada showed "there was no immediate problem to the health and safety of the personnel at the Beatty site, Vermont Yankee, or the general public along the way," the company said.

"It's not too unusual," said Stoll. "Barrels often have signs on them, put on with tape... You take the signs off, but you don't always cut the tape off.

"There really was no violation of any technical regulations; we're not in trouble with the (federal) Nuclear Regulatory Commission.

Stoll said he doubted a plant worker placed the tape on the barrel deliberately to cover the hole.

"We certainly hope that was not the case," he said. "We don't think anyone would deliberately punch a hole and place a piece of tape over it.

But Stoll conceded so many people at the plant handled the barrels, it probably will be impossible to pinpoint the person responsible or the circumstances.

"I don't think it can be blamed on any one individual," he said.

In the future, a "plant health physics technician" will be responsible for visually inspecting each barrel of waste destined for shipment, and will "pull off the tape," he said.

"I think it was extraordinarily careless," Saudek said, "and I believe it jeopardized Yankee's ability to use the waste disposal site in the future."

If disposal site officials determine a shipper has not followed proper procedures, they can bar that shipper from using the facility, he said.

Saudek speculated personnel unfamilier with Vermont Yankee procedures may have been responsible for the incident, since additional work crews were at the plant during a three-month shutdown for refueling, maintainence and repairs that ended late in December.

"One thing I'm very concerned about is quality control," he said.

(Yankee, Page 10)

Yankee

(Continued from Page One)

Saudek said to a layman, the barrels look like "a plastic bag full of clothes stuffed in a metal container...

"It is certainly inexcusable if people doing the packing are not fully aware that this could give you more serious problems than a bag of clothes," he said.

"I told them I want a full explanation of the circumstances of this. They say they'll do a thorough investigation."

Saudek said the matter will be taken before the Vermont State Nuclear Advisory Panel.

Name:	Times-Argus
City:	Barre
Edition:	Evening
Circulation:	12,285
Date:	January 29, 1981

Hole in Nuclear Waste Drum Another Sign of Lax Security

Because inspectors at the Vermont Yankee nuclear power plant in Vernon did not remove a piece of tape from a barrel of low-level radioactive waste, a drum with a pencil-sized hole was shipped across the country to a disposal site in Nevada.

The only protection against leakage was a plastic liner in the drum. The fact that the plastic was not punctured during the trip may not have prevented some leakage.

When the shipment arrived at a waste storage facility in Beatty, Nev., workers stopped unloading the truck when they discovered the pencil-sized hole in the drum. A health safety officer from the Vernon plant was summoned to Nevada to inspect the drum and discuss the matter with officials of the Nuclear Regulatory Commission after workers at the facility said they would not accept any more waste from Vermont Yankee. Unloading resumed when Vermont Yankee agreed to revise its inspection procedures.

The incident must raise questions in the public mind about the operation of the Vermont Yankee plant. Last week, it was revealed that government health and physics experts discovered inadequacies in the plant's emergency plans that were serious enough to warrant orders to Yankee officials to correct them before putting the plant back on the line late last month. A major emergency procedures plan must be submitted to the Nuclear Regulatory Commission and the Federal Emergency Management Agency by March 1.

What many persons should find inexplicable is the fact that Vermont Yankee officials appear to be handing ammunition to critics of nuclear power by failing to observe proper emergency and inspection procedures. Opponents no doubt will point to the plant's failures in making their case against expansion of nuclear power facilities.

Editorials

The laxity of the plant's operators is inexcusable and irresponsible. By their inattention to the rules, they not only have jeopardized the health and safety of people living in the vicinity of the facility but also might have endangered persons in other communities on the route to the waste disposal area. The public too might wonder whether the truck passed through communities that have bans on the transportation of nuclear waste.

Even though the federal commission has cracked down on plant officials for their nonchalance, state officials must take steps to guarantee closer monitoring of its operations.

Lawmakers should provide appropriate state agencies with the means to exercise more control over the facility as part of an effort to protect the public from possible injury stemming from noncompliance with federal regulations.

Name: Free Press
City: Burlington
Edition: Morning
Circulation: 48,051
Date: January 31, 1981

Vt. Yankee Reviews Waste Disposal

WED FEB 6 1980

By WILLIAM H. BRAUN
Free Press Staff Writer

The Vermont Yankee atomic power plant in Vernon generates two and a half times as much low-level radioactive waste as South Carolina will now permit the plant to ship to a burial site in that state Yankee Executive Vice President John Beck said Tuesday.

That means Vermont Yankee will have to find other, more expensive, alternatives, Beck told members of a state Health Department advisory committee on the problems of low-level waste.

He also urged creation of a regional storage site in New England.

He said negotiations are under way to use the only other nuclear dumps in the nation — one in Nevada and one in Washington state.

Nevada appears ready to accept Vermont Yankee shipments, Beck said, but the shipping costs will be greater than they are for the South Carolina site that took all 8,000 cubic feet a year of Yankee's low-level waste until Jan. 1. A limit of 278 cubic feet per month took effect then.

Beck said another alternative under consideration is to burn such items as rags and disposable plastic boots. The process would reduce the volume by 90 percent, Beck said. However, it would take several years to design and build an incinerator with the necessary filters to keep radioactive particles from going up the chimney and into the atmosphere.

Waste storage on Vermont Yankee's own grounds is another possibility, Beck said. But he said he strongly rejects that idea as a long-term answer to the problem.

He said the Tennessee Valley Authority is taking that tack, apparently fearing situations such as developed last year when two of the three disposal sites were shut down by governors in those states.

But postponing the waste disposal until a plant has completed its useful life and is decommissioned amounts to a failure to face up to the problem, Beck said.

He said he believes there should be regional disposal sites throughout the country, including one for New England.

He said if people want electricity generated by nuclear power plants, they should be willing to "take care of the product....Step up to the bar and be a big boy and solve the (waste disposal) problem."

He said establishing a regional storage site would amount to "closing the loop" of the power production cycle.

Panel member Linden Witherell of Burlington, however, took issue with Beck. "It isn't really 'closing the loop.' It's burying it," the federal Environmental Protection Agency employee said.

Witherell and Dr. Jack L. Mayer, an Enosburg Falls pediatrician, cited the Love Canal chemical dump controversy in western New York as an example of wastes causing severe problems years after they are buried.

"I think the history of waste disposal the past 35 years has been abysmal," Mayer said.

Beck said radioactive waste disposal "has had far greater scrutiny from the beginning" than industrial or chemical waste disposal or agricultural practices.

The Tuesday discussion in South Burlington dealt with low-level waste and touched only in passing on the much more controversial questions about what to do with the spent nuclear fuel rods that are now stored at the bottom of a deep pool of water at Vermont Yankee.

That is essentially a federal issue.

The advisory committee was formed to come up with proposals for state policy on handling of low-level wastes such as those generated in hospitals and in medical and research laboratories. Vermont Yankee is generally acknowledged to be the single largest source of low-level waste in the state, with medical facilities producing most of the rest.

Beck said Tuesday he did not have figures on radioactivity with him but promised to send them to Health Commissioner Lloyd Novick.

He said after the meeting that the radioactivity level of the materials in question is "about that of a watch dial."

Name: Free Press
City: Burlington
Edition: Morning
Circulation: 48,051
Date: February 6, 1981

Vermonters Tell Nuclear Power Industry: Stay Out Of Our Towns

By STEPHEN C. TERRY
Vermont Press Bureau

A loud "no" vote to the nuclear power industry was still echoing through the Green Mountains Wednesday, after Tuesday's traditional town Meeting Day, when the atom was the big loser as towns made decisions on local government.

While the majority of Vermont's 246 town and cities confined their town meetings to making decisions on school budgets and road repairs, 31 towns cast votes against construction of nuclear power plants within their borders or banning transportation and storage of nuclear wastes.

Only one town, Castleton, voted with the nuclear industry, while five others tabled or postponed consideration of the issue.

By Wednesday morning the opponents of nuclear power were claiming a victory in their effort to gain more citizen control over the giant nuclear power industry.

A spokesman for the state's power industry, Thomas Hurcomb of central Vermont Public Service Corp. in Rutland was downplaying the significance of Tuesday's votes against the nuclear industry. He said the defeat had been expected because many voters "didn't have anything at stake" in the votes.

But Hurcomb expressed fear that anti-nuclear sentiments were growing in Vermont and in the long run that could have wide implications for the future of nuclear power in Vermont, as well as energy costs.

"If the consumers in Vermont methodically reduce options available for nuclear generation, it appears the cost of power will go higher and it could jeopardize the state's supply of energy," Hurcomb suggested.

In claiming victory for the anti-nuclear power local referendum, Herman Bluestein, director of the Vermont Public Interest Research Group, said:

"Vermont has become the first state in the nation to sample public opinion and to decisively say no to nuclear power."

Two years ago the state Legislature enacted a first-in-the nation law saying it wanted to approve any future nuclear power plants before they were built in Vermont.

Tuesday's vote showed a continuation of the citizen unrest over nuclear power. And in doing so, Vermont may have set the pace for other states in trying to outlaw nuclear energy.

Nuclear power opponents until now have concentrated on statewide referendum questions on the issue. Last November seven states had anti-nuclear question on their state ballots. All went down to defeat.

The votes taken in the 31 Vermont towns on Tuesday weren't binding, especially the demands to ban transportation of nuclear waste over roads which crossed the towns' borders. Even the nuclear opponents conceded that before the voting, but the symbolic nature of the vote was considered important.

Some 25 Vermont towns had anti-nuclear articles on the town warning, while others considered the matter under "other business."

In several communities the vote against nuclear power was seen as an expression of public sentiment, rather than an attempt to shut down nuclear power.

The vote in Putney was seen as significant by supporters of the nuclear industry because in this Windham County town retired U.S. Sen. George D. Aiken, R-Vt., appealed to his neighbors to reject the anti-nuclear questions.

Aiken, who retired from the U.S. Senate after 34 years, spent 17 years as a member of the now-defunct joint Committee on Aomic Energy.

In a rare political defeat on his home ground, perhaps his first since the 1920's when he lost an election for the Vermont House, Putney went against its well-known resident.

Town Meeting Day in Vermont is more than a time for establishing government policy. It is an institution that is revered as an integral part of the character of the state.

It is a day when many people put down their labors and come to the Town Hall or the local school to participate in what is often called the most representative government of all.

Tuesday demonstrated that town meetings are becoming more than a forum for local issues.

The most obvious break in that tradition was seen in 37 communities that considered the anti-nuclear questions. However, several towns used Town Meeting to express disapproval over operations of state government.

Town Meeting Day also saw wide-spread concern over other energy issues. Several towns approved the appointment of town energy coordinators to help chart the alternative energy plans for towns.

Some towns approved giving tax breaks to alternative energy facilities, such as windmills and solar units.

Name: Times-Argus
City: Barre
Edition: Evening
Circulation: 12,285
Date: March 2, 1977

Inventory Tax, N-Waste To Appear on Stowe Ballot

STOWE — In addition to routine fiscal matters, voters will be asked on Town Meeting Day to decide whether the inventory tax should be abolished and whether nuclear waste should be prohibited within town borders.

Rep. John Farmer, R-Stowe, supports the elimination of the tax on business inventory, claiming it would spur new businesses.

The only selectman to face a challenge this year is Herbert O'Brien, whose three-year turn is running out. Running against him is John Chambers.

Voters will be asked to approve a $1,017,549 budget, about 13 percent larger than last year's.

A total of $62,600 in revenue sharing funds will be considered for building renovations, police department improvements and an administrator to investigate funding for a walking-biking path project. The concept of the path will also be subject to voter approval.

Voters will be asked to authorize the expenditure of $15,225 for an additional full-time police officer. A request for two new officers was rejected last year.

Name: Free Press
City: Burlington
Edition: Morning
Circulation: 48,051
Date: February 6, 1981

Yankee Official Favors Move to Regional Dump

By NEIL DAVIS
Free Press Capitol Bureau

MONTPELIER — National legislation allowing states to pool low-level radioactive waste is "a step forward," Vermont Yankee President James Griffin said Tuesday.

Because of the increased likelihood Vermont will join with nearby states to create a regional repository for "hot" trash, Vermont Yankee may think twice before installing its own incinerator, he said.

"If there were any possibility of a regional facility going ahead, I would hold back," Griffin said. "With a regional approach, you'd have a concentrated operation, a concentration of expertise."

A bill passed by Congress Dec. 13 makes each state responsible for meeting its own low-level radioactive waste disposal needs and authorizes disposal by interstate compacts.

The nuclear plant in Vernon is the largest Vermont producer of radioactive wastes. Hospitals, research institutions and a few industries also contribute. Waste products range from protective clothing, tools and resin from Vermont Yankee to depleted uranium from the General Electric plant in Burlington.

A compact would require congressional consent and could not take effect before 1986, said Margaret Downs, legislative director for Rep. James Jeffords, R-Vt.

"It looks like the states have a good five or six years to make some arrangement," she said.

The law calls for the national energy secretary to submit a report within four months to Congress and the states about how much capacity is needed and what potential sites are available.

Vermont should therefore have a good idea what is expected of it and other states in the Northeast by mid-April, Ms. Downs said.

A 1977 Vermont law requires legislative approval of in-state radioactive waste disposal. Former U.S. Energy Undersecretary John Deutch said that law may have been pre-empted by the congressional action.

Deutch, also former chairman of President Carter's interagency review group on radioactive waste disposal, said the Vermont statute "is probably illegal."

"I don't think the state can unilaterally not provide for disposal of its wastes," he said.

Now a physical chemistry professor at the Massachusetts Institute of Technology, Deutch said he remains a proponent of the regional approach.

"It will be essential for the New England region to have a site — absolutely essential," he said.

The states should develop radioactive waste burial sites, which are "a perfectly suitable way" to dispose of wastes, he said.

He said low-level radioactive wastes are far less serious a problem for the region than chemically toxic wastes, but nevertheless an

Turn to YANKEE, Page 2B

Name:	Free Press
City:	Burlington
Edition:	Morning
Circulation:	48,051
Date:	December 31, 1981

Dump Hunters, Stay Home

If the federal government hunts for nuclear waste disposal sites in states like Vermont before it has even determined if there is a safe way to dispose of nuclear waste, it will be making the same mistake anti-nuclear forces make when they demand nuclear plant shutdowns before alternative energy plans have been approved.

The cart does not belong before the horse on nuclear waste disposal, no matter how hard the federal government tries to put it there.

Is there any truly "safe" way to store highly toxic nuclear junk for the nearly infinite half-life of the junk? Will there ever be? Not judging from what we hear and see today. Short of shooting the stuff skyward so it contaminates outer space or some other planet, nobody knows for certain how to protect our world from such nuclear waste.

Some "experts" will tell you that it's okay to stick it in salt mines or granite deposits in a crystallized glass or other containerized form, but none of them can say for certain that such safeguards would remain safe for the many thousands of years required. Some "experts" once argued with similar conviction that ocean burial was a good idea, but they have grown silent recently as news of ocean-based nuclear and non-nuclear waste dump contamination continues to surface. Other "experts" have even argued that it doesn't matter if a truly safe nuclear waste disposal method is found or not. The best Americans can and should expect, they contend, is a disposal system that "minimizes the risks using the most advanced available technology."

Even supposing that federal, congressional and industrial "experts" can and do find a foolproof answer, there is still a throny political problem: How to convince a gun-shy public that the "experts" who gave them Three Mile Island, Love Canal and the Titanic aren't at it again.

The "experts" are not only imperfect, they have been known to hedge, cover up and even lie about how much they know or don't know about radiation, both long-term and short-term risks.

Is there any safe way to dispose of such waste? This should be the first question addressed and answered by the federal Energy Department, Environmental Protection Agency, Nuclear Regulatory Commission and the Congress.

Until then, let the nuclear dump site hunters to stay home.

Name:	Times-Argus
City:	Barre
Edition:	Evening
Circulation:	12,285
Date:	September 29, 1980

Vermont Should Solve Its Own Nuke Waste Problem

Editorials

There's no need for panic — not yet, anyway.

Although Vermont's Green Mountains will be studied as a possible site for deep storage of nuclear wastes, a word or two of caution is in order before pushing the panic button.

Vermont is one of 17 states, mostly in the East, which the federal Energy Department will study because they have granite formations believed suitable for the safe storage of wastes from nuclear plants. The proposed study is only in draft form and it may well be years before a serious investigation is begun.

On orders from President Carter, the Energy Department has expanded an earlier examination of other types of rock formations, such as salt domes and beds, basalt deposits and formations of tuff, stratified porous rock formed by volcanic ash and dust. Granite is being considered because of its density. Geologists believe it may be virtually leakproof at depths of 2,000 to 3,000 feet.

That theory has yet to be proven because no one has drilled that deep into granite to determine if it differs from surface granite, which is highly fractured and riddled with water. Attempts to prove out the suitability of deep granite also will take time.

No one wants nuclear waste buried in his "backyard," but the fact is that it has to be stored somewhere. Some folks want to enjoy the benefits of energy generated by nuclear plants but would refuse to accept responsibility for the wastes even when they are created within their own state's borders.

Vermont has a nuclear power plant in Vernon. Should we expect another state to accept the waste from Vernon? Or should we continue storing our wastes here and expect other states to store their own?

Are there other ways to rid ourselves of the wastes — sending it by rocket to the sun to be burned up? That is an expensive proposition but one that may be practical some day. We could dismantle all the nuclear plants in the country, putting an end to the problem, but who believes that will be done in the foreseeable future?

Instead of worrying about the possibility of wastes from other states being buried here at some time in the future, had not we better concern ourselves with the immediate problem of how much longer it will be possible for our wastes to be stored at the Vernon plant?

Name: Free Press
City: Burlington
Edition: Morning
Circulation: 48,051
Date: October 4, 1980

Tighten uranium mining regulation

(First of two editorials)

Recently, an Aberdeen reader wrote a letter to the editor commenting that the 49 percent support that the "uranium choice" initiative received in November was a strong indication that South Dakotans are quite concerned about uranium mining regulations.

We agree.

We didn't support the amendment which would have required voter approval on each project for a uranium mine, a nuclear waste dump or a nuclear power plant. We said — and still believe — that government cannot be effectively conducted when a vote is needed on specifics that can be covered by a state policy.

But we still strongly endorse a moratorium on new uranium mining permits in the state while existing laws are reviewed and strengthened.

And we see some positive signs that Gov. William Janklow and his administration have listened to concerns about adequacy of state regulation of mining activity.

For one thing, the surface mining office which is now in the Departent of Agriculture will be moved to the Department of Water and Natural Resources.

This will be accomplished by executive order. The shift will permit better coordination and make readily available to the personnel who regulate mining the expertise of water and other experts in the same department.

There will also be a department bill introduced in the session which opens today to increase exploration and mining permit fees. At the present time, such fees do not come close to the costs experienced by the state.

For example, the surface mining office in fiscal 1980 was budgeted at $91,484 and brought in $5,060 in revenue. This was based on $25 for an exploration permit and $50 for a mining permit. Fees are expected to produce $11,900 in Fiscal 1982, which is far from meeting the $144,551 recommended in the governor's budget.

A department spokesman said fees do not cover costs. He said exploration fees should be $100 and mining fees $400 or $500. Even those increases would not be sufficient to meet state government's costs.

Like a lot of similar issues, uranium mining has generated some strong emotional outcries.

Name:	Times-Argus
City:	Barre
Edition:	Evening
Circulation:	12,285
Date:	January 6, 1981

APPENDIX G
SURVEY METHODOLOGY

APPENDIX G

SURVEY METHODOLOGY

Low-level radioactive waste generators in Vermont were surveyed as part of this project in order to determine low-level waste management practices in general and the characteristics of shipped low-level waste in particular. The waste generator survey was conducted in two steps. The first step consisted of mailing the survey form shown in Figure G-1 to all generators. The second step consisted of site visits to generators.

The information requested by the survey form included:

- type of facility;
- disposal method(s) for all low-level waste;
- sources of all radioactive waste;
- amount and destination of low-level waste shipped;
- physical form of shipped waste;
- onsite processing of shipped waste;
- quantity of shipped waste; and
- disposal cost of shipped waste.

The questionnaire was designed to minimize the time and effort required to fill it out (e.g., most possible answers were provided). In

Suite 465
Washington, D.C. 20036
ATTN: Michael Frankel

LOW-LEVEL RADIOACTIVE WASTE SURVEY

Licensee Name _____

Name Of Facility _____

Street Address _____

City/State/Zip _____

Telephone No. ( ) _____

Person Supplying Information _____

Title _____

PART I - TYPE OF FACILITY

(Check The One Category Which Is Most Applicable.)

INDUSTRIAL

- [ ] Incorporates Radioactivity Into Products
- [ ] Uses Radioactivity In Process Control
- [ ] Commercial Power Reactor
- [ ] Pharmaceutical Manufacturer
- [ ] Other (Specify) _____

MEDICAL

- [ ] Hospital
- [ ] Medical Research/Education
- [ ] Other (Specify) _____

EDUCATIONAL

- [ ] University
- [ ] High School
- [ ] Other (Specify) _____

GOVERNMENTAL (NON-MEDICAL OR EDUCATIONAL)

- [ ] Federal
- [ ] Military
- [ ] State
- [ ] Local

PART II - DISPOSAL METHOD

(Check Each Disposal Method Which You Employ.)

- [ ] Ship To Commercial Low-Level Waste Disposal Site (Direct Or Through Broker)
- [ ] Release To Sewer
- [ ] Combine With Common Refuse
- [ ] Vent To Atmosphere
- [ ] Bury On-Site
- [ ] Return To Vendor
- [ ] Distribute In Product Form
- [ ] No Waste Generated
- [ ] Other (Specify) _____

PART III - SOURCE AND DESTINATION OF RADIOACTIVE WASTE

(Check Each Source Of Your Potential Radioactive Waste And, If You Ship, Indicate The Percentage Of Your Total Shipped Waste Volume Originating From Each Source Category And Its Destination.)

SOURCE OF RADIOACTIVITY	PERCENT OF TOTAL WASTE VOLUME SHIPPED	WHERE SHIPPED
[ ] Nuclear Reactor	_____	_____
[ ] Neutron Generator	_____	_____
[ ] Cyclotron Or Synchrotron	_____	_____
[ ] Sealed Source	_____	_____
[ ] Unsealed Radioactive Material	_____	_____
[ ] Natural Ores Or Mill Tailings	_____	_____
[ ] Other (Specify) _____	_____	_____
	100%	

If You Do Not Ship Radioactive Waste, You Have Completed The Questionnaire. Thank You. If You Do Ship, Please Continue With The Questions On The Reverse Page.

OVER...

(Check Each Form Of Waste Which You Ship And Indicate The Percentage Of Your Total Shipped Waste Volume Each Form Represents.)

FORM OF WASTE	PERCENT OF TOTAL WASTE VOLUME SHIPPED
[ ] Dry Solids, Trash, Irradiated Components	_____
[ ] Solidified Or Absorbed Liquids, Solid Sludges, Spent Resins, Filter Sludges Or Evaporator Bottoms	_____
[ ] Animal Carcasses Or Other Biological Waste	_____
[ ] Sealed Sources	_____
[ ] Other (Specify) _____	_____
	100%

Does Waste Shipped Contain Any Material Which Is Potentially:

[ ] Chemically Toxic

[ ] Corrosive

[ ] Combustible

[ ] Explosive

What Shipping Containers Do You Use?

[ ] 55 Gallon Steel Drums

[ ] 30 Gallon Steel Drums

[ ] Shielded Casks

[ ] Wooden Boxes

[ ] Other (Specify) _____

_____

What On-Site Processing Of Shipped Waste Do You Employ?

[ ] None

[ ] Mechanical Compaction

[ ] Incineration

[ ] Solidification Or Evaporation Of Liquids

[ ] Absorption Of Liquids

[ ] Other (Specify) _____

PART V - WASTE QUANTITY AND DISPOSAL COSTS

(Indicate Total Yearly Volume [In Cubic Feet] And Disposal Costs of Waste Shipped To A Commercial Disposal Facility.)

	Cubic Feet Of Waste Shipped	Total Cost
Actual Shipped in 1978	_____	_____
Actual Shipped in 1979	_____	_____
Actual Shipped in 1980	_____	_____

(Indicate Total Yearly Volume [In Cubic Feet] Of Waste Projected To Be Generated Which Will Be Shipped.)

	Cubic Feet of Waste To Be Shipped
Estimated Shipped In 1981	_____
Estimated Shipped In 1985	_____
Estimated Shipped In 1990	_____

(Indicate The Quantity Of Radioactivity [In Curies] In Waste Shipped To A Commercial Facility In The Years 1978, 1979 And 1980.)

ISOTOPE	Quantity Of Waste Shipped (Curies) In:		
	1978	1979	1980

THANK YOU.

addition, the questions asked were limited to those which have a direct bearing on the overall characterization of waste management practices within the State, rather than on a detailed characterization of each facility.

A list of licensees was obtained from the Nuclear Regulatory Commission.(1) To encourage recipients to respond, the questionnaire was accompanied by:

- a cover letter explaining the purposes of the study and questionnaire and identifying a person at Centaur Associates, Inc. who would be available to respond to questions (See Figure G-2);

- simple instructions on filling out the questionnaire, which addressed, among other things, the way the respondent should include the effects of NRC's recent "De Minimis" standard in the survey answers; and

- a self-addressed, stamped envelope in which the questionnaire was to be returned.

In addition, about two weeks after the survey was sent out, a post card was sent to those firms from whom completed forms had not been received, reminding them about the questionnaire.

The second part of the waste generator survey consisted of site visits to LLRW generators. These visits were used to verify and supplement the information received from the questionnaire. The sites visited were chosen on the basis of size and type of facility to provide a representative sample of waste generators in the State.

Figure G-2: Cover Letter

Centaur Associates, Inc. Suite 465
1120 Connecticut Avenue, N.W.
Washington, D.C. 20036
202/296-4100

April 2, 1981

Dear Licensee:

To assist in planning for safe low-level radioactive waste disposal, Centaur Associates, Inc. is conducting a survey of nuclear material licensees in Vermont for the U.S. Department of Energy's Idaho National Engineering Laboratory. The survey is part of a larger DOE effort to develop a national low-level radioactive waste management program. A state briefing book on low-level radioactive waste management is being prepared for Vermont as part of the national management plan. The survey results will be used to develop a profile of low-level radioactive waste generated in Vermont which will be included in the Vermont State Briefing Book.

Your organization has been included in the survey because it has a current license to use reactor generated radioactive materials. Please answer the questions as they relate to all of your licenses for possession of radioactive materials at this address and return the survey form to us in the enclosed envelope by May 1, 1981. All survey results will be aggregated and no information will be attributed to a single organization.

The Vermont Department of Health, Division of Occupational and Radiological Health has been informed of this project. The Division and other state agencies will be interviewed for the project.

Questions concerning the Vermont State Briefing Book on Low-Level Waste Management, the survey form or its use should be directed to me at (202) 296-4100. Questions concerning the U.S. Department of Energy's Low-Level Waste Management Program should be directed to EG&G Idaho, Inc., Edward Jennrich at (208) 526-9490. We look forward to receiving your response to the survey form.

Sincerely,

John Duberg

John Duberg

Enc.

Waste generators visited were initially contacted by letter to explain the purpose of the study and proposed visit. This letter was followed by a telephone call to set a date and time for the visit. In a few cases, when site visits could not be arranged due to schedule conflicts or other factors, these interviews were conducted by telephone.

The information obtained from the survey and site visits is presented in tabular form in Section 7 of this briefing book. The degree of response to each question is shown in Table G-1.

TABLE G-1. DEGREE OF RESPONSE TO SURVEY QUESTIONS

Type of Facility	No. of Licensees	Part I: Type of Facility		Part II: Disposal Method		Part III: Source of Radioactive Waste		Part III: Destination of Waste	
		No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensees
Medical	15	11	29.7	11	29.7	7	18.9	4	10.8
Educational	4	4	10.8	4	10.8	3	8.1	1	2.7
Industrial	11	6	16.2	6	16.2	4	10.8	3	8.1
Commercial Power Reactor	1	1	2.7	1	2.7	1	2.7	1	2.7
Governmental	6	6	16.2	6	16.2	4	10.8	0	0.0
Total	37	28	75.7	28	75.7	19	51.4	9	24.3

TABLE G-1. DEGREE OF RESPONSE TO SURVEY QUESTIONS (continued)

Type of Facility	Part IV						Part V							
	Physical Form		Hazardous Characteristics		Shipping Container Used		Actual Waste Shipped		Shipping Cost		Projected Waste Shipped		Isotopes	
	No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensees	No.	Percent of Licensee	No.	Percent of Licensees
Medical	4	10.8	3	8.1	4	10.8	3	8.1	3	8.1	3	8.1	3	8.1
Educational	2	5.4	2	5.4	2	5.4	1	2.7	1	2.7	2	5.4	1	2.7
Industrial	3	8.1	1	2.7	3	8.1	2	5.4	1	2.7	2	5.4	2	5.4
Commercial Power Reactor	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7
Governmental	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7	1	2.7
Total	11	29.7	8	21.6	11	29.7	8	21.6	7	18.9	9	24.3	8	21.6

REFERENCES

1. The Nuclear Regulatory Commission licenses nuclear reactors and users of special nuclear, source, and by-product materials. Potential generators of low-level waste were identified from the list of licensees.

APPENDIX H
GLOSSARY

APPENDIX H

GLOSSARY

activity	A measure of the rate at which a material emits nuclear radiation, usually given in terms of the number of nuclear disintegrations occurring in a given length of time.
Agreement State	A State that has entered into an agreement with the Nuclear Regulatory Commission to assume regulatory responsibility for radioactive materials under Section 274 of the Atomic Energy Act of 1954 as amended.
alpha particle	A positive charged particle emitted in the radioactive decay of certain isotopes. Made up of two protons and two neutrons bound together, it is identical to the nucleus of a helium atom. It is the least penetrating of the three common types of radiation--alpha, beta, and gamma radiation.
B (shipment type)	A classification (10 CFR 71) of shipments of radioactive material depending on the amount of radioactivity contained; broadly characterized, type B shipments contain more radioactivity than type A shipments of similar radioactivity and potential hazard. Federal regulations also specify standards for the packaging of shipments according to type.
background radiation	Radiation in the environment produced by naturally occurring radioactive materials in the crust of the earth, cosmic radiation, and the fallout from nuclear weapons tests.
beta particle	A negative charged particle emitted in the radioactive decay of certain isotopes; a free electron. Beta is one of the three types of radiation.
canister	A container, usually cylindrical, for remotely handled waste, spent fuel, or high-level waste. The waste will remain in this canister during and after burial. A canister affords physical containment but not shielding; shielding is provided during shipment by a cask.

cask	A large shipping container providing shielding for highly radioactive material and holding one or more canisters.
commercial disposal site	A facility at which nondefense low-level radioactive waste is buried under license of the Nuclear Regulatory Commission and/or an Agreement State.
commercial waste	Low-level radioactive waste generated by commercial power plants, manufacturing industries, and institutions (hospitals, universities, research institutions).
contact-handled waste	Waste that does not require shielding other than that provided by its container.
contamination	The uncontrolled and undesirable deposition of radioactivity on an object, material, or area. This contamination can be either transferable or fixed. Radiation penetrating the walls of a waste package from within is not contamination.
controlled landfill	Conceptually, a landfill similar to a commercial landfill for municipal waste, considered for the disposal of appropriate solid low-level waste.
curie	The standard unit for measuring radioactivity. It is equal to 37 billion nuclear transformations per second, or the radioactivity contained in one gram of radium.
decommissioning	The process of removing a facility from operation. It is then mothballed, entombed, decontaminated, and dismantled or converted to another use.
decontamination	The removal of unwanted material (especially radioactive material) from the surface or from within another material.
defense waste	Nuclear waste deriving from the manufacture of nuclear weapons and the operation of naval reactors. Associated activities such as the research carried on in the weapons laboratories also produce defense waste.
disposal	Operations designed to isolate waste from people and the environment, with no expectation of retrieval after emplacement.

dose (radiation)	A general term indicating the amount of energy absorbed per unit mass from incident radiation.
extended care	Procedures instituted at disposal sites after closure to monitor the long-term performance of the site.
fission	The splitting of a heavy nucleus into two approximately equal parts, each the nucleus of a lighter element, accompanied by the release of a large amount of energy and generally one or more neutrons. Fission can occur spontaneously, but it usually follows the absorption of neutrons.
fissionable	Describes an isotope that undergoes fission on absorption of a neutron of energy over some threshold energy.
gamma rays	Short-wavelength electromagnetic radiation emitted in the radioactive decay of certain isotopes. Gamma rays are the same as gamma particles. Of the three types of radiation, gamma rays are considered the most serious because of their ability to penetrate other materials.
half-life	The time required for the activity of a group of identical radioactive nuclei to decay to half its initial value. Each radioisotope has a unique half-life.
high-level waste	Discarded, unreprocessed spent reactor fuel or the radioactive wastes produced during the reprocessing of used reactor fuel. It is characterized by intense, penetrating radiation and by high heat-generation rates. Even in protective canisters, high-level waste must be handled remotely.
Interagency Review Group on Nuclear Waste	A group established by President Carter to review waste management goals, plans, and activities.
isotope	In chemistry and physics, one of two or more atoms having the same atomic number but differing in atomic weight and mass number. The nuclei of isotopes contain identical numbers of protons, equal to the atomic number of the atom, and thus represent the same chemical element, but do not have the same number of neutrons. Thus, isotopes of a given element have identical chemical properties but slightly different physical properties, and very different half-lives, if they are radioactive. Also nuclide.

leaching	The process of extracting a soluble component from a solid by the percolation of a solvent (e.g., water) through the solid.
low-level waste	Radioactive waste other than uranium mine or radioactive waste mill tailings, spent fuel, or high-level radioactive waste. Low-level waste contains radioisotopes emitting primarily beta and/or gamma radiation and less than 10 nanocuries per gram of transuranic elements.
microcurie	One one-millionth curie. The maximum in permissible body burden for persons exposed to radium risks is set at 0.1 microcurie.
millicurie	One one-thousandth curie.
nanocurie	One one-billionth curie.
Nuclear Regulatory Commission	Federal government agency established in 1974 by the Energy Reorganization Act to assume regulation of the commercial use of nuclear energy.
nuclide	Isotope.
radiation	The process of emitting radiant energy in the form of waves or particles.
radioactive decay	The decrease in the number of radioactive nuclei present in a radioactive material due to their spontaneous transmutation, which results in a decrease of the radioactive atoms in a sample. Also, the transmutation of a radioisotope into another isotope by the emission of a charged particle. All radioactive material is contantly decaying.
radioactivity	The property possessed by some atoms of spontaneously emitting alpha and beta particles and sometimes also gamma rays, by the decay of the nucleus of the atom.
radioactive isotope	Any species of atom having an unstable nucleus that decays emitting radiation, until stability is reached. It thus has a defined half-life. The stable end product is a non-radioactive isotope of another element. Also radioisotope, radioactive nuclide, or radionuclide.

rem	Abbreviation for "roentgen equivalent man." The unit for measuring radiation doses received by people.
repository	A facility for the storage or disposal of radioactive waste.
scintillation liquids	Organic chemical solutions that produce light when bombarded with radiation. These liquids are a major component of institutional low-level waste.
spent fuel	Nuclear-reactor fuel that, through nuclear reactions, has been sufficiently depleted of fissile material to require its removal from the reactor.
spent fuel storage pool	A water-filled and cooled basin in which spent fuel is stored before being sent away for reprocessing or disposal.
storage	Temporary disposition in a repository. Use of the word storage implies keeping open the possibility of retrieving the waste for reprocessing, for moving it elsewhere, etc. Storage usually implies the need for continued surveillance.
transuranic isotope	An isotope with an atomic number greater than that of uranium (92). All transuranic isotopes are produced artificially and are radioactive.
volume reduction	Various methods of waste treatment, such as evaporation for liquids or compaction for solids, aimed at reducing the volume of waste.
waste matrix	The material that surrounds and contains the waste and to some extent protects it from being released into the surrounding rock and groundwater. Only material within the canister that contains the waste is considered part of the waste matrix.