TRANSPORTATION AND DISPOSAL OF RADIOACTIVE MATERIAL

Bulletin No. 81-6

LEGISLATIVE COMMISSION

OF THE

LEGISLATIVE COUNSEL BUREAU

STATE OF NEVADA

October 1980

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FILE NUMBER 134

ASSEMBLY CONCURRENT RESOLUTION—Directing the legislative commission to conduct an interim study of methods used in transporting and disposing of radioactive material.

WHERFAS, The methods used for the safe transportation and disposal of radioactive material in this state are of grave importance to all Nevadans; and

WHEREAS, A recent incident in Nevada illustrates that the procedures used in the handling of radioactive waste may not be adequate; now, therefore, be it

Resolved by the Assembly of the State of Nevada, the Senate concurring, That the legislative commission is hereby directed to conduct an interim study of the procedures used in handling radioactive material, especially in its transportation and disposal; and be it further

Resolved, That the commission also include in the study procedures for licensing and inspecting private sites for disposal of radioactive waste; and be it further

Resolved, That the legislative commission report the results of the study and any recommended legislation, to the 61st session of the legislature.

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REPORT OF THE LEGISLATIVE COMMISSION

TO THE MEMBERS OF THE 61ST SESSION OF THE NEVADA LEGISLATURE:

This report is submitted in compliance with Assembly Concurrent Resolution No. 62 of the 60th session of the Nevada legislature, which directs the legislative commission to study the methods used in transporting and disposing of radioactive material.

The legislative commission appointed a subcommittee to make the study and recommend appropriate legislation to the next session of the legislature. Assemblyman Jack F. Fielding was designated chairman of the subcommittee and Senator Lawrence E. Jacobsen as vice chairman. The following legislators were named as members: Senator Joe Neal, Assemblymen Tod Bedrosian, Virgil M. Getto, and Paul Prengaman.

In this report the subcommittee has attempted to present its findings and recommendations briefly and concisely. A great deal of data was gathered in the course of the study. Much of it was provided in the form of exhibits that became part of the minutes of the subcommittee. This information is on file in the research library of the legislative counsel bureau and is readily available to any member.

This report is transmitted to the members of the 1981 legislature for their consideration and appropriate action.

Respectfully submitted,

Legislative Commission
Legislative Counsel Bureau
State of Nevada

Carson City, Nevada
October 1980

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LEGISLATIVE COMMISSION

Senator Keith Ashworth, Chairman
Senator Melvin D. Close, Jr., Vice Chairman

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Senator Carl F. Dodge	Assemblyman Joseph E. Dini, Jr.
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Senator Thomas R. C. Wilson	Assemblyman Paul W. May
	Assemblyman Robert F. Rusk
	Assemblyman Darrell D. Tanner

SUMMARY OF RECOMMENDATIONS

1. Require shipper or producer of radioactive waste to obtain a license from the health division to use the Beatty radioactive waste disposal facility. (BDR 40-6)

    a. Require the licensee to demonstrate his ability to properly package and label the radioactive waste which he is responsible for transporting in conformance with regulations promulgated by the state board of health.

    b. Provide for penalties in the event that the licensee violates the regulations.

    c. Provide for revocation of a licensee in the event of violation of the regulations.

2. Prohibit removing any waste, contaminated material, or equipment from the disposal area for personal use. (BDR 40-6)

3. Authorize inspectors and peace officers of the motor carrier division of the department of motor vehicles, the public service commission of Nevada and the Nevada highway patrol to enforce regulations promulgated relating to the transportation and handling of radioactive waste. (BDR 40-6)

    a. Permit an inspector or peace officer to impound vehicles with unsafe equipment and detain vehicles with radiation leaks.

    b. Permit an officer to order the cleaning up of leaks or spills including repacking of the contents of any unsafe or leaking packages.

4. Establish license fees for the use of radioactive disposal facilities in Nevada. (BDR 40-6)

5. Designate by regulation alternative routes for the transportation of radioactive materials over highways of the State of Nevada, but which do not conflict with the standards established by the United States Department of Transportation. (BDR 40-6)

6. Require motor carriers to acquire a permit from the public service commission which specifically allows him to transport radioactive waste. (BDR 40-6)

   a. Issue permits to carriers who demonstrate their ability to comply with federal and state laws regarding vehicle safety and the handling and transporting of radioactive waste.

   b. Designate liability to the carrier for accepting packages containing radioactive waste.

   c. Require notification to the public service commission of Nevada of shipment of radioactive waste into the State of Nevada.

   d. Authorize the public service commission of Nevada to revoke permits to transport radioactive waste if the carrier fails to comply with federal and state regulations regarding the handling or transportation of radioactive waste, driver safety or vehicle safety.

7. Request the Federal Government to more strictly enforce regulations relating to radioactive waste transportation, to establish responsibility between shippers and carriers for violations of the regulations, and to employ more inspectors to monitor shipments of radioactive waste in Nevada. (BDR 4)

8. Recommend to Congress the establishment of additional sites within the United States for the disposal of low-level radioactive waste. (BDR 5)

9. Consider establishing a user system for chemical waste disposal in Nevada similar to the user fee system proposed for radioactive waste disposal.

10. Establish a fee schedule which will provide revenue to support adequate regulation of the radioactive material industry. The schedule should provide for annual increases to reflect increasing costs of monitoring, inspection, and perpetual care and maintenance.

11. Allow revenue generated by the user fee system to be used to train the emergency response agencies of the state's communities with regard to hazardous materials.

12. Direct the health division of the department of human resources to report significant technical advances in radioactive waste management to the legislature.

REPORT OF THE LEGISLATIVE COMMISSION FROM THE SUBCOMMITTEE TO STUDY THE METHODS USED IN TRANSPORTING AND DISPOSING OF RADIOACTIVE MATERIALS

I. INTRODUCTION

Assembly Concurrent Resolution No. 62 of the 1979 session of the Nevada legislature directed the legislative commission "* * * to conduct an interim study of the procedures used in handling radioactive material * * * ." Specifically, the resolution directed the study of radioactive material transportation and disposal and procedures for licensing and inspecting private sites for disposal of radioactive waste. These aspects of radioactive waste management provided the focus and structure of the study.

To carry out the study assignment, the legislative commission appointed a subcommittee composed of the following legislators:

Assemblyman Jack F. Fielding, Chairman, Pahrump
Senator Lawrence E. Jacobsen, Vice Chairman, Minden
Senator Joe Neal, North Las Vegas
Assemblyman Tod Bedrosian, Reno
Assemblyman Virgil M. Getto, Fallon
Assemblyman Paul Prengaman, Reno

The subcommittee held six meetings. One included a tour of the U.S. Department of Energy radioactive waste disposal research facility at the Nevada test site and a visit to Nuclear Engineering Company's low-level radioactive waste facility near Beatty, Nevada. Subsequent meetings were held in Las Vegas, Reno, and three in Carson City.

The Las Vegas, Reno, and first Carson City meetings were devoted primarily to background information on the definition of low-level radioactive waste, sources, generators, shippers, brokers, and transporters, and disposal; regulation regarding transportation, disposal, and health protection; and identification of problem areas in current statutes and regulations.

The Reno meeting also included a tour of University of Nevada-Reno research laboratories in which low-level radioactive wastes were generated. The two final meetings in Carson City were spent developing precise legislative recommendations.

Testimony was received from a wide variety of sources. Hearing participants included interested citizens, state agency officials, federal agency officials, nuclear medicine professionals, members of the transportation industry, disposal site operator personnel, and university faculty. Consequently, information was accumulated from a cross section of the low-level radioactive waste disposal industry.

II. RADIOACTIVE WASTE

A. BIOLOGICAL EFFECTS OF RADIOACTIVE WASTE

Radioactive materials, including waste, emit radiation which is capable of penetrating matter and interacting with its chemical structure. Such changes in living tissue can cause a host of effects: damage to or death of exposed cells, cell mutation, induction of cancers, and injury to or even death of the exposed organism. These effcts translate into cancer, reproductive failure, genetic defects, birth abnormalities, and cell death.

Response to radiation exposure varies widely. Some of the factors upon which the effects depend include dose, dose rate, type of radiation, mode of exposure, and age and health of the individual exposed. A summary of effects for various exposure levels appears in Table I.

The effects of low-level ionizing radiation, like that emitted by low-level radioactive waste, are unclear. It has been suggested that the hazard of low, extended doses of radiation may be greater than that of short, acute exposures.*

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*Lipschutz, Ronnie D. Radioactive Waste: Politics, Technology and Risk, Ballinger Publishing Company, Cambridge, Massachusetts, 1980, p. 19.

TABLE I

BIOLOGICAL EFFECTS OF IONIZING RADIATION

Exposure Range	*Chronic Exposure*[a]	*Acute Exposure*[b]
Less than 1 rem	No observable effects, equivalent to exposure from background radiation for 5–10 years Cancer risk $1-2 \times 10^{-4}$ per rem for adult, greater than 4×10^{-4} per rem for fetus (may be as high as 6×10^{-4} to 6×10^{-3} per rem for children, 7×10^{-3} for adults)	No observable short-term effects
1–50 rems	Chromosomal aberrations in blood 0 3 - 30 leukemia cases per 10,000 person-rem observed in this exposure range; 0 5–1 2 thyroid cancers per 10,000 person-rem observed Occupational exposure range.	Slight blood changes, decreased head circumference and increased leukemia risk in fetus
50–100 rems	Approximate doubling dose for spontaneous mutations.	Mild symptoms of radiation sickness possible. Vomiting in 5 percent of those exposed to 100 rems within three hours
100–200 rems	Approximate doubling dose for cancer.	Vomiting in 5 percent of those exposed to 100 rems to 50 percent of those exposed to 200 rems within three hours Also, fatigue, loss of appetite, moderate blood changes that persist Recovery within several weeks. Increased cancer risk, cataracts possible.
200–600 rems	Limited experience with regard to chronic exposure over 200 rems Large increase in incidence of leukemia and other cancers Uranium miners exposed to 700–1,000 rads, with maximum exposures estimated to be as great as 10,000 rads. Excess of lung cancer deaths may reach 600–1,100 in a population of 6,000 miners.	Vomiting: 50 percent at 200 rems within three hours; 100 percent above 300 rems within two hours. Also, loss of hair, other symptoms of radiation sickness Death in 0 - 80 percent of those exposed within two months from hemorrhage and infection, recovery for survivors in one to twelve months.
600–1,000 rems		Vomiting within one hour, severe blood changes, hemorrhage, infection, loss of hair, damage to bone marrow Death in 80–100 percent of those exposed within two months from hemorrhage and infection. Long convalescence for survivors.
1,000–3,000 rems		Vomiting within thirty minutes, radiation sickness. Gastromtestinal syndrome within five to fourteen days, including diarrhea, fever, severe blood changes, damage to bone marrow Death in 90–100 percent of those exposed within two weeks due to circulatory collapse
More than 3,000 rems		Vomiting within thirty minutes Central nervous system syndrome within two days, including convulsions, tremor, loss of muscular control Death in 100 percent of those exposed within one to forty-eight hours due to respiratory failure and brain edema.

[a] Exposure over extended time period.

[b] Exposure over period of twenty-four hours or less

Sources Morgan (1978), Rothlat (1978), Schurgin and Hollocher (1975), Glasstone and Dolan (1977 580), DOD (1975 7A-77), Shapiro (1972)

Source: Lipschutz, Ronnie D. Radioactive Waste: Politics, Technology and Risk, Ballinger Publishing Company, Cambridge, Massachusetts, 1980, pp. 16-17.

However, laboratory studies remain inconclusive. At any rate, radioactive materials do have potential to be harmful to biological tissue, and there is public concern that low-level radioactive wastes be safely handled.

B. DEFINITIONS

In discussions of radioactive waste disposal, waste is frequently classified as high-level, intermediate-level, or low-level. The difficulty and hazardousness of radioactive waste disposal depends upon the lifespan, radioactivity and toxicity of the waste involved. Accordingly, nuclear wastes are normally characterized by the source and level of radioactivity and heat emitted by the material.

High-level waste is created from the reprocessing of spent fuel. It is generally characterized by extremely penetrating gamma ray radiation, high heat production, and a long toxic life. Stontium 90 and cesium 137, as examples, require about 600 years to decay to an innocuous level.

Intermediate-level transuranic waste consists of solid materials including fragments of fuel rods and structural components of fuel assemblies. These contain plutonium or other long-lived alpha radiation emitters. Intermediate-level waste requires some shielding but does not generate appreciable heat.

Low-level waste comes from a variety of sources including mill tailings, fuel fabrication scrap, reactor operation waste, and some fuel reprocessing. Nonfuel cycle (that is those not generated in the nuclear power industry) sources include a variety of materials many of which have been contaminated by working with radioactive materials. Low-level waste contains only minute quantities of radioactivity. Shielding is generally not required and no measureable heat is generated.

C. SOURCES

Radioactive waste is generated from a variety of uses of radioactive materials. Radioactive tracers are used widely

in the practice of nuclear medicine, both for diagnostic and therapeutic purposes. They are used for well logging in oil and gas exploration and production to provide information on underground formations, and as tracers to monitor flow patterns. Industrial uses include radiographic methods of determining thickness of materials and to check the integrity of joints and welds. Other industrial uses include research and development connected with the nuclear power industry.

Education and research uses, like those at the University of Nevada-Reno campus, include investigations of genetic and other radiation effects, basic research, and for tracers and other uses in chemical reactions. The nuclear power industry both produces and uses many radioactive materials with the attendant generation of radioactive waste.

There are about 85 nuclear material licensees in the State of Nevada. Of these, about one fourth are medical uses and the others are for industrial, service, well logging, disposal site operation, and university research.

D. DISPOSAL

Several methods have been suggested for the permanent disposal of radioactive waste. These include ocean disposal, ice sheet disposal, extraterrestrial disposal, deep hole drop and burial in deep geological formations. These methods were conceived basicly for the purpose of disposal of high-level radioactive waste. Low-level radioactive waste is generally disposed by shallow ground burial, such as in the case of the commercial facility near Beatty, Nevada.

With regard to the environmental acceptability of the Beatty disposal site, a number of criteria were considered in selecting it for low-level radioactive waste disposal. Among them were geology, hydrology, proximity to population, and potential unintended intrusion due to future land uses.

More generally, it is necessary to separate radioactive waste from the biosphere (food chains) whether high-level or low-level. The rock in which the waste is to be disposed must be able to withstand heat buildup, faulting, and have

low hydraulic transmissivity. The location for disposal should also have minimum danger from earthquakes.

The geologic and hydrologic characteristics of the Amargosa Desert in which the disposal site is located is thoroughly reviewed in Appendix A. Based on these physical characteristics and other considerations mentioned above, the southern section of Nevada lends to disposal of both high and low-level radioactive waste because it meets these requirements.

III. REGULATION

A. FEDERAL

The dominant federal agency which regulates management of radioactive materials is the U.S. Nuclear Regulatory Commission (NRC). The NRC succeeded the Atomic Energy Commission (AEC) which was created by the Atomic Energy Act of 1954. The NRC has broad authority to regulate the use and possession of materials capable of forming a critical mass.

The NRC regulates transportation of radioactive byproduct, source, and special nuclear sources under Title 20 of the Code of Federal Regulations (CFR). The NRC sets the basic safety standards for packaging, exposure control, and avoiding a nuclear chain reaction. Title 10 CFR relates to the issuance of general and specific licenses for receiving, acquiring, owning, possessing, using, and transferring by-product material, source material, and special nuclear material. The NRC requires each of its licensees to develop detailed programs for controlling and transporting packages, as well as for the use and maintenance of containers after delivery to the shipper.

The U.S. Environmental Protection Agency (EPA) regulates radioactive materials under the Atomic Energy Act of 1954 and the Reorganization Act of 1970 to set environmental standards for the protection of the general environment from radioactive materials covered by the 1954 act. Thus, EPA regulates environmental emissions from "source materials" (e.g., thorium, uranium), "special nuclear materials" (e.g., plutonium and uranium-enriched 233 and 235 isotopes), and

"byproduct" materials. EPA is limited to regulating and monitoring areas beyond the boundary of NRC licensees.

Under the 1977 Clean Air Act amendments, EPA retains the authority to regulate radioactive air emissions, and under the Federal Water Pollution Control Act, EPA is charged with regulating naturally occurring radioactivity discharges into navigable waterways. In addition, EPA is charged with planning a national waste disposal and storage system and with disposing of radioactive materials not stipulated by the 1954 Atomic Energy Act.

The United States Department of Transportation (U.S.D.O.T.) regulates all radioactive materials in interstate commerce in Title 49 CFR, parts 170-179. The U.S.D.O.T. has issued general regulations for shipping operators and carriers, including packaging standards, limits on size and contents, labeling, loading restrictions, inspections, shipping documents, accident reporting, and vehicle operation. The U.S.D.O.T. unit responsible for transport safety of radioactive and other hazardous materials is the Office of Hazardous Materials Operation within the Materials Transportation Bureau. Highway carriers are also governed by the Federal Motor Carrier Safety Regulations, parts 390-397. The U.S.D.O.T. investigates and reports on transportation-related accidents, incidents, or suspected radioactivity leakages, but the nontransit-related occurrences are investigated by NRC.

The Interstate Commerce Commission (ICC) (for land shipments) and the Civil Aeronautics Board (CAB) (for air shipments) exercise jurisdiction over the economic aspects of radioactive materials transport through the issuance of operating authorities to carriers and control of shipping costs (i.e., freight rates). However, private parties (those not required to obtain operating authorities) do not come within ICC's jurisdiction.

The U.S. Postal Service, under regulations found in Title 39 CFR, parts 123-125, regulates mail shipments of certain "limited" quantities of radioactive material.

Finally, worker protection is provided for by the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) in addition to

NRC. OSHA controls radiation exposure in manufacturing, health services, and general industries not regulated by NRC. The Mine Safety and Health Administration regulates and sets radiation standards for workers in the uranium, mining and milling industry as well as for workers mining such other radioactive substances as phosphates and certain coals.

B. STATE

The primary authority for regulation of radioactive material in Nevada is provided in chapter 459 of the Nevada Revised Statutes (NRS). The health division of the department of human resources is designated as the state radiation control agency. The duties of the department include evaluation of hazards associated with the use of sources of ionizing radiation, promulgation of regulations for licensing of byproduct materials, source materials, special nuclear materials and other radioactive materials, and maintaining appropriate files.

Some of this authority has been accorded the health division as a result of Nevada's becoming an "agreement state" with the Nuclear Regulatory Commission in 1972. At that time, the governor of Nevada signed an agreement to accept the responsibility for regulatory authority of otherwise NRC regulated radioactive materials.

Other state agencies which have some involvement in the regulation of radioactive materials in Nevada include the public service commission (PSC) through its regulation of motor carriers (NRS 706) and the department of motor vehicles' division of motor carriers (NRS title 43). There is also some authority within the environmental protection division of the department of conservation and natural resources to regulate the management of radioactive materials, for example, issuing permits for underground disposal of radioactive waste (NRS 445.287 through 445.301) and the prohibiting of radioactive discharges into Nevada waters (NRS 445.224 and 445.254). The authority of these three agencies, however, is not specific regarding radioactive materials regulation, and thus, must be considered indirect involvement.

IV. OTHER STATES' ACTIVITIES IN RADIOACTIVE WASTE DISPOSAL

A. INTRODUCTION

The management of low-level radioactive wastes in the 50 states is controlled by a variety of state laws and regulations. This is, of course, largely due to the range of conditions which prompted the passage of such legislation. In some cases, states have developed low-level radioactive waste laws in response to federal directives. This has been the case in the development of many states' radiation control statutes. On the other hand, specific crises have also resulted in legislative responses. The Kentucky legislature, for example, appropriated funds for the closure of the environmentally unsound commercial low-level disposal facility at Maxey Flats in Kentucky.

There are several distinct areas of regulation of low-level radioactive materials. These include radiation control generally, emergency responses, disposal, and transportation. Although related to low-level radioactive waste management, regulation of the uranium industry is excluded from the following discussion.

B. RADIATION CONTROL PROGRAMS

Adoption of a radiation control program is mandatory in states where the Nuclear Regulatory Commission has relinquished its regulatory duties through a federal/state agreement. (See agreement state discussion in previous section on regulation.) Other states have also developed radiation control programs in an effort to protect the public health and safety of its citizens regarding those radiation sources which are not controlled by the Federal Government without agreement status. Examples of recent laws are given on the following pages.

Indiana

Senate bill 191 (1980) directs the Indiana State Board of Health to regulate "who may operate a radiation machine and what level of training and experience an individual must have to operate such a machine." It also appropriates $56,000 for the year July 1, 1980, through June 30, 1981, to hire a radiochemist and health physicists to conduct a background radiation study for the Marble Hill area and other duties associated with offsite monitoring.

Kentucky

House bill 114 (1980) allows the Kentucky Department of Human Resources to monitor the radiation in discharges from nuclear power plants along the Kentucky border. If violations are found, the state attorney general is to report them to the U.S. attorney or bring an action of mandamus against the appropriate enforcement agency.

Maine

House bill 1682 (1980) directs that the Maine Department of Human Resources shall monitor radioactive emissions from all nuclear reactors in the state. It sets an annual registration fee of $59,200 per unit. It further requires registration of sources and devices capable of emitting ionizing radiation. Finally, it requires the department to promulgate rules and regulations requiring annual certification and calibration of the equipment.

Virginia

House bill 611 (1980) provides that any person who intentionally attempts to destroy or damage any facility, equipment or material which might threaten a radiation release beyond the areas in which they are normally used or contained shall be guilty of a felony.

C. EMERGENCY RESPONSE

Emergency response programs are currently being developed or upgraded, many as a result of the Three Mile Island nuclear reactor incident in Pennsylvania in the spring of 1980. Many of these programs are directed at nuclear reactor

incidents, but several states have developed or expanded emergency response programs to consider all radioactive material incidents. (Emergency response programs specifically related to transportation of radioactive waste are summarized later in this chapter.) Several recently enacted laws are listed below and serve as examples.

Arizona

House bill 2171 (1980) designates the Arizona Division of Emergency Services within the Arizona State Department of Emergency and Military Affairs as the lead agency for the development of a radiological emergency response plan. A status report on development of the plan is to be submitted to the governor and legislature by January 1, 1981. The bill also appropriates $125,000 for plan development.

Arkansas

Senate bill 32 (1980) directs the Arkansas Departments of Health, Bureau of Environmental Services and Public Safety and Office of Emergency Services to jointly carry out a nuclear response program. The program is to include environmental monitoring, radiological emergency response training, an emergency response plan, and dissemination of emergency information to the public. This program would be funded by fees levied against each utility. (Effective immediately, approved February 6, 1980.)

Colorado

Senate bill 55 (1980) states every town, city and county shall designate by ordinance an emergency response authority for hazardous material incidents occurring within its corporate limits. Provisions are made for hazardous material incidents occurring on private property or within unincorporated areas outside fire protection districts. Persons possessing hazardous materials on private property or within unincorporated areas outside fire protection districts shall provide the county sheriff with a list of the maximum quantity of each hazardous type anticipated to be present on the property at any time, or be subject to a civil penalty. The Colorado Department of Health shall compile and maintain current information necessary to enable the department to answer any inquiry concerning the proper action to take to counteract, eliminate, or minimize the public health

hazards of a hazardous material incident. The department shall establish and publicize a telephone service to make such information available to the public 24 hours each day. An emergency response cash fund is created and $20,000 is appropriated for the fiscal year beginning July 1, 1980. To implement this act, $30,000 for 1.5 full-time equivalents is appropriated for the fiscal year beginning July 1, 1980.

Connecticut

House bill 5555 (1980) amends existing law to require immediate reporting to the Connecticut Commissioner of Environmental Protection by licensees of the Nuclear Regulatory Commission (NRC) of any release of radiation and any occurrence, incident or abnormal circumstance, unless it is immediately evident that such occurrence, incident or circumstance is not required to be reported to the NRC within 24 hours. The Connecticut Department of Environmental Protection may, by adopting regulations, require the immediate reporting of additional occurrences, incidents, or abnormal circumstances at licensed nuclear plants which are not required to be reported to the NRC within 24 hours. Failure to make an immediate report could result in a civil penalty of no more than $25,000.

Indiana

House bill 1470 (1980) provides that upon notification of the accidental or deliberate discharge of any hazardous substance in an amount that could endanger the health, safety, or welfare of the public, the Indiana State Board of Health may require that the spilled substance be treated at the site of discharge or removed to a disposal facility. The board of health will assess actual costs against the parties they determine to be responsible.

Kansas

Senate bill 532 (1980) gives additional duties to the Kansas Division of Emergency Preparedness, including (1) determining the requirements of the state, counties and cities for food, clothing and other necessities in the event of a disaster; (2) procuring and distributing supplies, medicines, materials and equipment deemed necessary for use during a disaster; (3) publishing standards and requirements

for local disaster emergency plans; (4) periodically examining or reviewing and approving local and interjurisdictional disaster emergency plans; (5) establishing and operating training or public information programs relating to emergency preparedness; (6) surveying and arranging for private facilities, services and property for emergency preparedness activities; (7) establishing a register of persons, equipment and housing for use in a disaster; (8) preparing drafts of orders or proclamations for use by the governor during a disaster; and (9) coordinating and supervising all agencies that are involved in the transportation of hazardous materials.

Maryland

House bill 1032 (1980) amends the current state code to require each local organization within the plume or ingestion zone of a commercial nuclear reactor to submit to the Maryland State Director for Civil Defense and Disaster Preparedness a radiological emergency response plan, which provides for evacuation in the event of a major disaster caused by a dangerous release of radiation.

Minnesota

House bill 1842 (1980) authorizes the Minnesota Division of Emergency Services, in cooperation with the Minnesota Commissioner of Health and affected local governments, to develop a state and local radiological emergency response plan as specified in the license of each nuclear plant in the state. Each utility is assessed $250,000 to cover the initial costs of upgrading the plans and an annual assessment of $50,000 to cover ongoing costs. The Emergency Recovery Plan shall include (1) purchase of equipment for state and local units of government; (2) development of a detailed nuclear emergency response plan for areas surrounding each nuclear plant; (3) training of state and local emergency response personnel; (4) development of accident scenarios and exercises for nuclear emergency response plans; and (5) provision for other specialized response equipment necessary to fulfill the plan.

Oregon

Chapter 726 (1979) requires the Oregon Department of Energy, in cooperation with the Oregon Health Division, to make

rules to protect health and evacuate people after a nuclear emergency.

Virginia

Chapter 495 (1978) provides that the Virginia Office of Emergency Services may direct each political subdivision to prepare and update an emergency plan in response to nuclear accidents. Compliance is mandatory if a nuclear power station or nuclear facility is located within 10 miles of its boundaries.

D. DISPOSAL

In regard to the disposal of low-level radioactive waste, only six states have had operating commercial low-level radioactive waste disposal facilities. Thus, their disposal laws have been tailored to the administrative needs of these states. Other states' disposal-related laws are concerned with restrictions on the development of sites and alternative methods of disposal.

Within the last 12 months, the governors of three states in which commercial facilities are currently operating (Nevada, South Carolina, and Washington) have exerted considerable pressure on the states which send waste to their respective commercial sites by limiting the types and amounts of out-of-state waste to be accepted. Consequently, many states are beginning to consider disposal options for instate generated low-level radioactive waste. For example, the states of Michigan, Texas, and Virginia are considering the siting of instate facilities for instate generated low-level radioactive waste.

In the last 4 years, at least 25 states have placed restrictions on the disposal of radioactive waste. Disposal or disposal site development has been prohibited unless approved by the state legislature in Alaska, Colorado, Connecticut, Hawaii, Kansas, Kentucky, Maine, Minnesota, Mississippi, New Hampshire, New York, North Dakota, and Vermont. South Dakota is considering requiring voter approval of any development plans.

Except for Oregon law, most of the bans on disposal of radioactive waste have qualifications. Alabama has restricted disposal to instate generated waste only.

Indiana law will not allow disposal in national forests, and Louisiana prohibits disposal in salt domes. Large quantities of radioactive waste may not be disposed in Montana, while long-term disposal is prohibited in Maryland. Exceptions to sources of the waste are specified in the statutory bans in Michigan and West Virginia. Finally, New Mexico initiated a 12-month moratorium on radioactive waste disposal in 1977.

Other restrictions have been specified in Arizona and Texas. In Texas, radioactive discharges into air or water are prohibited. Arizona law contains a series of technical criteria for proposed disposal sites, including the following prohibitions: disposal facilities shall not be in flood plains; near roads, dwellings, or surface water; within one mile of groundwater at less than 150 feet; interfere with potential land uses; or in areas of known or potential subsidence.

Twenty-five states' disposal laws are summarized below.

Alabama

Act no. 79-105 (H 176) is an act to prohibit the disposal of certain nuclear spent fuel or radioactive material or waste by the United States of America in any site within the state except for that nuclear spent fuel or radioactive material or waste that is generated in Alabama.

Alaska

Chapter 172 (1978) is a general amendatory bill relating to radiation control in the Alaska Department of Health and Social Services. It adds a new section "Facilities Siting Permit Required" which prohibits construction of a nuclear fuel production facility, utilization facility, reprocessing facility, or nuclear waste disposal facility in the state unless a permit is obtained from the Alaska Department of Environmental Conservation. No permit can be issued unless the legislature, local government and governor have approved the permit.

Arizona

Senate bill 1283 (1980) provides that a hazardous waste disposal site or facility shall not be located within

(1) a 100 year flood plain; (2) an area close to public roads, residences or public and private water supplies; (3) an area where up to one mile from the perimeter of the site the depth to the ground water level is less than 150 feet; (4) an area where surrounding land use for one square mile may impede proper long-term maintenance of the site; and (5) an area where subsidence has occurred or is likely to occur. The Arizona Director of Health Services shall recommend an initial disposal site to the legislature for approval by January 1, 1981; after: (1) public hearings are held, and (2) consideration is given to transportation distances and routing. The director shall be given the authority to acquire, construct or operate a hazardous waste disposal site or facility and to assess reasonable fees for its use.

Colorado

Senate bill 335 (1979) provides that no facility or site for the disposal of radioactive waste shall be constructed unless the governor and legislature approve it. The department of health is to develop the criteria to be used in evaluating an application. The radiation control agency is allowed to collect fees for radioactive materials licenses.

Connecticut

House bill 5097 (1979) bans the disposal of nuclear waste in the state unless the general assembly approves it. Low-level medical and university wastes are excluded.

Hawaii

P 26 (1978) is to require anyone wishing to construct a nuclear fission power plant or dispose of radioactive material to receive the approval of two-thirds of the members of each house of the legislature.

Indiana

Senate bill 22 (1980) forbids the use of any land within a national forest "for the disposition, storage, or handling of nuclear or hazardous waste, including but not limited to nuclear material, radioactive material, and the radioactive remains of a nuclear facility."

Kansas

Senate bill 532 (1980) provides that no geologic investigation to determine the suitability of any site in the state for disposal or storage of radioactive waste materials shall be undertaken until the governor and the legislature have first been notified of all details of such investigations.

Kentucky

House bill 98 (1980) sets final authority for approving or disapproving the locating, opening, closing or reopening of a low-level radioactive waste disposal site or facility within the state legislature. Before reopening of the Maxey Flats site could occur, the following must be obtained: (1) a finding by the Kentucky Department of Human Resources and the Kentucky Department of Natural Resources and Environmental Protection that all reasons for site closure have been addressed and resolved; (2) public hearings have been held; (3) majority approval of the legislature; and (4) approval by the governor.

Louisiana

La. Stat. Ann., sec. 50:1071 prohibits the disposal of radioactive material or waste in salt domes. Requires prior notification of any geological testing to determine suitability of sites.

Maine

House bill 799 (1979) bans the storage, deposit or treatment of radioactive waste unless the legislature approves it. A study is to be performed on the effects of the act, waste disposal methods proposed for Maine, the state of the art and the amount of waste generated, treated, stored or disposed of in Maine. The study is due by February 14, 1981.

Maryland

Chapter 125 (HB 428) (1978) prohibits the establishment within the state of any facility for long-term storage of nuclear waste. The law does not prohibit temporary storage of used nuclear fuel pending shipment out of the state. The temporary storage is not to exceed 2 years.

Michigan

PA 113 (SB 144) (1978) prohibits the storage or disposal of radioactive waste within the state. This law does not apply to facilities at educational institutions, spent fuel storage pools at nuclear power plants, mill tailings from uranium mining within the state, medical uses of radioactive material, temporary storage of low-level waste for not more than 6 months, and the storage of waste which was stored before January 1, 1970.

Minnesota

House file 1215 (1977) prohibits construction or operation of a radioactive waste management facility within the state unless it is authorized by the legislature. The law prohibits the transportation of radioactive waste into the state for burial or permanent storage without the legislature's authorization. But, radioactive waste may be transported into the state for temporary storage (for up to 12 months) pending transportation out of the state.

Mississippi

Senate bill 2674 (1980) provides for the completion of certain technical, environmental and socioeconomic studies before the governor can recommend that the legislature approve a site for a radioactive waste disposal facility.

Montana

Chapter 68 (H 254) (1977) prohibits the disposal in Montana of a large quantity of radioactive materials from other states and provides a penalty.

New Hampshire

House bill 91 (1979) prohibits the storage or disposal of radioactive waste in the state unless the legislature approves it by concurrent resolution. Spent fuel from other plants or facilities cannot, under any circumstances, be stored in the state. A task force to negotiate on behalf of the state during the consultation and concurrence process is established.

New Mexico

Chapter 122 (1977) prohibits the disposal within the state of radioactive material generated outside the state until March 31, 1978.

New York

Assembly bill 3197B (1979) provides that no permanent waste repository can be sited in the state unless the governor and legislature approve it by statute. Prior to approval, the New York State Energy Research and Development Administration (ERDA) shall conduct a complete study on all issues of waste disposal, prepare an EIS, certify that a particular site is suitable and a proven technology exists, conduct public hearings, and prepare a detailed estimate on the costs.

Assembly bill 7363 (1979) amends the above-mentioned law to change the words "permanent repository" to "repository for the terminal storage of nuclear waste." The West Valley facility is excluded from the definition of repository. The state's approval is also changed to a consultation and concurrence.

North Dakota

Chapter 320 (senate bill 2168) (1979) provides that no radioactive waste material which has been brought into North Dakota may be deposited in the state without prior approval by the legislative assembly.

Oregon

Chapter 283 (1979) redefines "radioactive waste" and "waste disposal facility." Requires the Oregon Health Division to contract for an independent study to be made of public health hazards of radioactive waste and report to the next legislative assembly. It prohibits establishment, operation or licensing of any radioactive waste disposal facility.

South Dakota

House bill 822 (1977) prohibits containment, disposal, or deposit of high-level nuclear waste, radioactive substances, and radioactively contaminated materials and prohibits the

processing of high-level nuclear waste within the state without approval by the legislature.

In 1980, the legislature adopted house joint resolution 1008 which directs that an "act to regulate the mining of uranium, the construction of nuclear power plants, and the generation of nuclear waste" be placed on the November 1980 ballot. If enacted this bill would require a certificate of environmental compatibility and public need to construct a nuclear power plant, provide for nuclear waste or begin uranium mining or milling. If the department of water and natural resources decides to issue the certificate, the voters in a statewide election must approve it.

Texas

Chapter 644 (HB 1560) (1977) prohibits the issuing of permits by the Texas Water Quality Board for the discharge of radiological or high-level radioactive waste into any water within the state.

Vermont

House bill 261 (1977) prohibits the construction or establishment of facilities for deposit, storage, reprocessing, or disposal of spent nuclear fuel elements of high-level radioactive waste materials in the state unless approved by the legislature. Procedure for legislative approval is provided.

More recently, Vermont passed senate bill 199 (1980). It provides that 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 unless the general assembly first finds that it promotes the general good of the state and approves. The construction or establishment of low-level temporary storage facilities is exempt.

West Virginia

House bill 986 (1980) bans the storage or disposal of radioactive waste within the state except medical, educational research or industrial waste. The industrial waste may not include any materials produced in conjunction with the operation of a power reactor or reprocessing facility.

E. STATE LAWS ON TRANSPORATION OF RADIOACTIVE MATERIALS

The transport of radioactive material is controlled by numerous laws and regulations at the federal, state, and local levels. These laws and regulations address a spectrum of issues including routing, prenotification, emergency response, packaging, and inspection and monitoring to name a few. While some states have left radioactive material transportation regulation to the Federal Government, others have provided statutory authority over many areas. Georgia, for example, requires route approval, prenotification, recordkeeping, accident notification, proper packaging and labeling, permits and licenses, and liability insurance.

The Office of State Programs of the Nuclear Regulatory Commission has compiled state laws and regulations governing the transportation of radioactive materials in NUREG/CR-1263 entitled "Compilation of State Laws and Regulations on Transportation of Radioactive Materials" (January 1980). The compilation's appendix summarizes the laws and regulations and is included as Table II on the following pages. Terms used in the table are further described below and on the page following the table:

Routing -- State regulatory agency can specify acceptable routes for nuclear material shipments.

Advance notification -- Calls for advance notification to state agency by shippers before certain nuclear materials can be transported within state's boundaries.

Escorts -- Applies to shipments of formula quantities of special nuclear material usually in the field of physical security.

Keeping of records/access to records, manifests -- Refers to maintenance of and access to records of nuclear material shipments including those to be on board a vehicle.

Qualification of personnel -- Specifies personnel requirements for guard and escort personnel as well as for other types.

Accident notification -- Requires accident notification on all carriers and specifies reporting requirements.

TABLE II

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Alabama	Alaska	Arizona
Routing			
Advance Notification			
Escorts			
Keeping of/ Access to Records Manifests			
Qualification of Personnel			
Accident Notification	As required by DOT in 49 CFR		File with Arizona Atomic Energy Commission
Accident/ Emergency Procedures			
Loading, Packaging Labeling, Marking	As required by DOT in 49 CFR	As required by DOT in 49 CFR and others	As required by DOT in 49 CFR
Registration, Fees, Permits, Licensing	Reciprocal with DOT licensing	State Dept. of Health and Science registration	Reciprocal with DOT licensing
Certain Shipments Prohibited			
Financial Liability, Insurance, Bonding			
Monitoring, Surveillance, Inspection			
State Adoption of Federal Requirements	DOT regulations	DOT and others	DOT regulations
Other			

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Arkansas	California	Colorado	Connecticut
Routing				Prescribed by state
Advance Notification	Transportation Commission authority (no regs. issued)			1 day
Escorts	Transportation Commission authority (no regs. issued)			
Keeping of/ Access to Records Manifests	Transportation Commission authority (no regs. issued)	Documents in vehicles describing material		
Qualification of Personnel				
Accident Notification	Notify State Police Immediately	Federal requirements	As required by DOT in 49 CFR	
Accident/ Emergency Procedures		Federal requirements		
Loading, Packaging Labeling, Marking	As required by DOT in 49 CFR	As required by DOT in 49 CFR and Hgwy. Patrol	As required by DOT in 49 CFR	As required by ICC
Registration, Fees, Permits, Licensing	Permit required from State Dept. of Pollution Control & Ecology	Registration; $50 fee; Dept. of Health Services	Reciprocal with DOT licensing	Permit required from the State Department of Environmental Protection
Certain Shipments Prohibited				
Financial Liability, Insurance, Bonding				
Monitoring, Surveillance, Inspection	State Dept. of Energy authority	State Dept. of Industrial Relations		
State Adoption of Federal Requirements	DOT regulations	NRC, DOT, regs	DOT regulations	ICC regulations
Other	Enforcement by Trans. Commission, State Police, State Hgwy Dept.			No shipment permitted on weekends Ship only between 9am & 4pm

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Delaware	Florida	Georgia	Hawaii
Routing			Prior notice and approval required	
Advance Notification		10 days before trip	Prior notice of route, time of trip, cargo	
Escorts				
Keeping of/ Access to Records Manifests		Inspections of records permitted by Health Dept.	Annual reports required of non-permit holders	
Qualification of Personnel				
Accident Notification	As required by DOT in 49 CFR		As required by DOT in 49 CFR	
Accident/ Emergency Procedures				
Loading, Packaging Labeling, Marking		As required by DOT in 49 CFR	As required by DOT, Postal & State Pkg. & Labeling Regs.	
Registration, Fees, Permits, Licensing	Permits for Del. Memorial Bridge	Certificates required for some roads	Permits, Licenses required. Permits for Talmadge Bridge	
Certain Shipments Prohibited				
Financial Liability, Insurance, Bonding			Liability Insurance required by state DOT	
Monitoring, Surveillance, Inspection	State Police	Optional vehicle inspection by Health Dept.		
State Adoption of Federal Requirements	49 CFR	49 CFR	Parts of 49 CFR, 14 CFR and 39 CFR	
Other			Restrictions on shipments through Atlanta 5 day limit on trips	

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Idaho	Illinois	Indiana
Routing			
Advance Notification			
Escorts			
Keeping of/ Access to Records Manifests			
Qualification of Personnel			
Accident Notification			
Accident/ Emergency Procedures		Report railroad accidents to Illinois Commerce Comm.	
Loading, Packaging Labeling, Marking		"Radioactive" placed in opening & closing instructions	
Registration, Fees, Permits, Licensing	Reciprocal with DOT licensing		Permit required for East Indiana Toll road
Certain Shipments Prohibited			
Financial Liability, Insurance, Bonding		$10,000 fine for each civil violation. $25.000 criminal	$1 million Insurance Certificate
Monitoring, Surveillance, Inspection		Law enforcement officials enforce on highways	
State Adoption of Federal Requirements	49 CFR 14 CFR 39 CFR	49 CFR ICC regulations	
Other		Radioactive shipments allowed on toll highways if NRC, DOT &ICC regs followed.	

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Iowa	Kansas	Kentucky	Louisiana
Routing				
Advance Notification				
Escorts				
Keeping of/ Access to Records Manifests				Documents in vehicle describing material
Qualification of Personnel				Department of Public Safety prescribes standards
Accident Notification	Iowa Hwy Safety Patrol; Dept. of Motor Veh.			Dept. of Public Safety and Nuclear Energy Diphoned & written reports
Accident/ Emergency Procedures	Contact Police radio; state safety patrol			
Loading, Packaging Labeling, Marking			As required in 49, 46, 39 and 14 CFR	As required by DOT in 49 CFR
Registration, Fees, Permits, Licensing	Permits required for some bridges	Registration by Sec. of Health and Environ. required	State Dept. of Human Resources, general license to carriers in compliance w/DOT regs.	Reciprocal with DOT licensing
Certain Shipments Prohibited				Shipments of high level waste prohibited.
Financial Liability, Insurance, Bonding				Liability insurance required; $300,000 public $100,000 private liability coverage
Monitoring, Surveillance, Inspection			Inspection by authorized agencies	Monitoring as required by DOT in 49 CFR
State Adoption of Federal Requirements		49 CFR 397.1 through 397.21	Parts of 49, 46, 39 and 14 CFR	DOT, postal service regulations
Other				

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Maine	Maryland	Massachusetts	Michigan
Routing				
Advance Notification		Sufficient to allow for inspection and processing permit		
Escorts				
Keeping of/ Access to Records Manifests	Bill of Lading describing materials			
Qualification of Personnel				
Accident Notification	Report to an emergency agency (unnamed)			Report "incidents" affecting public hea to Dept. of Public H
Accident/ Emergency Procedures				
Loading, Packaging Labeling, Marking	Placard as required by 49 CFR			
Registration, Fees, Permits, Licensing	Permits required for turnpike	Permits required for toll roads, bridges, tunnels	Permits required for turnpike	Registration required; permit Saulte Ste. Marie Bridge
Certain Shipments Prohibited			Banned through Callahan-Sumner Tunnels	Banned on Detroit International Bridge
Financial Liability, Insurance, Bonding				
Monitoring, Surveillance, Inspection				
State Adoption of Federal Requirements	49 CFR requirements for placarding		49 CFR	Parts of 10, 14 and 49 CFR
Other				

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Minnesota	Mississippi	Missouri	Montana	Nebraska
Routing					
Advance Notification					
Escorts					
Keeping of/ Access to Records Manifests					Quarterly reports to Department of Health
Qualification of Personnel					
Accident Notification			Accidents reported to state Division of Health		
Accident/ Emergency Procedures					
Loading, Packaging Labeling, Marking	As required by 49 CFR				DOT, Postal Service, plus "Removal Prohibited" warning
Registration, Fees, Permits, Licensing		Law requires license, no registration issued		Law requires license, no regulation issued	Reciprocal with DOT licensing
Certain Shipments Prohibited					
Financial Liability, Insurance, Bonding		Liable to state for incidents			
Monitoring, Surveillance, Inspection					As required by DOT
State Adoption of Federal Requirements	Parts of 14 and 49 CFR				DOT regulations
Other					

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Nevada	New Hamoshire	New Jersey	New Mexico	New York
Routing			Information when applying for certificate	Authorization in law, no reas	
Advance Notification	3 days for out-of-state licensee, can be waived		7 days for certificate		Yearly permit applications 30 days in advance
Escorts					
Keeping of/ Access to Records Manifests	Quarterly reports to Bd. of Health				Manifest in carrier
Qualification of Personnel					
Accident Notification					
Accident/ Emergency Procedures					
Loading, Packaging Labeling, Marking			As required by DOT, NRC, Postal Service		As in 49 CFR
Registration, Fees, Permits, Licensing	Specific NRC, other licenses granted general state license		Certificate, Dept. Env. Prot. Permit, toll roads		Permits required
Certain Shipments Prohibited					Banned on Triboro bridge, tunnel
Financial Liability, Insurance, Bonding					Insurance certificate city thruway
Monitoring, Surveillance, Inspection					By DOT, FHA & Div. of State Police
State Adoption of Federal Requirements	Specific parts of 46, 49 & 14 CFR			4/3/74 agreement with AEC	49 CFR, NRC, DOT
Other					See NYC column for special requirements

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	North Carolina	North Dakota	Ohio	Oklahoma	Oregon
Routing	Notice for spent fuel to Division of Highway Patrol				Inform State Health Department
Advance Notification	5 Days spent fuel				
Escorts					
Keeping of/ Access to Records Manifests					
Qualification of Personnel					
Accident Notification					As required in 49 CFR
Accident/ Emergency Procedures		Subject to Health Dept. orders, Health Council hearing in 10 days			
Loading, Packaging Labeling, Marking	As required by DOT	As required by DOT	49 CFR		As required in 49 CFR
Registration, Fees, Permits, Licensing		Reciprocal with DOT Licenses			Reciprocal with DOT Licensing
Certain Shipments Prohibited			Banned on some bridges		
Financial Liability, Insurance, Bonding					
Monitoring, Surveillance, Inspection		Health Dept. may impound			
State Adoption of Federal Requirements	DOT, Coast Guard regulations	DOT regulation	49 CFR 14 CFR	Board of Health empowered to adopt regs	
Other	Materials not subject to DOT, Special notice			Compliance w/ NRC, ICC &DOT required for turnpike	Rail transporters advance & incident notice

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Pennsylvania	Rhode Island	South Carolina	South Dakota
Routing				
Advance Notification	30 days prior to transportation to H.S.T.B.*	48 hours prior to shipment		2 days prior to entry into state
Escorts				
Keeping of/ Access to Records Manifests		Certificate of compliance with DOT, NRC regulations	Inspections permitted	
Qualification of Personnel				
Accident Notification	Report accident to H.S.T.B.	Immediately notify RI State Police		Notify within 24 hours Dir. of Health Dept.
Accident, Emergency Procedures				
Loading, Packaging Labeling, Marking	As required by DOT in 49 CFR		As required by DOT in 49 CFR	
Registration, Fees, Permits, Licensing	Permits required for turnpike reciprocal with DOT licensing	Permits required from Public Utilities Carriers		State Health Department registration
Certain Shipments Prohibited				
Financial Liability, Insurance, Bonding		Bond may be required from Dir. of Health		
Monitoring, Surveillance, Inspection	Inspection by H.S.T.B. authorized representative		Inspection by SC Dept. of Health & Environmental Control	
State Adoption of Federal Requirements	49 CFR	DOT, NRC regulations	For packing, loading, marking & handling	
Other	*H.S.T.B. - Hazardous Substance Transportation Board	2-way radios req. No shipmts. ber. 7-9am, 4-6 pm weekdays		

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Tennessee	Texas	Utah	Vermont
Routing				Give notice to Director of Occupational Health
Advance Notification	To Public Service Comm. for spent fuel shipments			2 days
Escorts				
Keeping of/ Access to Records Manifests				
Qualification of Personnel				
Accident Notification				Radiation Control Agency may act, 10 days to hold hearing
Accident/ Emergency Procedures				
Loading, Packaging Labeling, Marking				
Registration, Fees, Permits, Licensing	PUC has authority to license, no regulation issued			Reciprocal with DOT licensing
Certain Shipments Prohibited		Banned through Baytown-La Porte tunnel		
Financial Liability, Insurance, Bonding				
Monitoring, Surveillance, Inspection				Inspection authorized
State Adoption of Federal Requirements		To be consistent with DOT regulations	DOT regulations	Law enables Commission of Health to adopt by reference
Other		Fire extinguishers required		Notice of destination date, time of shipment

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Virginia	Washington	West Virginia	Wisconsin
Routing				
Advance Notification				
Escorts				
Keeping of Access to Records Manifests				
Qualification of Personnel				
Accident Notification		Report incidents to Dept. of Social and Health Sciences		
Accident Emergency Procedures				
Loading, Packaging Labeling, Marking		As required by DOT	As required by DOT and other federal agencies	
Registration, Fees, Permits, Licensing	Permit required for state highways	Reciprocal w/ DOT license requirement		
Certain Shipments Prohibited				
Financial Liability, Insurance, Bonding				
Monitoring, Surveillance, Inspection	Office of Emergency Services monitors			
State Adoption of Federal Requirements	Regulations pending		DOT, NRC and Postal Regulations	
Other		Physicians Exempt		

TABLE II
(Continued)

STATE AND LOCAL LAWS AND REGULATIONS GOVERNING

THE TRANSPORTATION OF RADIOACTIVE MATERIALS

	Wyoming	
Routing		
Advance Notification		
Escorts		
Keeping of/ Access to Records Manifests		
Qualification of Personnel		
Accident Notification		
Accident/ Emergency Procedures		
Loading, Packaging Labeling, Marking		
Registration, Fees, Permits, Licensing		
Certain Shipments Prohibited		
Financial Liability, Insurance, Bonding		
Monitoring, Surveillance, Inspection		
State Adoption of Federal Requirements	DOT Regulations	
Other		

Accident/emergency procedures -- Primarily a state responsibility and states are relied upon to specify requirements.

Loading, packaging, labeling, marking -- Specifies the requirements for the handling and marking of nuclear material containers.

Registration, fees, permits, licensing -- Requirement to obtain a permit in advance of transportation of material and may also contain routing restrictions.

Certain shipment prohibited -- Type of nuclear materials as well as modes and purpose of transportation; prohibitions usually concern routes.

Financial liability, insurance, bonding -- Specifies protection limits for the public.

Monitoring, surveillance, inspection -- Applies to the physical condition of the equipment and to the packaging.

Other -- Clarifies specific restrictions.

The most frequent actions taken by states are the adoption of Federal Department of Transportation regulations and the requiring of some sort of registration, fee payment, permitting or licensing. Many states have also adopted requirements for prenotification of shipments, accident notification, packaging and labeling (usually as required by the U.S. Department of Transportation), and some form of monitoring and inspection.

In addition to the laws and regulations identified in the table, several states have enacted provisions concerning transportation of radioactive material more recently. These are summarized below.

Arizona

House bill 2172, approved in April 1980, establishes an Arizona Radiation Regulatory Agency and a Radiation Regulatory Hearing Board. Among their duties are the regulation of the transportation of sources of radiation, in

cooperation with the Arizona State Department of Transportation and the Arizona Corporation Commission. The law also provides for the establishment of an escalated enforcement action including issuance of orders, conduct of hearings, and procedures for appeals and civil penalties.

Maryland

Senate bill 536, approved in May 1980, amends the current Code of Maryland relating to the transportation of hazardous substances (which includes radioactive materials): (1) to permit only a designated hazardous substance hauler, certified under Maryland law, to transport a designated hazardous substance from its place of generation; (2) to require periodic reporting to the Maryland Department of Natural Resources on the source, hauler, facility destination, volume, and nature of the designated hazardous substance; and (3) to require contracts for treatment, storage or disposal of designated hazardous substances be with operators of currently authorized facilities.

New Hampshire

Chapter 344 (house bill 818) (1979) provides for adoption of federal transportation regulations, inspection of motor vehicles carrying radioactive materials, and emergency response.

Chapter 371 (house bill 719) (1979) established the Hazardous Material Transportation Advisory Board whose duties include coordination of federal, state, and local regulatory agencies.

South Carolina

House bill 3350, approved in May 1980, requires a shipper of radioactive waste to: (1) deposit and maintain with the South Carolina Department of Health and Environmental Control a cash or corporate surety bond or provide evidence of liability insurance sufficient to protect the state and the public at large from possible radiological injury; (2) comply fully with all applicable laws and administrative rules and regulations, both state and federal, regarding packaging, transport, storage, disposal, and delivery of radioactive waste; (3) certify to the department that it

will hold the state harmless for all claims, actions, or proceedings in law or equity arising out of radiological injury occurring during the transportation of radioactive waste; (4) provide to the department for each shipment a shipping manifest; (5) provide to the department for each shipment certification that the foregoing requirements have been complied with and any other certifications that the department may find necessary; (6) provide such other information as the department may deem necessary for the protection of the health and safety of the public and the environment; and (7) purchase a permit. Nontransferable permits are to be issued by the department based on compliance with the above provisions. After acceptance of and departure with a shipment of radioactive waste, a carrier must immediately notify the department of any variance from the shipper's notification of primary route and estimated date of arrival. The carrier is to provide to the department certification that: (1) the shipment is properly placarded; (2) the vehicle has been inspected and meets the applicable requirements; (3) the carrier has received a copy of the shipper certification of compliance and the shipping manifest; and (4) the carrier has complied with all applicable laws and administrative rules and regulations, both state and federal, regarding the transportation of radioactive waste. The department is to establish a schedule of fees for permits. Rules and regulations may be enforced, within their respective jurisidiction by the South Carolina Department of Health and Environmental Control, the South Carolina State Department of Highways and Public Transportation, and the South Carolina Public Service Commission. A notification period shorter than 72 hours may be required by the department for shipments greater than 75 cubic feet. Owners and operators of disposal facilities are to permanently record, and report to the department within 24 hours after discovery, any and all conditions in violation of these requirements. No operator is to accept radioactive waste unless the shipper has a valid permit. Violations may be subject to fine, penalty, or suspension or revocation of a permit. These are assessed by the department giving consideration to (1) degree of harm which has resulted or might result; (2) degree by which the accepted radiation level is exceeded; (3) duration of violation; and (4) record of violator. Funds from fines, penalties, or fees accrue to the general fund. Funds from permits are to

administer and enforce the permitting provision. When an emergency exists the department may require that action be taken as necessary to meet the emergency.

House bill 3177, approved in June 1980, authorizes the security organization of any corporation or legal entity doing business in the state engaged in the business of transporting, fabricating, storing or using in any manner nuclear material to obtain from the South Carolina Law Enforcement Division a copy of the confidential criminal history record of any employee or any applicant for employment only after a written release is obtained from the employee or applicant. The criminal records shall only be used for the following: (1) screening such applicants or employees whose duties include having access to nuclear power plants or storage facilities; (2) screening employees whose duties include having access to or control over nuclear material or sensitive information relating to nuclear power plants or facilities.

South Dakota

Senate bill 65, approved in February 1980, requires that the Federal Government notify the governor 72 hours in advance before transporting any radioactive waste through the state.

Tennessee

Senate bill 1884, approved in April 1980, directs the Tennessee Department of Public Health to purchase 12 portable radiation monitoring devices to be used at freight inspection stations in Knox, Coffee, Hayward and Robertson counties. The Tennessee Public Service Commission is directed to make manpower available to utilize the equipment and the Tennessee Civil Defense is to provide training. Senate bill 2225, also approved in April 1980, changes the words "or all buildings or premises" to "property" in section 53-3315 on inspecting for sources of radiation and sets more stringent penalties for noncompliance with the state's radiation code. (Approved April 2, 1980.)

Washington

House bill 1807, approved in February 1980, adopts U.S. Department of Transportation regulations 49 CFR 100-199 on the transportation of hazardous materials and authorizes the

state patrol to inspect cargoes. House bill 1970, approved in March 1980, requires a bill of lading with a red border for the transport of hazardous materials within the state and sets civil penalties for violation of the state's transportation regulations. Finally, senate bill 3331, also approved in March 1980, sets a scale of fines from $200 to $500 for noncompliance with regulations pertaining to vehicle equipment on motor carriers transporting hazardous materials.

F. STUDIES ON RADIOACTIVE WASTE TRANSPORTATION AND DISPOSAL CONDUCTED BY OTHER STATES

A request for information about studies on the methods of transporting and disposing of radioactive materials conducted by state legislatures was distributed to 49 states' legislative research agencies. In addition to requesting findings, conclusions, and recommendations derived from such studies, the respondents were also asked to identify any current or recently completed studies regarding radioactive waste management conducted by their respective executive branches. Of the 37 responses to the information request, 14 identified legislative studies or staff reports relating to radioactive waste transportation and disposal, and six identified executive branch studies. A list of the studies appears in Table III.

California

The State of California and the California State Assembly have published a number of lengthy reports. Four of them are cited in Table III. The background papers written by staff of the California Assembly Committee on Resources, Land Use and Energy, include a discussion of the problems of handling and disposal of waste. In one section, it is projected that 1,225 tons of nuclear waste will be generated each year in California by 1994 and that the shipping of these wastes by truck and rail could result in 4 to 15 accidents in the period from 1985-1995 with up to a 40 percent chance that one of them will involve serious radiation injuries to several persons and possibly a fatality.

The reassessment policy analysis, also by the California Assembly Committee on Resources, Land Use and Energy, summarizes information on nuclear power plant safety and waste

TABLE III

STUDIES ON RADIOACTIVE WASTE TRANSPORTATION AND DISPOSAL CONDUCTED BY OTHER STATES

California

Emilio E. Varanini, III, Gary D. Simon, and Cynthia G. Praul, Staff Background Papers, Hearings on Proposition 15, The Nuclear Initiative, Assembly Committee on Resources, Land Use and Energy, May 15, 1976.

California State Assembly, Committee on Resources, Land Use and Energy, Reassessment of Nuclear Energy in California, A Policy Analysis of Proposition 15 and Its Alternatives, May 10, 1976.

State of California, Resources Agency, Radioactive Materials in California, Report of the Secretary for Resources' State Task Force on Nuclear Energy and Radioactive Materials, April 1979.

State of California, Energy Resources Conservation and Development Commission, Low-Level Radioactive Waste Management, Consultant Report by NUS Corporation, August 1979.

Idaho

State of Idaho, Report of the Governor's Radioactive Waste Task Force, December 13, 1979.

Illinois

Illinois Legislative Council, Collection of Nuclear Energy Memoranda, Publication No. 151, May 1979.

J. W. Ahlen, Low-Level Radioactive Waste Disposal, Research Memorandum File 9-043, Illinois Legislative Council, June 1979.

Gary J. LaPaille, Current Low-Level Radiation Disposal Issue, Memorandum to Members of the Subcommittee on Nuclear Safety, Illinois House of Representatives, October 1979.

TABLE III (continued)

State of Illinois, Commission on Atomic Energy, The Ad Hoc Nuclear Power Reactor Safety Review Committee, Nuclear Power Reactor Safety in Illinois, July 1979.

Iowa

State of Iowa, Departments of Environmental Quality and Transportation, Staff Working Paper, A Report to the Interagency Coordinating Council on Radiation Safety: Transportation of Radioactive Materials, July 1979.

Kansas

Kansas Legislature, Special Committee on Transportation, "Re: Proposal No. 38 - Hazardous Materials Transportation," Report on Kansas Legislative Interim Studies to the 1980 Legislature, pp. 745-758, December 1979.

Kentucky

Legislative Research Commission, Report of the Special Advisory Committee on Nuclear Waste Disposal, Research Report No. 142, October 1977.

Legislative Research Commission, Report of the Special Advisory Committee on Nuclear Waste Disposal (1979 Supplement) Research Report No. 167, January 1980.

Michigan

State of Michigan, Science and Technology Project, Report of the Governor's Nuclear Waste Disposal Task Force, December 1976.

State of Michigan, Office of Science and Technology, Report of the Governor's Task Force on Low-Level Radioactive Waste Disposal, September 1978.

Minnesota

John G. Malinka, Background Information for Radioactive Waste Management and Storage, Testimony related to HF 649, Minnesota Legislature House of Representatives, April 19, 1979.

TABLE III (continued)

New Mexico

New Mexico Legislature, Radioactive Waste Consultation Committee, Report to the Thirty-Fourth Legislature, Second Session, January 14, 1980.

New York

New York State Assembly, Special Committee on Nuclear Power Safety, Low-Level Radiation and the Nuclear Fuel Cycle, 1980.

North Carolina

General Assembly of North Carolina, Legislative Research Commission, 1975 Report on Radiation Hazards, November 1974.

Texas

Texas House of Representatives, "Nuclear Waste Storage," Interim Report, Sixty-Sixth Legislative Session, The Committee on Energy Resources, Volume 1, December 1977.

Virginia

General Assembly of Virginia, 1978 Joint Subcommittee Studying the Licensing of Nuclear Generation Facilities, Senate Document No. 29, pp. 21 and 31, 1978.

West Virginia

West Virginia Legislature, Joint Standing Committee on Judiciary, Subcommittee A -- Hazardous Material, Subcommittee Report, November 12, 1979.

West Virginia Legislature, Joint Standing Committee on Judiciary, Joint Subcommittee A -- Hazardous Materials, Subcommittee Report, January 8, 1980.

TABLE III (continued)

Wisconsin

John Stolzenberg, Legislation Relating to Radioactive Waste Management, Wisconsin Legislative Council, Report No. 5 to the 1979 Legislature, March 2, 1979.

materials disposal. This information was developed from 15 days of public hearings on nuclear energy.

Four broad issue areas are addressed in Radioactive Materials in California. These are (1) state regulation of users of radioactive materials; (2) environmental surveillance and radiation monitoring; (3) decontamination and decommissioning of facilities at which radioactive materials are used; and (4) transportation of radioactive materials.

The report identifies problem areas and includes 107 recommendations for administrative and legislative action. Many of the recommendations for legislative action call for expansion of the general fund support for inspection and monitoring and emergency preparedness programs. In regard to possible disposal of low-level wastes at sites in California, the report adopts a "wait and see" approach because the Nuclear Regulatory Commission is not actively encouraging the siting of new facilities until current studies have been completed (recommendation 38). Finally, a series of actions related to transportation of radioactive materials are recommended, including upgrading packaging requirements by the NRC and the U.S. Department of Transportation (recommendation 81); upgrading quality assurance programs by the NRC (recommendation 83); using patrol inspectors (recommendation 84); and assisting state and local enforcement authorities in complying with federal transportation regulations (recommendation 85).

Idaho

The report of the Radioactive Waste Task Force includes a series of recommendations to the governor which relate directly to the U.S. Department of Energy practice of injecting low-level radioactive wastes from their research operations in Idaho into the Snake Plain aquifer. The task force recommended discontinuance of this practice. It also suggested increasing the state's monitoring capability as previously injected contaminants move farther from the point of discharge.

Illinois

The legislative reports from Illinois cited in Table III are primarily informational and, thus, do not provide

recommendations for legislative action. The Ad Hoc Nuclear Power Reactor Safety Review Committee Report, on the other hand, provides 49 recommendations on general and/or policy aspects of nuclear power reactor safety, operating staff and operating procedures, technical aspects, and long-term considerations. While most of these recommendations are related to nuclear power plant safety, several (A. 17, A. 18, and A. 19) are concerned with informing the general public with sufficient and consistent information in the event of a nuclear accident. State, industry, and NRC coordination regarding public statements could help reduce public anxiety considerably.

Iowa

The purpose of the radioactive materials transportation report to the Interagency Coordinating Council was to explore the need for a radioactive material movement monitoring and surveillance plan for the State of Iowa. The conclusions of the report are that (1) data on the types and quantities of radioactive materials transported through Iowa is not readily available; (2) prompt information regarding the details of shipments of radioactive material is lacking for emergency response situations; (3) no state or federal agency requires advance notification about shipments in Iowa of any type of radioactive material; (4) a high accident problem involving radioactive materials has not been shown to exist; and (5) increased transportation of radioactive materials through Iowa is likely. The report recommended obtaining information regarding a series of concerns as a direct result of the conclusions.

Kansas

The purpose of the Special Committee on Transportation was to determine whether further regulations of the transportation of high-level radioactive and other hazardous materials was necessary and to determine jurisdictional responsibility in cases of accidental spillage of such materials. As a consequence of the committee's findings, it recommended a bill which provided for (1) defining hazardous materials; (2) designating an emergency preparedness office to prepare and carry out all emergency functions; (3) authorizing the emergency office to supervise and to coordinate activities with other state agencies which regulate any activities with

other state agencies which regulate any matter affecting the transportation and storage of hazardous materials; and establishing an informational system under which state agencies notify the emergency preparedness office upon receiving notification of shipment of hazardous materials through the state during cases of an emergency.

Kentucky

The purpose of the Special Advisory Committee on Nuclear Waste Disposal was to study the effects of nuclear waste disposal in Kentucky in light of serious concern being voiced about the public health hazards of Maxey Flats (the commercial low-level radioactive waste disposal site). Because measureable amounts of radioactivity were allowed to escape into the surrounding environment, the committee concluded that the decision to locate a nuclear burial site at Maxey Flats was a mistake, at least for geological and hydrological reasons; hence, the committee recommended that no additional nuclear burial sites be allowed in Kentucky, and further, that there should be increased site monitoring, that the Federal Government should share some of the costs, and that the tax on disposal of radioactive materials should reflect both volume and radiotoxicity being buried.

As the committee's deliberations drew to a close, new information indicated that there was additional contamination of the environment with radioactivity. A subsequent study committee was formed to consider long-range policies for radioactive waste disposal in Kentucky. Through administrative management, the commercial site was closed, however, the committee recommended retention of ownership of the site by the state. The committee also recommended that the site remain closed until substantial evidence could be found that reopening the site would not constitute a hazard.

Michigan

In response to an announcement by the Federal Government to search for possible high-level radioactive waste disposal sites in Michigan (and almost all other states), the governor of Michigan set up a nuclear waste disposal task force to review the federal proposal and the issue of radioactive waste disposal in general. The task force made 13 major

recommendations in its report. Generally, the recommendations called for coordination and cooperation between federal agencies and the states (recommendations 10-4); confirmation of technical feasibility, analysis of economic impact and transportation requirements (recommendations 5-10); and state review of design characteristics and proposed time tables for project implementation (recommendations 11-13).

About a year later, a similar task force was convened to review information on low-level radioactive waste generation and disposal alternatives as a consequence of the closing of the Sheffield, Illinois, commercial low-level radioactive waste disposal facility. Three major recommendations emerged from the task force's deliberations:

1. Because of the benefits derived from the operation of industries using radioactive materials, the health department should continue to assist Michigan nuclear material licensees in getting information on contracts and costs for shipping and disposal of low-level radioactive waste.

2. The midwestern states and the federal regulatory agencies should explore the possibility of disposing of commercial waste at federal low-level radioactive waste disposal sites.

3. The health department should develop a "contingency plan" to address the possibility of a lack of disposal capability at commercial and federal sites for Michigan produced low-level radioactive wastes.

Although not recommended, the task force acknowledged the potential need for the development of a central surface storage facility for Michigan generated low-level radioactive waste.

New Mexico

The radioactive waste consultation committee was created in response to public concern over the proposed waste isolation pilot plant (WIPP) in Carlsbad. Because the committee was continuing its study of the issues, no specific recommendations were presented in this report to the second session

of the 34th legislature (1980). The issues under consideration, however, included (1) the applicability of the Price-Anderson Act to radioactive waste transportation and disposal facilities; (2) the transportation of radioactive waste material; (3) compliance with the National Environmental Policy Act in the creation of any disposal facility; and (4) possible procedures for effective consultation and negotiation with the Federal Government. Some of the committee's action has been delayed due to pending federal legislation.

New York

One meeting of the Special Committee on Nuclear Power was organized for the purpose of gathering information on the health risks of low-level radioactive materials in response to the public's uncertainty of the risks associated with transportation and disposal of such materials. The committee made recommendations which dealt with five major areas: upgrading monitoring practices; implementing stricter workplace monitoring and recordkeeping; clarification of government responsibilities; regulation of radioactive material transport; and waste disposal strategies. The last two areas included specific recommendations to develop regulations with regard to shipment of radioactive materials during peak highway use hours and through densely populated areas, and train police, fire, and other public safety officials to respond properly to accidents and fires involving radioactive materials. Requiring legislative consultation and concurrence in the siting of temporary radioactive waste disposal facilities was also recommended.

North Carolina

The thrust of most of the 16 recommendations of the Legislative Research Commission's Committee on Radiation Hazards was in the area of nonionizing radiation (microwaves, lasers, and so on). Two, however, did address radioactive materials transportation and disposal. Specifically, it was recommended that the general assembly statutorily authorize the enforcement of federal rules and regulations relating to the transportation of radioactive materials (recommendation 10) and provide for bonding, insurance, or other security as a prerequisite to the possession of radioactive materials for expenditures in emergency response to radiation incidents and perpetual maintenance or other disposition of radioactive materials

that were abandoned or were once in the possession of a person that becomes insolvent or bankrupt.

West Virginia

In response to the reduced availability and inadequacy of current storage and disposal methods and facilities, the hazardous materials subcommittee of the joint standing committee on judiciary convened to consider issues regarding the storage and disposal of radioactive waste materials. As a result, the subcommittee recommended a bill which prohibits the storage and disposal of radioactive waste materials within West Virginia, except for waste generated within the state by medical, educational, research and industrial activity.

Wisconsin

At the conclusion of its study, the subcommittee on radioactive waste management of the legislative council's Special Committee on Solid Waste Management proposed four bills to the 1979 legislature. Of the four, assembly bill 210, relating to transportation of radioactive waste, provided for licensing transporters and establishing a system for notification of shipment of radioactive waste.

Assembly bill 212 related to state action on proposed construction of radioactive disposal facilities in Wisconsin. It directed the attorney general to intervene in the process of federal licensing of facilities located in Wisconsin and outlined the procedure by which an application for a certificate of compatibility in the development of a site is evaluated.

Other Studies and Reports

Information from other states was not in the form of a report containing findings, conclusions, and recommendations. However, several of the materials contain useful background information. These include, for example, Maryland legislative staff background information and bill analysis for a draft bill on transportation of radioactive materials and Minnesota legislative staff testimony on radioactive waste management and storage. Although legislative recommendations were not developed, the House Committee

on Energy submitted an extensive background report and summary of testimony on nuclear waste storage to the 66th legislative session (1978) of the Texas House of Representatives. Similarly, transportation of nuclear waste was considered in a Virginia general assembly joint subcommittee study of the licensing of nuclear generation facilities.

It must also be kept in mind that state legislative policy regarding the handling of radioactive waste is not static. Failure of existing technologies, scientific developments, and emerging federal policies and programs continue to call for new responses from the states. Thus, there are many studies of the issues of radioactive waste management currently in progress, and the findings, conclusions, and recommendations of such studies may provide additional policy direction.

V. FINDINGS AND RECOMMENDATIONS

A. USER PERMIT SYSTEM

A considerable amount of concern over management of low-level radioactive waste stems from problems associated with the packaging of radioactive waste to be disposed. The disposal facility operated by Nuclear Engineering Company (NECo) near Beatty, Nevada, has been plagued with shipments containing packaging discrepancies.

Such problems have been documented by Chem-Nuclear Systems, Inc. which operated the commercial low-level radioactive disposal site near Barnwell, South Carolina. Between June 20, 1979, and January 31, 1980, there are 620 discrepancies noted in 3,193 shipments received. About one-third of the discrepancies were errors in volume, and another half were made up of errors related to contamination problems, water in casks or drums, incorrect RSR's, below acceptable strong/tight container criteria, and shipment rejection.*

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*Other categories of discrepancies include problems with cables and pallets (inside casks), water in liner, improper packaging, improper loading, cask or containers which did not meet design specifications, debris in cask, improper closure, D.O.T. dose rates exceeded, no gasket in cask, improper weights, cask bolts too tight, improper labeling.

Similar problems have occurred at the commercial low-level radioactive waste disposal site at Hanford, Washington. In response to these problems, the State of Washington has established a site-use permit system for the shipper in an effort to provide accountability for shipments. In compliance with Executive Order EO 79-09, the Department of Social and Health Services has promulgated WAC 402-19-530 which requires each broker of low-level radioactive waste, and each shipper/generator of radioactive waste who ships such waste direct, to have a site use permit prior to the disposal of such wastes at the commercial low-level radioactive waste burial site located in the State of Washington.

Finding 1. The State of Nevada needs a user permit system in order to establish accountability for packaging problems in the management of low-level radioactive waste.

On June 25, 1980, the Nevada state board of health adopted a regulation which requires users of NECo's low-level radioactive waste disposal site in Nevada to obtain a permit before shipping waste to the site. Radioactive waste being shipped to the site, according to the regulation, must be packaged in compliance with any applicable federal and state regulations, and the packaging must remain in compliance with those regulations until the waste is received at the site for burial. In addition, the waste must be in such a condition that the operator of the site is able to dispose of the waste without violating any term of his license. Suspension or revocation of permits is also provided for.

Recommendation 1. In order to give added force to the regulations promugated by the state board of health, the subcommittee recommends requiring statutorily that a shipper or producer of low-level radioactive waste obtain a license to use the Beatty disposal facility from the health division. The licensee must demonstrate his ability to properly package and label the waste which he is responsible for transporting in conformance with regulations promulgated by the state board of health. The subcommittee further recommends providing for penalties and revocation of license in the event that the licensee violates the regulations.

B. REMOVAL OF RADIOACTIVE MATERIALS

As noted in the November 1979 hearings of the state board of health regarding the revocation of NECo's license to operate

a low-level radioactive waste disposal facility near Beatty, Nevada, there have been problems at the disposal site with the removal of contaminated tools and pieces of hardware by employees at various times between 1969 and 1972. During the same time a cement truck used on the site for disposal work was used by private parties in Beatty, Nevada, to pour cement for privates uses. Although no significant personal injury was detected as a consequence of these actions, there is no guarantee that future incidents of removal might not constitute a health hazard.

Finding 2. Radioactive materials have been removed from the disposal site in the past and may present a hazard to public health and safety.

Recommendation 2. Removal of any waste, contaminated material, or equipment from the disposal area for personal use should be prohibited by law.

C. INSPECTION OF VEHICLES CARRYING RADIOACTIVE WASTE

One of the problems associated with the management of radioactive waste is inadequate authority to inspect shipments in transit which are suspected of violating shipping regulations. According to the Nevada highway patrol, if a transporter of radioactive waste were stopped for a violation, he could only be cited for a "leaking" load. The patrol does not have the authority to impound a carrier or prevent the carrier from going back on the highway. The patrol is also responsible for only state regulations.

The U.S. Department of Transportation (U.S.D.O.T.) is responsible for shipping, packaging, and monitoring of low-level radioactive waste shipments according to Public Law 93-633. The U.S. Department of Transportation can fine up to $10,000 for each offense by shippers and also have the power to fine for discrepancies. The problem in Nevada is that one federal inspector is assigned to the entire state. Thus, many shipments of radioactive materials in Nevada are never inspected or monitored by the U.S.D.O.T.

Other agencies could also be involved in inspection and monitoring of motor carriers. The public service commission of Nevada has the authority to enforce Title 49 (transporting) restrictions under federal law. Other agencies which could

be involved in enforcement could be the motor carrier division of the state department of motor vehicles and the department of human resources, which can fine for violations under chapter 459, Nevada Revised Statutes.

Finding 3. Better enforcement of existing radioactive waste transportation regulations is needed. This may be accomplished in part by expanding the agencies involved. Specific authority must be delegated to enforcement officers to insure comprehensive management of violations.

Recommendation 3. The subcommittee recommends that inspectors and peace officers of the motor carrier division of the department of motor vehicles, the public service commission of Nevada and the Nevada highway patrol should be authorized to enforce regulations promulgated relating to the transportation and handling of radioactive waste. An inspector or officer should be permitted to impound vehicles with unsafe equipment, detain vehicles with radiation leaks, and order the cleaning up of leaks or spills, including repacking of the contents of any unsafe or leaking packages.

D. LICENSE FEES FOR DISPOSAL

Cost to the State of Nevada for regulating a commercial low-level radioactive waste disposal site is currently borne directly by the operator of the site through license fees and fees associated with leasing state property for the disposal facility. If additional regulatory activities are enacted, these will also have to be paid for. One such regulatory activity will be the licensing of disposal facility users.

Finding 4. Implementing a user permit system (see finding 1) will incur additional state regulatory expenditures.

The method for determining the fees could be based on several factors including volume of waste deposited, radiotoxicity of waste deposited, and total fee assessed by the operator. Before closure of the Maxey Flats, Kentucky, commercial low-level radioactive waste facility, the Kentucky General Assembly imposed a nuclear tax based on volume only which had the effect of decreasing the volume of material buried by 95 percent while increasing its specific

radioactivity by a factor of 20 times. Subsequently, a tax based on relative hazard of the waste material was proposed.

In the interest of neither encouraging nor discouraging the use of the Beatty, Nevada, disposal facility by generators of radioactive waste, fees assessed by other commercial facilities could be reviewed periodically to determine the appropriateness of fees assessed in Nevada. At a minimum, the user fees would cover the administrative costs of licensing users and enforcing regulations pursuant to the issuance of the licenses.

Recommendation 4. The subcommittee recommends requiring license fees for the use of radioactive disposal facilities in Nevada.

E. ROUTE DESIGNATION

Several municipalities have restricted transportation of radioactive materials through their jurisdictions. For example, New London, Connecticut, has banned shipment of spent fuel; all shipments have been banned at the Port of Miami in Florida; O'Hare Airport in Chicago, Illinois, is not allowed to receive any plutonium or enriched uranium shipments; and spent fuel has been banned in a number of Ohio cities and towns.

Because such ordinances have a significant impact on the transportation of radioactive materials, for example, lengthening the amount of time required to get a shipment of waste from the generator to the disposal site and thus increasing the probability of a transportation accident, the U.S.D.O.T. has promulgated new regulations regarding route designation for radioactive materials. The regulations will preempt local authority in the event of conflicts in route designation. However, local and state authorities are encouraged to submit alternate proposals for route designation to the U.S.D.O.T. in the event that they may be able to identify more acceptable routes.

Finding 5. The State of Nevada needs to be involved in the designation of acceptable routes for the transportation of low-level radioactive waste shipments to the Beatty, Nevada, commercial disposal site.

Recommendation 5. The subcommittee recommends that the state department of transportation designate, by regulation, alternative routes for the transportation of radioactive materials over highways of the State of Nevada, but which do not conflict with the standards established by the U.S.D.O.T.

F. PERMITTING MOTOR CARRIERS

Accountability for shipments of low-level radioactive waste among motor carriers has not been clear, according to shippers and regulators. Although packaging problems may not be the direct result of mishandling by transporters, many instances have arisen in which neither the generator who packaged the shipment, nor the transporter who delivers the shipment, accept responsibility for violation of any radiation control regulations.

Finding 6. Transporters of radioactive waste are unclear regarding the extent of their responsibility for their shipments.

The State of South Carolina has recently enacted legislation which requires shippers to purchase a permit for all radioactive waste shipments which are to be disposed at its commercial disposal facility (house bill 3350, 1980). The carrier must certify that the shipment is properly placarded; the vehicle has been inspected and meets the applicable requirements; the carrier has received a copy of the shipper certification of compliance and the shipping manifest; and the carrier has complied with all applicable laws and administrative rules and regulations regarding radioactive waste. The law also provides that a notification period shorter than 72 hours may be required for shipments greater than 75 cubic feet.

According to Table II in the preceding section which summarizes transportation laws and regulations, 35 states require some sort of registration, fee payment, permitting or licensing of carriers of radioactive materials. Also in Table II, it is indicated that 14 states require some sort of prenotification of shipments of radioactive materials into the state.

Recommendation 6. The subcommittee recommends that motor carriers be required to acquire a permit which specifically

allows them to transport radioactive waste. The public service commission shall administer the issuance and revocation of the permits. The subcommittee further recommends that motor carriers be required to notify the public service commission of shipment of radioactive waste into the State of Nevada.

G. ENFORCEMENT OF U.S.D.O.T. REGULATIONS

As indicated in section C above, the enforcement of U.S.D.O.T. regulations regarding the transportation of radioactive waste is limited by the number of personnel assigned to such duties. This is of particular concern to the State of Nevada for two reasons. First, the shipment of low-level radioactive waste over highways of the United States to disposal sites is constantly increasing, which increases the risk of accidents, injuries, and radioactive pollution. Second, the State of Nevada contains one of only three disposal sites for low-level radioactive waste in the United States, so that Nevada has become a focal point for shipments of low-level radioactive waste, thereby disproportionately increasing the risk of accidents, injuries, and radioactive pollution on Nevada's highways.

Finding 7. There are insufficient federal inspectors to monitor shipments of low-level radioactive waste in Nevada.

Recommendation 7. The subcommittee recommends that the legislature requests the Federal Government to more strictly enforce regulations relating to radioactive waste transportation and to employ more inspectors to monitor shipments of radioactive waste in Nevada.

H. REGIONAL DISPOSAL SITES

There are currently only three sites for the disposal of commercial low-level radioactive waste in the United States, one of which is located in the State of Nevada. The other two are the states of Washington and South Carolina. Thus, in most regions of the United States, there are no sites for the disposal of low-level radioactive wastes.

With the volume of low-level radioactive waste being generated in the United States steadily increasing, more waste is being transported for thousands of miles over the

highways of the United States thereby greatly increasing the risk of accidents, of injuries to persons and property, and especially of spills of radioactive materials to pollute the environment. As focal points in the transportation of ever increasing amounts of radioactive waste, the states of Nevada, South Carolina, and Washington are being subjected to increasing waste-related radiation risks.

Fortunately, several states are beginning to seriously consider siting their own commercial low-level radioactive waste disposal facilities. Examples include Michigan, Texas, and Virginia. However, a national policy will be necessary to accomplish regional goals.

Finding 8. Regional sites would alleviate some of the transportation risks associated with the disposal of low-level radioactive waste.

Recommendation 8. The subcommittee recommends that the legislature request the Federal Government to establish additional regional sites within the United States for the disposal of low-level radioactive waste.

I. USER FEE SYSTEM FOR CHEMICAL WASTE

There is currently an overlap in the statutory provisions for chemical waste disposal and radioactive waste disposal in chapter 459 of the Nevada Revised Statutes. The overlap stems from the fact that both types of waste are handled by Nuclear Engineering Company (NECo) at its Beatty, Nevada, disposal facility. (There are separate sections of the facility allotted for each of the two types of waste.) Although the subcommittee limited the scope of its deliberations to transporting and disposing low-level radioactive waste, chemical waste regulation should not be overlooked. The cost of regulation could be covered by a user fee structure for chemical waste similar to the one proposed for radioactive waste.

Finding 9. Comparable fee systems for the disposal of chemical and radioactive wastes are needed.

Because the subcommittee has limited its study to the management of radioactive waste, the suggested legislation does not address issues related to chemical waste.

Recommendation 9. The subcommittee recommends that the legislature should consider establishing a user fee system for chemical waste disposal in Nevada similar to the user fee system proposed for radioactive waste disposal.

J. FEE SCHEDULE

Current revenues for disposal of radioactive waste are collected from the disposal site operator at a fixed rate of $0.25 per cubic foot of waste buried. The revenues are used to cover the costs of inspection, monitoring, accident cleanup, and perpetual care and maintenance. The fixed cost, however, does not account for increases in regulatory costs due to increases in the amount of nuclear waste disposed in Nevada and due to inflation.

Finding 10. The costs of inspection, monitoring, accident cleanup, and perpetual care and maintenance will increase with the growth of Nevada's nuclear waste industry and with inflation.

Recommendation 10. The subcommittee recommends that the state board of health be directed to establish a fee schedule which will provide revenue to support adequate regulation of the radioactive material industry in Nevada. The schedule should provide for annual increases to reflect increasing costs of monitoring, inspection, accident cleanup, and perpetual care and maintenance.

K. EMERGENCY RESPONSE TRAINING

Appropriate emergency response to hazardous material (including radioactive material) incidents depends on trained emergency response agency personnel at the local level as well as statewide and nationally. Adequate training of such personnel is becoming more important in light of a 70 percent increase in the number of traffic accidents in Nevada during 1979 (as calculated from accident totals for truck traffic). However, grant requests for joint federal-state funding of training programs have been denied.

Finding 11. Training of emergency response agency personnel is inadequately funded.

Recommendation 11. The subcommittee recommends that the legislature allow revenue generated by the user fee system to be used to train the emergency response agencies of the state's communities with regard to hazardous materials.

L. TECHNICAL UPDATES FOR THE LEGISLATURE

Alternative methods for management of radioactive waste continue to be studied in the scientific and engineering community. The results of these studies may require changes in public policy and ultimately call for legislative action.

Finding 12. The legislature is not adequately informed regarding technical developments in the disposal of radioactive waste.

Recommendation 12. The subcommittee recommends that the health division of the department of human resources be directed to report significant technical advances in radioactive waste management to the legislature.

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VII. CREDITS

The following is a listing of the names of persons who appeared before the subcommittee.

R. Lee Armbruster
Corporate Counsel
Nuclear Engineering Co., Inc.
Louisville, Kentucky

Bill Ayres
AWC, Incorporated
Las Vegas

Paul Bandt, M.D.
Radiologist
Southern Nevada Memorial Hospital
Las Vegas

Abul K. Bhuiya, Ph.D.
University of Nevada System
Radiological Safety Officer
Radiological Safety Board
Reno

Steve Bump
Radiation Control Specialist
Department of Human Resources
Division of Health
Las Vegas

Thorne Butler, M.D., Chairman
Nevada State Board of Health
Las Vegas

Daryl Capurro
Nevada Motor Transport Association
Reno

Steve Carpenter, Plant Manager
Nuclear Engineering Company, Inc.
Beatty

Bruce W. Church
Chief, Radiation Operations
U.S. Department of Energy
Nevada Operations Office
Las Vegas

Pamela Crowell
Private Citizen
Carson City

Bernard Dehl
Former Chief of the
Nevada Highway Patrol
Director, Civil Defense and
Disaster Agency
Carson City

Ralph DiSibio, Ed.D., Director
Department of Human Resources
Carson City

Larry Franks
Department of Human Resources
Division of Health
Radiation Control Specialist
Carson City

Darwin Garvin
Officer in Charge
Federal Highway Administration
Carson City

General Mahlon Gates, Manager
Nevada Operations Office
U.S. Department of Energy
Las Vegas

Hank Greenspun, Publisher
Editor in Chief
Las Vegas Sun
Las Vegas

Terry Hansen
Department of Conservation and
Natural Resources
Division of Environmental Protection
Carson City

Lt. Eric Hatch
Nevada Highway Patrol
Carson City

Frank Holzhauer
Director's Office
Department of Human Resources
Carson City

S. Barton Jacka, Director
Department of Motor Vehicles
Carson City

Robert M. Jefferson
Manager, Nuclear Materials
Transportation Technology Dept.
Transportation Technology Center
Sandia Laboratories
Albuquerque, New Mexico

George Kolbenschlag
Assistant to the President
Nuclear Engineering Company, Inc.
Louisville, Kentucky

Roger O. McClellan, D.V.M., Director
Inhalation Toxicology Research Institute
(Lovelace Biomedical Environmental Research Institute)
Albuquerque, New Mexico

Greg McKenzie
Private Citizen
Reno

Charles H. Mayer, Vice President
Nuclear Transporation Division
Tri-State Motor Transit Company
Joplin, Missouri

Brian Nelson
Deputy Attorney General
Department of Human Resources
Carson City

Robert Nelson, Project Manager
U.S. Department of Energy
Waste Isolation Branch
Nevada Test Site

Al T. Neumann
U.S. Department of Energy
Las Vegas

William D. Nichols
Hydrologist
U.S. Geological Survey
Water Resources Division
Carson City

Duane Pierce
University of Nevada-Las Vegas
Radiological Safety Board
Las Vegas

LaVerne H. Rossee
Public Health Engineer
Department of Conservation and
Natural Resources
Division of Environmental Protection
Carson City

Frank Steinberg
Department of Conservation and
Natural Resources
Division of Environmental Protection
Carson City

John Vaden
Supervisor, Radiological Health
Department of Human Resources
Division of Health
Bureau of Consumer Health Protection Services
Carson City

Assemblyman Sue Wagner
District No. 25
Reno

Joseph A. Warburton, Ph.D., Chairman
Radiological Safety Board
University of Nevada System
Desert Research Institute
Reno

Andrew P. Weber
U.S. Department of Energy
EMAD Facility
Nevada Test Site

Fred Welden
Senior Research Analyst
Research Division
Legislative Counsel Bureau
Carson City

Richard W. Wyman, Ph.D., Chairman
University of Nevada-Las Vegas
Engineering Department
Las Vegas

VIII. APPENDIX

SUMMARY REPORT ON THE GEOHYDROLOGY OF THE LOW-LEVEL SOLID RADIOACTIVE WASTE BURIAL SITE NEAR BEATTY, NEVADA

Prepared by

William D. Nichols

November 1979

INTRODUCTION

Location

The low-level solid radioactive waste burial facility in southern Nevada is located on the Amargosa Desert, 10.5 airline miles south-southeast of Beatty in Nye County. It comprises part of the north half of section 35, T. 13 S., R. 47 E., Mount Diablo Baseline and Meridian. The middle of the north boundary of the facility is about 3,000 feet west of U.S. Highway 95. The highway distance to Beatty is about 11 miles. Lathrop Wells is about 18 miles southeast of the facility.

Geographic Setting

The Amargosa Desert in the area of the waste burial site is a northwest-trending valley about 8 miles wide. It is bounded on the northeast by Bare Mountain and on the southwest by the Grapevine Mountains and the Funeral Mountains. The head of the valley, about 12 miles northwest of the waste burial site, is formed by the Bullfrog Hills and Sawtooth Mountain. The Desert extends from the Bullfrog Hills to the Spring Mountains about 50 miles to the southeast and the Greenwater and Resting Spring Ranges, 50 to 55 miles to the south-southeast. The altitude of the valley floor is about 3,600 feet in the northwest and drops to nearly 2,000 feet at the southeastern end near Death Valley Junction. The waste burial facility is 2,780 feet above sea level.

Regional Geohydrologic Setting

Geohydrologic studies commonly concentrate on defining the geology and hydrology of the saturated zone. Hydrologic phenomena occurring in the unsaturated zone, that region between land surface and the top of the saturated zone, are usually of passing interest only. But it is the

unsaturated zone in which the radioactive waste is buried, at depths of 0 to 50 feet, and in the area of the waste burial site, the unsaturated zone is about 280 feet thick. In this instance, the geohydrology of the unsaturated zone is of major importance as are hydrologic factors that govern and affect the movement of water into and through this zone.

Climate

The climatic factors of rainfall, temperature, and evaporation interact in a complex manner with the geohydrologic factors of soil moisture, soil matric suction, and unsaturated hydraulic conductivity to determine the amount and movement rate of water percolating through the unsaturated zone. About the only water that might come in contact with the buried waste, and leach and transport radionuclides is that water derived from precipitation. The amount of water that percolates downward, the depth to which it will move, and the rate at which it moves will depend largely on the amount of precipitation, evaporation demands, and pre-existing soil moisture conditions. To gain a better understanding of the hydrologic processes occurring in the shallow unsaturated zone in the vicinity of the waste burial site, it is necessary to examine each of the controlling parameters in some detail.

Precipitation

The waste burial site is situated in one of the most arid parts of the United States. The average annual precipitation in the area varies from 4.5 inches at Beatty (altitude, 3,300 feet) 10.5 miles north of the site to 2.9 inches at Lathrop Wells (altitude, 2,650 feet) 18 miles to the southeast. A detailed analysis of the precipitation volume, frequency,

and distribution in the local region around the waste burial facility has not been completed. Generalizations cannot be made at this time as to what constitutes a significant precipitation event--that is, one from which infiltration and deep percolation can be expected. Preliminary analyses of available data from the U.S. Weather Service for several nearby stations and associated data being collected at the site by the U.S. Geological Survey provide the basis for suggesting preliminary probable limiting values for significant events.

It is being assumed at the present time, on the basis of these data, that a 24-hour rainfall of at least 1 inch must occur for any deep percolation of that rainfall to take place. Anything less that 1 inch will generally be lost to evaporation or soil moisture storage at very shallow depths. There are also conditions when 1 inch of precipitation will not lead to deep percolation. It is being assumed that such a rainfall occurring during the hot summer months (June through September) probably represents a local convective storm with no regional implications and probably will be lost completely to evaporation. Also, it is assumed that if such an event is the first rain to fall in several months, especially the fall months, then it will probably be lost to evaporation and replenishment of the existing soil moisture deficit. Given these limits and assumptions it is possible to estimate the amount of significant precipitation that has fallen on the area.

Four weather stations in the vicinity of the waste burial site have been selected for a preliminary analysis of precipitation data. They are (1) Beatty, altitude, 3,300 feet, 10.5 miles north of the site, 28 years of record; (2) Lathrop Wells, altitude, 2,650 feet, 18 miles

southeast of the site, 16 years of record; (3) Sarcobatus Flats, altitude, 4,020 feet, about 37 miles northwest of the site near Scotty's Junction, 13 years of record; and (4) Amargosa Ranch, altitude, 2,370 feet, about 18 miles south-southeast of the site, 5 years of record. All of these records do not overlap nor cover the same period of time, but some approximate conclusions can be reached.

Of the total number of precipitation events recorded for the entire period of record, only about 3 percent equaled or exceeded 1 inch. These events occur at an average rate of about once every 2.5 years. This disregards the time of year when the event occurred. Of the total number of significant events recorded, 23 percent occurred during summer months and another 8 percent may represent the first major rain of the season. This reduces that rate of occurrence of potential recharge rainfalls to once every 3.5 years. Considering only the winter storms of 1 inch or more, only three storms have been recorded concurrently at two stations. All of the other storms have dropped an inch of precipitation at and near one of the weather stations, but not at any of the others. This implies that only the three storms that were recorded at both Beatty and Lathrop Wells as producing 1 inch or more of rain, also dropped a similar amount at the site of the waste burial facility during the 28 years from 1949 to 1976. There is also the possibility, of course, that a winter rainfall of 1 inch or more occurred at the waste burial site, but not at any of the stations.

Temperature

Temperature is an indirect factor in the discussion of infiltration and deep percolation of precipitation. It is an indicator of the evaporative

demands that exist in the area at any given time, and so provides a guide to potential evaporation. Temperature also tends to show more areal uniformity over longer periods of time so that average values have greater meaning than do average values of precipitation.

The average annual temperature at Beatty is 76°F and at Lathrop Wells is 81°F. Average maximum daily temperatures exceed 90°F at both stations during the months of June through September. The hottest month is July, with an average maximum daily temperature of 99°F at Beatty and 102°F at Lathrop Wells. Average minimum daily temperatures fall below 32°F during December, January, and February at both stations. The average maximum daily temperatures during these same months is less than 65°F and generally less than 60°F. It is during these months that evaporation will commonly be at a minimum.

Evaporation

It is more common to consider and discuss evapotranspiration rather than just evaporation, because it is usually necessary to consider not only water lost directly from the soil by evaporation, but also moisture lost by plants through transpiration. Only evaporation is considered here, however, because the waste burial site is kept cleared of vegetation and water is lost only through evaporation from the bare soil.

Many discussions of evaporation consider only pan evaporation or potential evaporation, usually because actual evaporation data are not available. Pan evaporation and potential evaporation data can be a useful guide to actual evaporation in some cases, but are poor indicators in such an arid climate. Pan evaporation in this part of Nevada probably exceeds 100 inches a year. Potential evaporation computed with equations

appropriate to this climate (Jensen-Haise equation) varies from 70 inches to 85 inches, depending on variation in mean daily temperature.

Examination of the monthly distribution of potential evaporation is interesting. Fifty-five percent of the computed potential evaporation occurs in the months of June through September when there is generally little rainfall, so these numbers are misleading. About all that can be said is that whatever rain does occur will all be lost to evaporation. On the other hand, only 13 percent of the computed potential evaporation occurs during the winter period November through February when much of the annual precipitation occurs. Given the right conditions of antecedent soil moistures, high rainfall, and low temperatures, the potential evaporation demands could be met with some moisture being left for deep percolation.

The U.S. Geological Survey has been collecting meteorological data needed for evaporation calculations as part of its study of the geohydrology of the waste burial site. It is intended to use the data to better define precipitation/evaporation relationships in the immediate vicinity of the study area. Many of these data are still being processed and it is not yet possible to arrive at any definite conclusion. Preliminary analyses of data from several selected months, January and February 1978, and May and June 1979, generally support the conclusions above regarding potential evaporation.

The computed evaporation for January and February 1978, totaled 0.16 inch. Precipitation during these two months totaled 5.25 inches and while there is not a direct relationship among precipitation, evaporation, and deep percolation over a time span this short, these figures do

suggest that there is a very strong potential for some deep percolation to occur. Computed evaporation for May and June 1979, totaled 5.3 inches, but during this same interval there was only 0.13 inch of rain. During this time period, water was being removed from soil moisture in the top several feet of the soil profile.

This discussion of computed evaporation is not intended to be definitive because it is based on preliminary analysis and covers a very short period. It is largely intended to demonstrate the difference of evaporation and potential evaporation. An estimate of potential evaporation for May and June would be about 25 inches; computed actual evaporation was little more than 5 inches. Potential evaporation for January and February would be about 5 inches, but computed actual evaporation was less than 0.2 inch.

Surface Drainage

Precipitation is sparce in the area, but surface runoff is even more rare. There are no perennial streams within about 10 miles of the waste burial facility. The dry bed of the Amargosa River is the principal drainage channel. Perennial flow is maintained by springs in the upper reaches of the Amargosa north of Beatty. This flow disappears beneath the surface less than a mile downstream from Beatty. The dry channel of the Amargosa passes about 2 miles west of the waste burial site.

Secondary drainage features that may be of some significance are two dry stream beds that trend roughly parallel to U.S. Highway 95. Both of these drainages split from the main channel of the Amargosa about 2.5 miles south of the Amargosa Narrows south of Beatty. One dry channel trends south-southeast and passes about 0.4 mile west of the

waste burial site between the site and the main channel of the Amargosa. This channel appears to have no tributaries. It rejoins the main channel of the Amargosa about 3.5 miles south of the site. The other dry channel trends southeast along the north side of the highway and passes about 0.6 mile east of the waste burial site. This channel has several small tributary channels that drain the southwest slope of Bare Mountain. This channel largely disappears about 8 miles southeast of the site.

On aerial photographs, minor local surface drainage channels appear to intersect the area occupied by the waste burial site. However, no surface runoff has been observed during the course of the study.

Geology

Unconsolidated deposits of gravel, sand, silt, and clay form the valley floor of the Amargosa Desert. These deposits are at least 570 feet thick beneath the waste burial site. Bedrock beneath the site is probably similar to the rocks exposed in Bare Mountain on the northeast and the Funeral Mountains on the southwest. These rocks include limestone, dolomite, siltstone, sandstone, marble argillite, phyllite, and quartzite. The most significant feature of the bedrock units is that although they are dense, hard, and inherently impermeable, they have been highly fractured and faulted in the course of recent intense tectonic activity. As a consequence they may transmit significant quantities of water through these fractures.

The valley-fill deposits have been derived from the weathering of adjacent hills and mountain ranges. Information obtained from the driller's log and sample descriptions for the well drilled at the waste burial site indicate that in general the sediments are poorly sorted mixtures of clay and boulders or clay and gravel. Two intervals penetrated

by the well are primarily clay or fresh-water limestone altered to clay, indicating deposition in still water. Most of the rest of the deposits have been interpreted as a fanglomerate, but the major rock type encountered in the coarse-grained deposits is volcanic rock of one type or another. The primary sources for rocks of this type are the Bullfrog Hills at the north end of the Amargosa Desert, and the upper reaches of the Amargosa River and its tributaries. This, together with the fact that many of the sample descriptions, indicate the gravels are well-rounded suggest the materials have been transported considerable distances by streamflow.

Ground-Water System

Little is known of the regional ground-water system in the area of the northern Amargosa Desert. It is assumed, on the basis of studies on the Nevada Test Site and in the southern Amargosa Desert, that two major aquifers underlie the area. These are the carbonate aquifer in the underlying bedrock and the valley-fill aquifer.

Water in the carbonate aquifer moves primarily through fractures and possibly through solution opening. Recharge to this aquifer is probably supplied by underflow through Paleozoic and perhaps Tertiary volcanic rocks outside the surface drainage area. The principal sources for the recharge are assumed to be to the north and northeast. The direction of flow in this aquifer is presumed to be towards the south-southeast. Interconnections and interrelationships between the carbonate aquifer and the overlying valley-fill aquifer are not known.

The valley-fill aquifer may consist of one or more water-bearing zones in the unconsolidated alluvial material underlying the desert floor. Recharge to this aquifer is probably from the underlying carbonate aquifer. Water-level data from the well at the waste burial site, together with data from two wells about 8 miles to the southeast, suggests

that water in this aquifer flows roughly parallel to the axis of the valley, that is, towards the southeast. Data collected from the well drilled at the site suggests that the uppermost water-bearing zone beneath the site is confined under a clay layer 60 feet thick. The water level in the well is about 280 feet below land surface, but the clay layer extends from a depth of 265 feet to 326 feet. The areal extent of this clay is not known.

GEOHYDROLOGY OF THE WASTE-BURIAL SITE

Investigation of the geohydrologic conditions at the waste burial site have been confined to defining the stratigraphy, soil moisture profile, soil matric suction, and soil hydraulic properties to a depth of 30 to 40 feet below land surface. The intent has been to obtain enough data to determine the amount and rate of downward water movement near the bottom of this zone on the assumption that this would probably represent the long-term rate of deep percolation. This investigation is still in progress and the following discussion should be considered a preliminary summary.

The shallow subsurface stratigraphy is fairly uniform over the area of the waste burial site. The top 2 to 3 feet consists of very fine silty sand. This is underlain by 5 to 7 feet of very loose coarse, well-rounded sandy gravel with some cobbles. This unit grades downward into a hard, dense, poorly cemented, gravelly, silty sand with some cobbles and a few boulders. Gravel lenses and stringers and gravel-filled cut-and-fill channels are found in this unit, which extends to a depth of about 35 to 40 feet. In at least one part of the area, this unit is underlain by what may be a laterally extensive bed of sandy

gravel similar to that near the surface. The deeper gravel layer is 5 to 6 feet thick, and is in turn underlain by a dense gravelly sand.

The soil moisture content, determined from neutron logging data, varies from 5 to 11 percent (by volume) between land surface and a depth of 12 feet. Moisture contents of as much as 16 percent (by volume) have been noted in the upper few feet of sediments during the weeks following winter storms. Soil moisture profiles for the period February 1979, to November 1979, suggest that small amounts of water are moving downward from land surface to a depth of about 12 feet. It is presumed that the downward movement continues below 12 feet. The amount of water involved in this movement is very small, usually involving moisture content changes of not more than 0.5 percent by volume.

Soil-water suction, the negative pressure exerted on the soil moisture in the unsaturated zone, has been measured and monitored at depths of from 10 to 30 feet. The magnitude of the negative pressure is such that traditional measuring devices do not work and less precise electronic instrumentation has been employed instead. Soil-water suctions of negative 40 to 70 bars are being recorded. The data collected thus far suggests that moisture is moving, but the pattern of movement, up or down, is not clear, and there is a possibility that movement at such high suctions may be in the vapor phase rather than in the liquid phase.

Values of porosity and unsaturated hydraulic conductivity have not yet been developed for the earth materials underlying the waste burial site. Analyses of similar soil materials on the Nevada Test Site suggest porosity values in the range of 30 to 40 percent. Unsaturated conductivity may vary from 0.24 centimeters per day (cm/d) to 2.4×10^{-7} cm/d depending

on the soil moisture content. Using the moisture content of the near-surface materials, the unsaturated conductivity may be about 1.2×10^{-2} cm/d while at a depth of 30 feet it may be as low as 2×10^{-5} cm/d. These values of unsaturated conductivity all suggest extremely slow rates of moisture movement.

After trenches are backfilled with waste and soil and capped with a layer of soil, gradual compaction and settling occurs. This leads to local subsidence depressions and open cracks in the capping layer. Although these features are periodically repaired, it is possible that they have, in the past, contributed to more downward percolation of precipitation water than would normally occur in an undisturbed area. However, no quantitative information is available on the hydrologic affects of these features.

IX. SUGGESTED LEGISLATION

SUMMARY--Requests President and Congress to regulate strictly the transport of radioactive waste. (BDR 4)

JOINT RESOLUTION--Requesting the President of the United States to enforce strictly those federal regulations governing the transport of low-level radioactive waste, establish responsibility between shippers and carriers for violations of those regulations and employ more inspectors to monitor shipments of low-level radioactive waste in Nevada, and the Congress to provide necessary money.

WHEREAS, The shipment of low-level radioactive waste over the highways of the United States to disposal sites is constantly increasing, which increases the risk of accidents, injuries and radioactive pollution; and

WHEREAS, A number of accidents have occurred recently in the course of shipping low-level radioactive waste, and United States Department of Transportation regulations concerning the transport of low-level radioactive waste should be more strictly enforced; and

WHEREAS, Existing regulations of the Department of Transportation are adequate to police shipments of low-level radioactive waste, except for the question of responsibility among the shippers, brokers who ship and carriers of the waste for the packaging, labeling and leaks or spills of the waste; and

WHEREAS, There are insufficient federal inspectors to monitor shipments of low-level radioactive waste; and

WHEREAS, The State of Nevada contains one of only three disposal sites for low-level radioactive waste in the United States, so that Nevada has become a focal point for shipments of low-level radioactive waste, thereby disproportionately increasing the risk of accidents, injuries and radioactive pollution on Nevada's highways; now, therefore, be it

RESOLVED BY THE AND OF THE STATE OF NEVADA, JOINTLY, That this legislature requests the President of the United States to order the United States Department of Transportation to: enforce strictly its regulations regarding the transport of low-level radioactive waste; establish by regulation responsibility among shippers, brokers and carriers of low-level radioactive waste for the packaging, labeling and leaks or spills of that waste; employ or assign more inspectors to monitor shipments of low-level radioactive waste, especially in the State of Nevada; and provide training for the employees of state and local governmental agencies in those states in which sites for the disposal of low-level radioactive waste are located, so that they may respond to and deal with emergencies involving the leakage or spill of radioactive waste; and requests the Congress to provide additional money for these inspectors and this training if needed; and be it further

RESOLVED, That a copy of this resolution be immediately transmitted by the legislative counsel to the President of the United

States, the Secretary of the United States Department of Transportation, the Vice-President of the United States as president of the Senate, the Speaker of the House of Representatives, and to each member of the Nevada congressional delegation; and be it further

RESOLVED, That this resolution shall become effective upon passage and approval.

SUMMARY--Requests Congress to establish regional sites for disposal of low-level radioactive waste. (BDR 5)

JOINT RESOLUTION--Requesting the Congress of the United States to establish regional sites within the United States for the disposal of low-level radioactive waste.

WHEREAS, There are currently only three sites for the disposal of low-level radioactive waste in the United States, one of which is located in the State of Nevada; and

WHEREAS, The other two sites in the United States for the disposal of low-level radioactive waste are located in the states of South Carolina and Washington; and

WHEREAS, In most regions of the United States there are no sites for the disposal of low-level radioactive waste; and

WHEREAS, The volume of low-level radioactive waste being generated in the United States is steadily increasing, year by year; and

WHEREAS, The lack of regional sites in the United States for the disposal of low-level radioactive waste results in transporting radioactive material for thousands of miles over the highways of the United States, thereby greatly increasing the risk of accidents, of injuries to persons and property, and especially of spills of radioactive material to pollute the environment; and

WHEREAS, Because of the lack of sites for the disposal of the radioactive waste in other regions of the United States, the states of Nevada, South Carolina and Washington have become focal points

in the transportation of ever increasing amounts of radioactive waste, thereby disproportionately increasing the risk in those states of accidents, injuries and radioactive pollution; now, therefore, be it

RESOLVED BY THE AND OF THE STATE OF NEVADA, JOINTLY, That this legislature requests the Congress of the United States to establish additional regional sites, geographically distributed within the United States, for the disposal of low-level radioactive waste, and provide programs of training in the states in which such regional sites are established so that those states and their local governments will be prepared to respond to emergencies involving the accidental leakage or spill of radioactive waste, and requests the Congress to provide money for this training if needed; and be it further

RESOLVED, That a copy of this resolution be immediately transmitted by the legislative counsel to the President of the Senate and the Speaker of the House of Representatives of the United States, to each member of the Nevada congressional delegation and to each member of the congressional delegations of the states of South Carolina and Washington; and be it further

RESOLVED, That this resolution shall become effective upon passage and approval.

SUMMARY--Provides for regulation of transport and disposal of radioactive, chemical and other hazardous materials. (BDR 40-6)
Fiscal Note: Effect on Local Government: No.
Effect on the State or on Industrial Insurance: Yes.

AN ACT relating to radioactive, chemical and other hazardous materials; providing for the regulation of their transport and disposal; clarifying the respective power to adopt regulations respecting nuclear affairs of the state board of health and the health division of the department of human resources; providing penalties; and providing other matters properly relating thereto.

THE PEOPLE OF THE STATE OF NEVADA, REPRESENTED IN SENATE AND ASSEMBLY, DO ENACT AS FOLLOWS:

Section 1. Chapter 459 of NRS is hereby amended by adding thereto the provisions set forth as sections 2 to 4, inclusive, of this act.

Sec. 2. 1. A shipper or producer of radioactive waste, or a broker who receives such waste from another person for the purpose of disposal, shall not dispose of the waste in this state until he obtains a license from the health division to use the disposal area. The health division shall order a shipment of such waste from an unlicensed shipper or broker to be returned to him, except for a package which has leaked or spilled its contents, unless the package has been securely repackaged for return.

2. The health division shall issue a license to use a disposal area to a shipper or broker who demonstrates to the satisfaction of

the division that he will package and label the waste he transports or causes to be transported to the disposal area in conformity with the regulations of the state board of health.

3. A shipper or broker violates this section if he transports or causes to be transported to a disposal area any such waste:

(a) Which is not packaged or labeled in conformity with regulations of the state board of health;

(b) Which is not accompanied by a bill of lading or other shipping document prescribed by that board; or

(c) Which leaks or spills from its package, unless, by way of affirmative defense, the shipper or broker proves that the carrier of the waste was responsible for the leak or spill,

and if licensed by the board, he may be assessed an administrative penalty by the health division of not more than $500, or if not licensed, he is guilty of a misdemeanor.

4. Each container of such waste which is not properly packaged or labeled, or leaks or spills its contents, constitutes a separate violation, but the total amount of the penalty or fine for any one shipment must not exceed $10,000. In imposing a penalty or fine, the health division or the court shall consider the substantiality of the violation and the injury or risk of injury to persons or property in this state.

5. The health division, or the board pursuant to NRS 459.100, may suspend or revoke a license to use a disposal area if it finds

that the licensee has violated any provision of this chapter. If a license has been revoked, it may be reinstated only if the licensee demonstrates to the health division that he will comply with the provisions of this chapter in all future shipments of waste.

Sec. 3. 1. A person who is employed at an area used for the disposal of radioactive waste and removes from the disposal area any of that waste, or removes from the disposal area for his own personal use any machinery or equipment belonging to the operator of the area, shall be punished by imprisonment in the county jail for not more than 1 year, or by a fine of not more than $10,000, or by both fine and imprisonment.

2. If a person who violates this section is employed by the operator of the disposal area, the operator may be fined not more than $10,000, in addition to any other penalty provided by law.

Sec. 4. 1. Inspectors and peace officers of the motor carrier division of the department of motor vehicles, the public service commission of Nevada and the Nevada highway patrol shall enforce those provisions of sections 2 and 11 of this act which govern the transport and handling of radioactive waste as they affect the safety of drivers or vehicles, the leakage or spill of radioactive waste from its package or the emission of ionizing radiation in an unsafe amount as established by the regulations of the state board of health.

2. The inspector or peace officer may:

(a) Impound a vehicle with unsafe equipment; or

(b) Detain a vehicle, if any such waste has leaked or spilled from its package or if he has detected the emission of ionizing radiation in an unsafe amount, and order the driver of the vehicle to park it in a safe place, as determined by an officer designated by the state board of health, pending remedial action by that board.

3. After a vehicle has been so detained, an officer designated by the state board of health may order:

(a) The vehicle to be impounded;

(b) The leaked or spilled waste to be cleaned up;

(c) The contents of any unsafe or leaking package to be repackaged; or

(d) Any other appropriate precaution or remedy,

at the expense of the shipper or broker, carrier or other person who is responsible as determined by the health division of the department of human resources.

Sec. 5. NRS 459.030 is hereby amended to read as follows:

459.030 For the protection of public health and safety, the health division shall:

1. Develop and conduct programs for the evaluation of hazards associated with the use of sources of ionizing radiation.

2. Develop programs and formulate, [adopt and promulgate rules and regulations,] with due regard for compatibility with federal programs, [for:] regulations for adoption by the state board of health regarding:

(a) Licensing and regulation of byproduct materials, source materials, special nuclear materials and other radioactive materials [.] , including radioactive waste.

(b) Control of other sources of ionizing radiation.

3. [Formulate, adopt and promulgate] Adopt such [additional rules and] regulations as may be necessary to administer the provisions of NRS 459.010 to 459.160, inclusive.

4. Collect and disseminate information relating to control of sources of ionizing radiation, including:

(a) Maintenance of a file of all license applications, issuances, denials, amendments, transfers, renewals, modifications, suspensions and revocations.

(b) Maintenance of a file of registrants possessing sources of ionizing radiation which require registration under the provisions of NRS 459.010 to 459.160, inclusive, such file to include a record of any administrative or judicial action pertaining to such registrants.

(c) Maintenance of a file of all [rules and] regulations, pending or promulgated, relating to the regulation of sources of ionizing radiation, and any proceedings pertaining to [such rules and] the regulations.

Sec. 6. NRS 459.040 is hereby amended to read as follows:

459.040 1. The state board of health shall [provide by rule or regulation] , with due regard for compatibility with federal programs, adopt regulations for:

(a) General or specific licensing of persons to receive, possess or transfer radioactive materials, or devices or equipment utilizing such materials. Every such [rule or] regulation shall provide for amendment, suspension or revocation of licenses.

(b) Licensing and regulation of byproduct materials, source materials, special nuclear materials and other radioactive materials [.] , including radioactive waste.

(c) Control of other sources of ionizing radiation.

2. The health division of the department of human resources may require:

(a) Registration and inspection of sources of ionizing radiation which do not require specific licensing.

(b) Compliance with specific standards to be promulgated by the state board of health.

3. The state board of health may exempt certain sources of ionizing radiation, or kinds of uses or users of such sources, from the licensing or registration requirements set forth in this section if the board makes a finding that the exemption of such sources of ionizing radiation, or kinds of uses or users of such sources, will not constitute a significant risk to the health and safety of the public.

4. [Rules and regulations] Regulations promulgated pursuant to NRS 459.010 to 459.160, inclusive, may provide for recognition of such other state or federal licenses as the state board of health may consider desirable, subject to such registration requirements as the state board of health may prescribe.

Sec. 7. NRS 459.045 is hereby amended to read as follows:

459.045 The state board of health [may] shall establish by regulation:

1. License fees and any other fees for the [use] operation of state-owned [disposal] areas in an amount sufficient to defray all costs of monitoring, securing or otherwise regulating the storage or disposal of radioactive materials and chemical wastes. The person who contracts with the state for the [use] operation of such an area is responsible for the payment of these fees.

2. Procedures for the collection of interest on delinquent fees and other accounts for the [use] operation of disposal areas.

3. Penalties of no more than $3,000 per day for each separate failure to comply with [a license or agreement or $25,000 for any 30-day period for all such failures.] an agreement, license, regulation or statute governing the operation of a disposal area.

4. License fees and other fees for the use of such an area to store or dispose of radioactive materials, which are chargeable against shippers or brokers in amounts sufficient to defray the

costs to the state of inspecting, monitoring, securing or otherwise regulating their use of the area. In addition, the board may establish by regulation a fee chargeable against shippers and brokers for revenue for the State of Nevada. Before establishing a fee for revenue, the board must consider the amounts of the fees for licensing and disposal which are chargeable against the users of such areas in other states, in order that a shipper or broker be neither encouraged nor discouraged from disposing of such waste in this state, and that he base his decision about where to dispose of the waste primarily on the cost of transportation to the areas which are available for disposal. The regulations adopted pursuant to this subsection may include a method for the collection of fees from the users of an area, and each of the fees may be a percentage of the fee paid by a user to the operator of the area. The board shall report to the legislature at the end of January of odd-numbered years the amounts of revenue paid to the state for the use of such areas in the preceding biennium.

Sec. 8. NRS 408.125 is hereby amended to read as follows:

408.125 The board may:

1. Adopt such rules, bylaws, motions and resolutions, not inconsistent with this chapter, as may be necessary to govern the administration, activities and proceedings of the department.

2. On behalf of the State of Nevada, enter into agreements with any adjoining state, or any proper agency of such state, for the

construction, reconstruction, improvement, operation and maintenance by any party to such agreement, in such manner and by such means as may be provided in the agreement, of bridges over interstate waters, and may enter into like agreements with respect to construction, reconstruction, improvement, operation and maintenance of highways within the State of Nevada or such adjoining state, when such highways are at or near the common boundary of the states.

3. Authorize the department to join associations of highway officials of other states and other organizations which have been heretofore or may hereafter be established, having as their purpose the interchange of information, establishment of standards and policies relating to highway construction, reconstruction, improvement, maintenance and administration.

4. Designate by regulation alternative routes for the transport of radioactive, chemical or other hazardous materials over the highways or county roads of this state, in lieu of the preferred highways for such transport designated by the United States Department of Transportation, or approve alternative routes set forth in a proposed county or city ordinance if the regulation or ordinance does not conflict with the standards for alternative routes established by the United States Department of Transportation.

Sec. 9. NRS 484.773 is hereby amended to read as follows:

484.773 The department of motor vehicles shall adopt reasonable regulations providing for:

1. Minimum binder requirements to secure loads on vehicles against dangerous displacement and governing the loading and securement of loads for transportation over public highways by vehicles [.] , except loads containing radioactive waste.

2. Safety chains and cables for combinations of vehicles.

Sec. 10. NRS 484.779 is hereby amended to read as follows:

484.779 1. Except as provided in subsection 3, a local authority may adopt, by ordinance, regulations with respect to highways under its jurisdiction within the reasonable exercise of the police power:

(a) Regulating or prohibiting processions or assemblages on the highways.

(b) Designating particular highways as one-way highways and requiring that all vehicles thereon be moved in one specific direction.

(c) Designating any highway as a through highway, requiring that all vehicles stop before entering or crossing the highway, or designating any intersection as a stop or a yield intersection and requiring all vehicles to stop or yield at one or more entrances to the intersection.

(d) Designating truck routes.

(e) Regulating the operation of bicycles and requiring the registration and licensing thereof.

(f) Adopting such other traffic regulations as are specifically authorized by this chapter.

2. An ordinance relating to traffic control enacted under this section is not effective until official traffic-control devices giving notice of such local traffic regulations are posted upon or at the entrances to the highway or part thereof affected as may be most appropriate.

3. An ordinance enacted under this section is not effective with respect to [highways] :

(a) Highways constructed and maintained by the department of transportation under the authority granted by chapter 408 of NRS ; or

(b) Alternative routes for the transport of radioactive, chemical or other hazardous materials which are governed by regulations of the United States Department of Transportation,

until the ordinance has been approved by the board of directors of the department of transportation.

Sec. 11. Chapter 706 of NRS is hereby amended by adding thereto a new section which shall read as follows:

1. No common, contract or private motor carrier of property may transport radioactive waste upon the highways of this state unless

he obtains from the commission a permit specifically allowing him to transport radioactive waste. An interstate common or contract carrier must register with the commission the certificate issued to him by the Interstate Commerce Commission when he applies for such a permit.

2. The commission shall issue a permit to a carrier allowing him to transport radioactive waste if the carrier:

(a) Registers his certificate issued by the Interstate Commerce Commission and complies with the regulations of the public service commission respecting the registration of interstate carriers; or

(b) Demonstrates to the satisfaction of the public service commission that he complies and will continue to comply with all laws and regulations of this state and the Federal Government respecting the handling and transport of radioactive waste and the safety of drivers and vehicles.

3. A carrier of radioactive waste shall reject any package containing such waste which is tendered to him for transport in this state if the package is leaking or spilling its contents, does not bear a shipping label prescribed by the state board of health or is not accompanied by a bill of lading or other shipping document in a form prescribed by that board. A carrier who accepts such waste for transport in this state is liable for any package in his custody which leaks or spills its contents, does not bear the required shipping label or is not accompanied by the required

shipping documents, unless, in the case of a leak or spill of such waste and by way of affirmative defense, the carrier proves that he did not and could not know of the leak when he accepted the package for transport.

4. A carrier of radioactive waste shall notify the commission not less than 4 nor more than 48 hours before he begins to transport the waste in this state.

5. A carrier is exempt from obtaining the permit required by this section if he transports only radioactive waste the possession of which is exempt from licensing by the state board of health.

6. The commission may revoke a certificate issued pursuant to this chapter, and shall revoke a permit to transport radioactive waste issued pursuant to this section, or in the case of a carrier whose certificate is issued by the Interstate Commerce Commission it may file a complaint with that commission, if it finds that, while transporting radioactive waste, the carrier has failed to comply with any laws or regulations of this state or the Federal Government respecting the handling or transport of radioactive waste and the safety of drivers or vehicles.