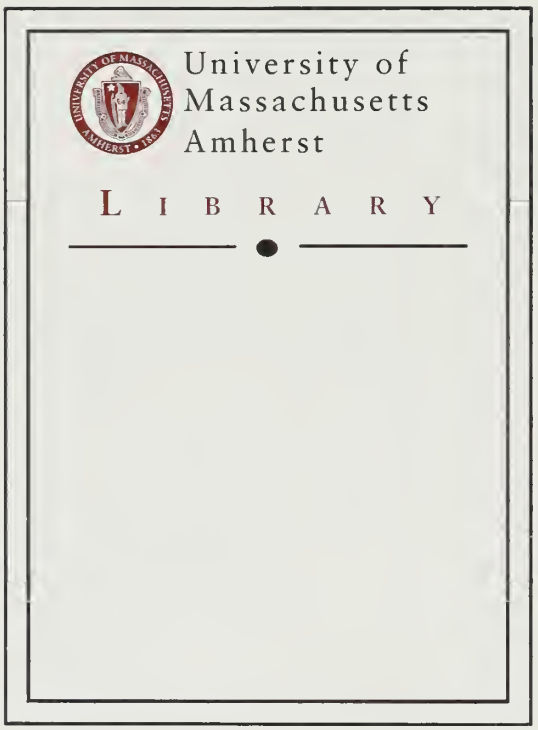
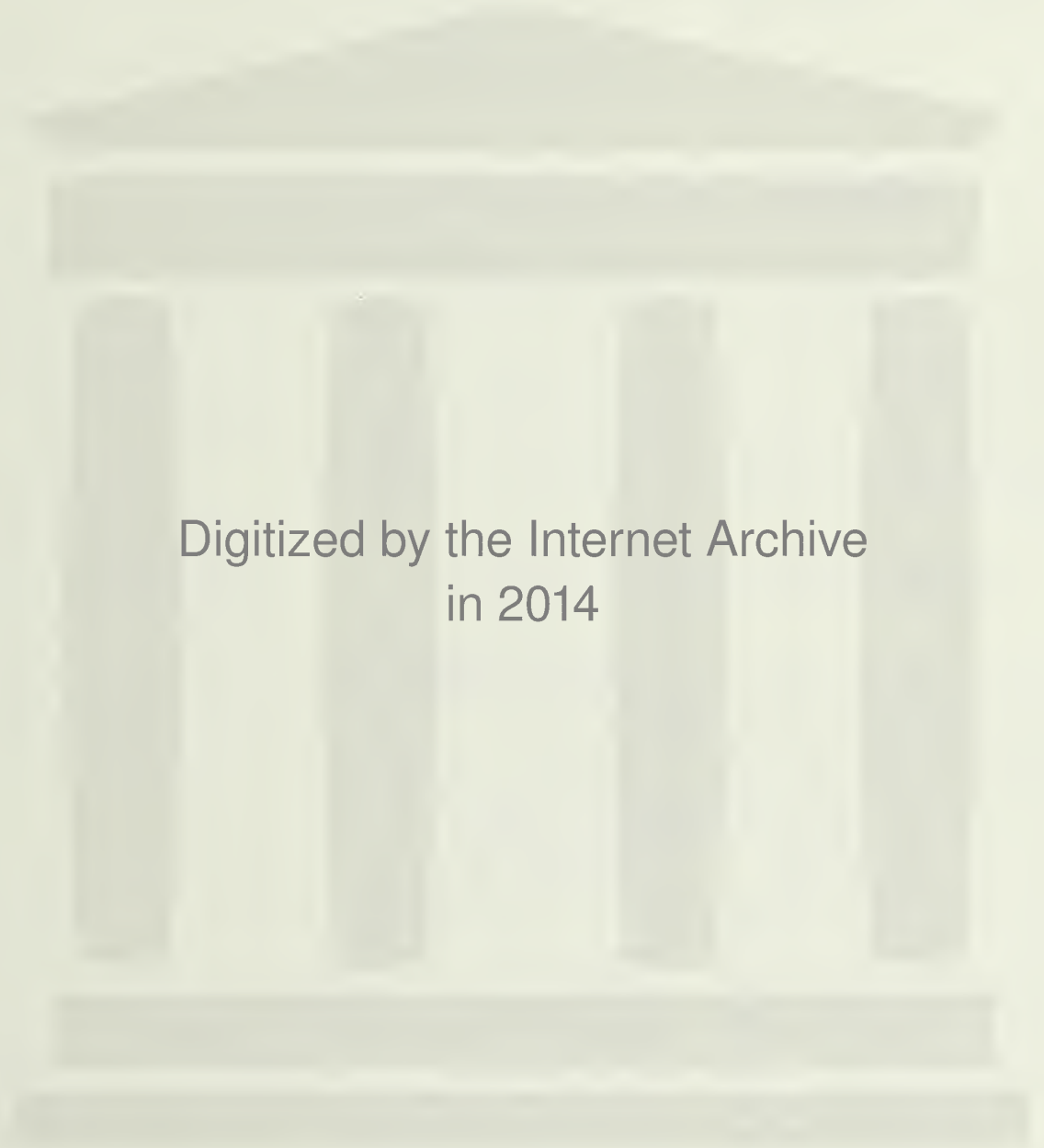




The Massachusetts Low-Level Radioactive Waste Management Board

LLW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 1 - Number 1 - Fall 1991

Ready for public review

Draft Public Participation Plan Available

The Massachusetts Low-Level Radioactive Waste Management Board, the chief state agency responsible for managing low-level radioactive waste (LLW), is undertaking extensive public review of its Draft Public Participation Plan. The plan will serve as the State's "blueprint" for public involvement in LLW management activities.

Small group meetings are being arranged throughout the state to gain input on the Draft Public Participation Plan and to discuss information on LLW issues. The final version of the plan will utilize public comments and be adopted as part of the Massachusetts Low-Level Radioactive Waste Management Plan. Groups interested in hosting a meeting should call Harry Manasewich, Public Participation Coordinator, at 617-727-6018. (Please see the back-page of this newsletter for more information on upcoming meetings.)

Communications and public participation are cornerstones of LLW management and potential LLW storage, treatment, and disposal facility siting activities in Massachusetts. The Massachusetts Low-Level Radioactive Waste Management Act clearly prescribes an open and pro-active process that ensures opportunities for public review and input at each major decision point. It is built upon the premise that people have a right to be involved and should participate in decisions that could affect them. (Please see the enclosed green Chapter 111H overview for more details.)

Greetings!

Welcome to the first issue of *LLW UP-FRONT*, the newsletter about the Massachusetts Low-Level Radioactive Waste Management Board's program for assuring the safe management (and possible disposal within Massachusetts) of LLW.

The newsletter will cover a wide variety of topics including descriptions of activities that result in LLW, information on public participation activities, updates of other Management Board activities, and news from other states.

Federal Mandates Force Action

In response to pressures from South Carolina, Nevada and Washington -- the three states which currently dispose of all commercial low-level radioactive waste in the nation, and their intent "no longer to be the nation's repository for LLW," Congress passed two federal laws that eventually led to the enactment of the Massachusetts Low-Level Radioactive Waste Management Act. The 1980 federal Low-Level Radioactive Waste Policy Act **transferred the responsibility for LLW management to the states**. The 1985 federal Low-Level Radioactive Waste Policy Amendments Act established a timetable for state action, and provided financial incentives and penalties to encourage state adherence to the requirements of the federal law.

The chief mandate of these federal statutes requires each state to provide for its LLW disposal ***by January 1, 1996***. If a state fails to do so by this date, it must assume ownership and liability for all the LLW produced within its borders after 1996.

The statutes also empower the three states which operate LLW disposal facilities (the "sited" states), to ***deny access to their facilities on January 1, 1993*** to all states outside their compact regions. The three sited states have announced their intentions to do so and also believe they have the authority to close off their disposal sites *before* this date, to any state which they decide is not meeting the federal timetable. They denied Michigan LLW generators access in November of 1990, and have warned Massachusetts that delays due to the state's funding crisis could lead to the same result here. Michigan generators are challenging this decision in federal court.

Publication No. 16,968-1-5,000-10/91-$.0582 ea.
Approved by Philmore Anderson III, State Purchasing Agent

Our Options for Long-Term Low-Level Radioactive Waste Management

Massachusetts is **mandated** by federal law to provide "management and disposal" for all LLW produced in the Commonwealth.

If we cannot provide a disposal location by January 1, 1996, either in-state or out-of-state, then state government must **take title to the waste**, and reimburse the companies and institutions producing it for their costs to "store" the "state's" waste until a disposal solution is found. These reimbursements could total millions of dollars.

With this in mind, the Management Board is evaluating the possible options for long-term LLW management. These options include:

- Contract with another state that is already developing a LLW disposal facility. This is the preferred option. So far, however, no other state has indicated a willingness to take our waste.

- Join an existing LLW disposal regional compact. To date, most compact regions have either stated their opposition to new membership or require a new member to host the compact's regional disposal facility.

- Establish a new regional compact for northeast states. While this option could eliminate or reduce the costs of facility development and operation to the sited state (the other compact states would likely share or sustain these costs), Massachusetts *could* be selected as the host state.

- Site, build, and operate a disposal facility for Massachusetts-only LLW. This option would ensure the Commonwealth's ability to reliably provide for its LLW disposal needs, and avoid being subject to the actions of another state or compact. However, due to the politics of siting and the critical need to address potential health, safety and environmental issues, locating such a facility could be difficult.

- Do nothing *for the time being* and wait to see what other solutions appear. Concerns about the economic viability of building numerous LLW facilities and attempts to change the "take title" provision of federal law, may yield new opportunities and options for LLW disposal in the future. However, if no opportunities arise during this waiting period, the state may have to pay liability costs higher than the financing costs of the other options, due to potentially greater delays.

Low-Level Radioactive Waste Defined

Low-level radioactive wastes are the radioactive by-products of various institutions and industries that use radioactive materials - hospitals, nuclear power plants, industrial facilities, and research laboratories. Equipment and material used at these places, such as gloves and coveralls, filtering media and metal components from nuclear power plants, research test tubes, leftover liquids used in the diagnosis and treatment of diseases, and hospital patient bedding, may come in contact with radioactive elements or may be irradiated. *These objects become waste products **containing a low concentration** of radioactive material,* and are called low-level radioactive waste.

LLW is legally defined by what it is not. It is not spent reactor fuel or other high-level waste, which generally requires substantial shielding and cooling due to its very large concentrations of certain radioactive elements. By contrast, LLW requires less shielding and has lower concentrations of long-lived radioactivity. The active life of most of the radioactivity can be measured in weeks or years rather than thousands of years, although small concentrations of long lived radioactivity may be present.

Recent Management Board Activities

Recent accomplishments of the Management Board include:

- A decision not to site a centralized interim storage facility at this time for "small" producers of LLW, who with the larger LLW generators, will have to store their waste "on-site" after the three commercial disposal sites close their doors on January 1, 1993.

- A policy encouraging LLW generators to ship waste out-of-state for treatment, but requiring generators to meet certain requirements that will protect the Commonwealth from liability if waste becomes "orphaned" at an out-of-state location.

- Completion of a series of meetings on a proposal to create a Public Participation Advisory Committee, which will advise the Public Participation Coordinator on establishing and conducting public participation and information programs throughout the Commonwealth.

- Tabulation of the results of the 1990 Radioactive Materials Licensee and NARM Users Survey.

The Board is currently working towards completion of Phase I activities. (See insert for more details on "Phases.") One of its principal responsibilities will be to decide whether or not a LLW storage, treatment or disposal facility is needed. By law, this decision can only be made after all the other requirements of Phase I are completed. These activities include formulating a management plan, siting criteria and regulations. Once the drafts of these Phase I activities are completed, they will undergo *extensive public review.*

***LLW UP-FRONT** is a quarterly newsletter, published by the Massachusetts Low-Level Radioactive Waste Management Board.* *Submit inquiries or comments to 100 Cambridge Street, Room 903, Boston, MA 02202 or call (617) 727-6018.*

Overview of the Massachusetts Low-Level Radioactive Waste Management Act Massachusetts General Laws Chapter 111H

Federal mandates transfer low-level radioactive waste management to the states

In response to pressures from the three states which dispose of all low-level radioactive waste (LLW) produced in the United States, and their intent to "no longer be the nation's repository for LLW," Congress passed two federal laws that eventually led to the enactment of the Massachusetts Low-Level Radioactive Waste Management Act. The 1980 federal Low-Level Radioactive Waste Policy Act assigned the responsibility for LLW management to the states. The 1985 federal Low-Level Radioactive Waste Policy Amendments Act established milestones, incentives, and penalties to encourage state adherence to the requirements of the federal law. The chief mandate of these federal statutes requires each state to provide for its LLW disposal ***by January 1, 1996***. If a state fails to do so, it must assume ownership and liability for failing to take possession of all the LLW produced after 1996.

Massachusetts takes action

Enacts the low-level radioactive waste management law

In response to the federal laws, Massachusetts enacted M.G.L. c.111H in 1987.

Major provisions of M.G.L. c.111H

- Establishes the *Low-Level Radioactive Waste Management Board* (the Management Board) as the lead state agency responsible for planning and effecting LLW management in the Commonwealth. Stipulates that the Management Board consist of nine members. Seven are to be public members with professional experience in engineering, municipal government, radiological health, business management and environmental protection. The remaining two members are the Secretaries of the state's Executive Offices of Environmental Affairs and Human Services. In addition, if a facility is sited in the state, the Management Board is enlarged to include two site community representatives.
- Divides LLW management into *six phases*. Specifies that Phase I include development of a Management Plan and a determination ***on the need to site a LLW storage, treatment or disposal facility within the Commonwealth.*** Phases II through VI outline detailed siting and control measures to be taken if the Management Board determines that siting a facility is necessary. *These six phases are more fully outlined in the next section of this overview.*
- Requires that the Management Board's decision on the need to establish an in-state LLW storage, treatment or disposal facility be made by a two-thirds majority vote. *If two-thirds of the Management Board vote affirmatively to establish such a facility, the siting process commences.*
- ***Prohibits landfilling of LLW***

Publication No. 16969-6-10000-10-9-91-$ 096 each
Approved by Philmore Anderson III, State Purchasing Agent

(continued from page 1; major provisions of Chapter 111H)

anywhere in Massachusetts.

- Directs the Department of Public Health to be the chief LLW regulator.
- Establishes a process of **pro-active public participation** as the cornerstone of LLW management and siting activities. Prescribes an open process that includes all interested parties and ensures opportunities for public input and review at each report or decision point. Creates the position of Public Participation Coordinator to facilitate and encourage public participation, and to make recommendations to the Management Board concerning implementation of programs to ensure public participation.
- Requires **minimization** of LLW.

If siting goes forth in Massachusetts, the law...

- Establishes **trust funds** to ensure the availability of funds to maintain a facility several hundred years after it is closed, and to provide third party liability protection.
- Requires the Management Board to include two representatives from the LLW facility site community.
- Ensures significant site community control over issues effecting it, including the environmental review of the site.
- **Directs the site community to select the facility operator and the type of facility.**
- Directs the Management Board, in consultation with the site community, to *negotiate a comprehensive operating contract* with the LLW facility operator. The contract will contain agreements relating to the operation of the LLW facility, including further measures to protect the public health and safety and a community compensation package.

The six phases of LLW management, facility siting, operation and closure

Chapter 111H divides LLW management, facility siting, operation and closure into six phases. The following is an outline of these phases.

Phase I: Planning for LLW management

This is the planning phase for all Management Board and related agency activities.

- Specifies that a Management Plan be developed by the Management Board to provide for the safe and efficient management of LLW.
- Requires the Management Board to vote on the need to proceed with siting a LLW facility.
- Sets forth procedures for active public participation in Management Board activities including the development and review of regulations, siting criteria, operator selection and facility licensing.
- Requires that information about regulations and plans are available to the public.
- Directs the Department of Public Health to develop regulations for LLW source and volume minimization, and the licensing, construction, operation and closure of LLW storage, treatment and disposal facilities, which must provide for waste monitoring

(continued from page 2; Phase I: planning for LLW management)

and retrieval.

- Directs the Department of Environmental Protection to develop criteria and procedures for site screening to ensure sites are selected which protect the public's health and the environment.

Phase II: Selection of a LLW facility site

This phase outlines procedures and ensures an open and fair process for selecting a superior LLW facility site, and for certifying applicants to develop and operate a LLW facility.

- Directs the Management Board to commence the siting process upon an affirmative vote to site a LLW facility.
- Requires the Management Board to implement the recommendations of the Public Participation Coordinator.
- Requires that each report or major decision be subject to public review.

Establishes site selection process as follows:

1. Issuance of a report which describes the statewide mapping and screening activities used to identify, and exclude from further consideration, those areas of the state that are obviously unable to satisfy the site selection criteria.
2. Issuance of a report which describes more detailed screening activities which identify possible locations that are likely to contain one or more candidate sites.
3. Issuance of a draft candidate site identification report which describes even greater detailed screening activities to identify at least two, but not more than five, candidate sites considered best able to satisfy the site selection criteria and otherwise be appropriate for detailed characterization (including on-site analyses). Report to also include the following:
   - Preliminary characterization of geologic and environmental resources, as well as cultural, social and economic features.
   - Description of procedures used to identify candidate sites based on such preliminary characterization.
   - Draft plans for detailed site characterization of each candidate site.
4. Performance of an environmental review (MEPA) by Secretary of Environmental Affairs.
5. Establishment of a Community Supervisory Committee (CSC). Management Board requests chief executive officer of each community in which is located all or part of a candidate site to appoint a CSC consisting of the CEO or designee, chairs of the Boards of Health and Planning, Conservation Commission, and three residents approved by a majority vote of the City Council or Board of Selectmen.

   The powers and duties of the CSC include representing the interests of the candidate site community, to select a company which will build and operate the facility, to choose the type of technology for the facility and to receive and expend technical assistance and planning funds as will be provided to hire staff, consultants and other necessities.
6. Performance of a four-season-long detailed on-site characterization to investigate each candidate site's ability to support a LLW facility.
7. Selection of a superior site by a two-thirds vote of the Management Board.

(continued from page 3; site selection process)

8. Acquisition of the site by purchase or taking if not already owned by the Commonwealth.

- Persons aggrieved by the site selection process may appeal via adjudicatory proceeding of the Department of Environmental Protection (DEP). Upon request of the aggrieved, judicial review of DEP finding by the Supreme Judicial Court.

Phase III: Selection of an operator and facility technology

This phase permits the LLW facility site community to select the operator and the type of technology for the facility that best ensures proper operation.

- Requires certified operator applicants to be interviewed by CSC.
- Directs CSC to select operator.
- Requires Management Board and operator to execute facility development contract.

Phase IV: Facility approval and licensing

This phase ensures an open and fair process for carrying out the environmental review and licensing of any facility, and requires development of a comprehensive operating contract.

- Requires operator to submit to environmental review (MEPA).
- Directs operator to file a facility license application with the Department of Public Health.
- Instructs Department of Public Health to prepare a draft license, and issue or deny a final license, after review.
- Requires Management Board to negotiate a comprehensive operating contract with the facility operator, in consultation with the CSC. The contract will specify the terms on which the LLW facility site is to be leased to the operator, including the facility design and performance specifications (measures to protect the public health and safety), community compensation and license transfer conditions.

Phase V: Facility development, operation and closure

This phase provides for the safe and orderly development, operation, closure and post-closure observation and maintenance of the LLW facility.

- Specifies that the Department of Public Health establish a comprehensive environmental monitoring program after consultations with DEP and site community Board of Health.
- Requires LLW facility operator to reimburse site community and Department of Public Health for monitoring program costs.
- Directs Department of Public Health, Management Board, and CSC to inspect construction.
- Requires operator to submit disposal fee schedule and waste acceptance criteria to Management Board.
- Empowers Management Board to authorize facility operation.
- Authorizes Department of Public Health to close facility if it finds potential hazard(s).
- Requires plans for closure to be prepared one year before expected facility closing.
- Requires facility operator to maintain responsibility for five years after

(continued from page 4; facility development, operation and closure)

closure and then to transfer responsibility to Management Board.

Phase VI: Institutional control of facility

This final phase provides for the safe and orderly institutional control of a facility following transfer of the license from the operator to the Management Board.

- Management Board develops plan for institutional control after public meetings in LLW facility site and neighboring community(s).
- Requires Management Board, in co-operation with local officials of site community, to periodically inspect the operator's implementation of the facility closure plan, and to ensure that the terms of the comprehensive operating contract are being satisfied.
- Directs Management Board to maintain responsibility throughout institutional control period and to issue an annual report to facility site community of its institutional control of the facility.

Glossary

"Candidate site" is a site which will be the subject of a detailed site characterization as part of the process to select a superior site for a LLW storage, treatment or disposal facility.

"Closure" is the permanent termination of LLW acceptance at a facility, including closure prior to the scheduled closing date, and the implementation of a closure plan.

"Closure plan" is a plan, required as a condition of a facility license, to assure safe facility closure after operation.

"Detailed site characterization" is the analytical, investigatory and testing process, conducted both at the site and in the laboratory, which determines whether a candidate site complies with site selection criteria. It is done prior to the selection of any superior site.

"Environmental monitoring program" is a monitoring program established by the Department of Public Health, after consultation with the Department of Environmental Protection and the Board of Health of each site community, for the purpose of collecting and analyzing environmental data prior to and throughout the construction, operation, closure, post-closure, observation and maintenance and institutional control of a LLW facility.

"Facility" is a parcel of land, together with structures and equipment, that are used for the storage, treatment or disposal of LLW.

"Facility license" is a license to operate a LLW facility. Depending on

conditions at the time of the license submittal, the license is issued either by the Massachusetts Department of Public Health or the U.S. Nuclear Regulatory Commission.

"Institutional control" is the continued observation, monitoring, and care of a LLW facility following transfer of the facility license from the operator to the Management Board. Institutional control may last up to 500 years.

"Operator selection" is the selection of a company to develop and operate a LLW facility.

"Post-closure observation and maintenance" is the active monitoring and maintenance of a facility which has been closed in preparation for transfer of the facility's license from the private company operator to the Management Board.

"Site community" is the community in which is located all or part of any superior site.

"Siting criteria" are the technical and non-technical factors used to select a superior site.

"Source minimization" is minimizing the volume of radioactivity of LLW before its generation by such methods as: (1) avoiding unnecessary contamination of items during the use of radioactive materials; (2) carefully segregating radioactive waste from non-radioactive trash; or (3) substituting radioactive materials with non-radioactive materials or using substances with shorter lives where practicable.

"Storage for decay " is a procedure in which LLW with a relatively short half-life is held for natural radioactive decay until it contains no measurable radioactivity, rather than disposing of the material as LLW.

"Superior Site" is the site selected by the Management Board for a LLW treatment, storage, or disposal facility. A superior site is selected at the end of the site selection process.

"Technology" refers to the methods used to store, treat or dispose of LLW including the type of containment structure(s) to be built and their locations (e.g. above grade, below grade, etc.).

"Volume minimization" is the treatment of LLW after its generation (such as compaction) in order to minimize the size of the waste and the space required for disposal.

Who is the Low-Level Radioactive Waste Management Board?

In the old television show, "The Lone Ranger," the question was often asked: "Who was that masked man?"

The Massachusetts Low-Level Radioactive Waste Management Board may seem faceless because most of its activities have not drawn much media attention. However, the Management Board is neither "mysterious" nor "masked!" Established by the Massachusetts Low-Level Radioactive Waste Management Act (Chapter 111H), it is the lead state agency responsible for planning and effecting LLW management in the Commonwealth.

Nine individuals comprise the Management Board. Two are Susan Tierney, Secretary of the Executive Office of Environmental Affairs and David Forsberg, Secretary of the Executive Office of Health and Human Services. Designated to represent Secretary Tierney is Sharon Green, Director of Waste Management Policy and Planning. Representing Secretary Forsberg is Peggy Lynch, Program Coordinator for Primary Health Programs.

Seven members are "appointed by the Governor from lists of candidates whose experience, background and professional training indicate that *they can act in the public interest" [M.G.L.* c.111H, Section 2; emphasis added]. Each of these seven is to have professional training and experience in one of the following: engineering (1), public administration (1), radiological health (1), business management (1) and environmental protection (3).

Experienced in engineering is Professor John Mayer, Jr., Director of the Nuclear Engineering Program at Worcester Polytechnic Institute. Professor Mayer, who is completing his final year as the Board's Chairman, is recognized professionally for his ability to produce practical solutions to technical problems, and has over 37 years of experience in the fields of environmental policy, energy production and use.

Susan Fargo, Vice-Chairman, brings to the Board professional experience in public administration. With over 11 years of experience as a journalist and as a public official in state, county, and local government, including six years as a Selectman for the Town of Lincoln, she possesses a keen insight into the dynamics of the public process.

Knowledgeable and experienced in radiological health is William Riethle. A health physicist for over 21 years whose work involves extensive experience protecting the public and workers from the effects of radiation, Mr. Riethle is employed by Yankee Atomic Electric Company as Group Manager- Radiation Protection.

Charles Killian provides the Board with professional experience in business management. His high level of expertise in management and safety is widely recognized and comes from over 34 years of service to E.I. DuPont De Nemours, a manufacturer of radiopharmaceuticals used internationally for cancer detection and treatment. His contributions to the radiation field have also meant his appointment to the Governor's Advisory Council on Radiation Protection, where he currently serves as Chairman.

Timothy Brennan is one of the three environmental protection experienced members of the Board. For over 18 years he has provided professional leadership to the Pioneer Valley Planning Commission including 11 years as its Executive Director. Noted for his skill in bringing together diverse groups to address critical environmental concerns, he serves as Co-Chairman of the Western Massachusetts Coalition for Safe Waste Management.

The second of the Board members having professional experience in environmental protection is Barry Connell, who has worked on radioactive waste issues since 1980. In 1982 he directed the successful " Question 3" statewide referendum campaign to regulate the siting of radioactive waste disposal and nuclear power facilities. He also served on the Special Commission on Low-Level Radioactive Waste which, following extensive public participation, drafted M.G.L. c.111H, the Low-Level Radioactive Waste Management Act. Mr. Connell currently serves as staff to the Massachusetts House of Representatives.

Judith Shope, Legislative Director for the Environmental Lobby of Massachusetts and a recognized environmental authority, also brings professional environmental protection experience to the Board. She is renowned for her ability to build diverse coalitions to help enact critical environmental legislation, and has played major roles in drafting significant legislation like the Massachusetts Low-Level Radioactive Waste Management Act and the Toxic Use Reduction Act.

Profile:
Carol Amick, Executive Director

Former State Senator Carol C. Amick was appointed by the Low-Level Radioactive Waste Management Board as its first Executive Director.

She earned her B.S. from Iowa State University and her Masters of Public Administration from Harvard University.

Serving as a State Representative and State Senator for 15 years, Amick compiled a distinguished record of public service in the areas of environmental protection and tax law. While a Senator, she chaired several environmental policy committees including the Committee on Natural Resources and Agriculture and the Special Commission on Low-Level Radioactive Waste. Her work to craft the 1987 Low-Level Radioactive Waste Management Act won praise from both environmentalists and radioactive waste producers. She has written numerous legislative proposals that are now law, including laws that regulate hazardous waste, acid rain and water quality.

The State Low-Level Radioactive Waste Management Law:

What Does It Mean To You?

The *Massachusetts Low-Level Radioactive Waste Management Act*, M.G.L.c.111H, is a comprehensive statute which guides LLW management in the Commonwealth.

It was written utilizing extensive input from the public and industry who helped design a siting process -- if siting is determined to be necessary in Massachusetts -- based on preventing the mistakes made in other waste facility siting processes or laws.

The insert included with this newsletter provides an overview of this law. Summed up, Chapter 111H establishes the Low-Level Radioactive Waste Management Board as the lead state agency responsible for managing LLW and divides LLW management into six phases. It outlines a specific and comprehensive process for facility siting, prohibits landfilling of LLW and ensures significant facility host community control over issues that affect them. Most of all, it establishes public participation as the cornerstone of LLW management in Massachusetts.

Upcoming Activities

**** Meeting times and locations are subject to change. Please call for directions and other details before you attend.**

Low-Level Radioactive Waste Management Board Meetings:

November 20, 1991: 1:00 p.m., Holyoke Community College, 271 Frost Building, Holyoke, MA. **Special public forum to discuss Draft Public Participation Plan.**

December 18, 1991: 10:00 a.m., 100 Cambridge St., room 905, Boston, MA.

Draft Public Participation Plan Review Meetings:

November 26, 1991: 7:00 p.m., Traprock Peace Center, Deerfield, MA

December 11, 1991: 7:00 p.m., Massachusetts Association of Health Boards, Board of Health office, Needham Town Hall, Needham, MA

December 19, 1991: 7:30 p.m., Berkshire County Regional Planning Commission, 10 Fenn St., Pittsfield, MA

Massachusetts Low-Level Radioactive Waste
Management Board
100 Cambridge Street
Room 903
Boston, MA 02202

Address Correction Requested

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 1 - Number 2 - Spring, 1992

Report issued

Survey of Radioactive Materials Users, LLW Generators

The Management Board recently issued a report of its 1990 survey of all radioactive materials (RAM) users and low-level radioactive waste (LLW) producers in Massachusetts. The report is available by contacting the Management Board office (617-727-6018).

The report includes data characterizing LLW produced in 1989, consisting of waste volumes and total activity of waste shipped out-of-state to the three existing commercial disposal sites which accept LLW.

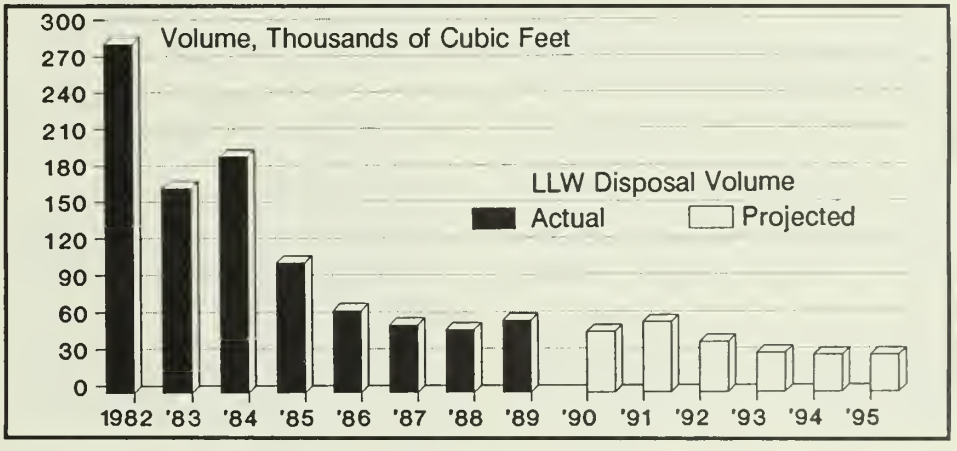


Figure 1 - Historical and Projected LLW Volume Trends

More than 400 hospitals, universities, government agencies, biotechnology firms and other businesses, including the two nuclear powered utility companies, are licensed or registered to use RAM within the Commonwealth. Of these, 89 companies and institutions produced LLW requiring disposal in Barnwell, South Carolina; Beatty, Nevada or Hanford, Washington.

58,717 cubic feet was shipped for disposal in 1989, ranking this state as the 11th largest LLW producer in the nation that year. This volume shows a profound improvement in waste management practices since the early 1980's, when Massachusetts was ranked number one in terms of waste production. (See Figure 1)

Survey Collects Classification Data

Low-level radioactive waste (LLW) possesses a number of characteristics which requires it to be regulated and managed. In some combinations, these characteristics may cause the LLW to be of relatively small environmental or public health concern. In other combinations, or separately, these attributes may be of substantial concern and may require significant short- and long-term management strategies.

The major characteristics are:

Radioactivity -- the rate at which radioactive materials emit radiation, expressed in terms of the number of nuclear disintegrations occurring in a unit of time. The common unit of radioactivity is the curie (Ci).

Curie -- a measure of the amount of radioactive material which equals 37 billion disintegrations per second. A

continued on page 3

LLW comes in numerous forms. It includes dry solids such as wood, clothing and metal; filters and filter media; ion exchange resins; liquids; oils; soil and building rubble; biological waste and sludges, all contaminated with radioactivity. The radioactive atoms, called "radionuclides," in LLW are constantly decaying, or transforming into other atoms. The amount of radioactive material is measured in "curies" and is called the "radioactivity" or simply the "activity" of the waste.

continued on page 2

Publication Number: 17,086-2-4,000-04/92-bid no.12104
Approved by Philmore Anderson III, State Purchasing Agent

Survey of Radioactive Materials Users, LLW Generators

continued from page 1

Much of the LLW produced in Massachusetts decays to minute quantities in relatively short time periods -- from minutes to a few years. Waste that can be stored for decay where it was produced, in order to decay to safe levels, does not require disposal in a licensed LLW disposal facility. About 120 RAM users produced LLW which was managed by this "storage for decay" method.

Some RAM users never produce any LLW because they use radioactive materials encapsulated in a shell of non-radioactive material, which prevents any radioactive contamination from escaping outside the shell. These "sealed sources" were used by about 161 companies and institutions in 1989, according to survey results.

The report also presents a portrait of the types of LLW generators in Massachusetts. The five types include:

(1) Commercial companies including biotechnology firms, engineering and construction companies, testing laboratories and radiopharmaceutical manufacturers.

(2) Academic institutions such as universities and research laboratories.

Waste Generator Category	Volumes by Disposal Class (cubic feet)					Total Activity	
	Class A	Class B	Class C	Total	% of Total	Curies	% of Total
Commercial	35,852	98	0	35,950	61	56,853	99
Academic	2,407	0	0	2,407	4	14	0
Health	2,113	4	0	2,117	4	13	0
Government	609	0	0	609	1	12	0
Utility	16,485	1,149	0	17,634	30	300	1
Total	57,466	1,251	0	58,717	100	57,192	100

Table 1 - Summary of 1989 LLW Shipped for Disposal

(3) Health care facilities such as hospitals, clinics and doctors.

(4) Government entities such as water districts and health departments.

(5) Utility companies which operate nuclear power plants.

An interrelationship exists between some of these generator types. For example, radiopharmaceutical manufacturers make most of the radioactive products which are used in academic and medical research, diagnosis and treatment. E.I. Du Pont, a commercial generator, produces LLW as a result of making test kits and other radioactive products for identifying and treating cancer and other diseases by research institutions and hospitals throughout Massachusetts and the nation.

Commercial generators of LLW produced 61% of the volume and 99% of the activity in 1989. Percentages of the other generator types are shown in Figure 2 and Table 1, which also shows waste shipped by class.

The report also contains projections of all waste volumes and radioactivity that will be produced through 1995. RAM users predicted reductions in volume to about 30,000 cubic feet by 1994. However, activity is forecast to vary significantly from year to year, averaging about 132,800 curies annually, or double the level reported for 1989.

The 1990 Survey Report contains other interesting information. For example, a list of all RAM users responding to the survey appears at the end of the report, and various tables reveal the specific types of radionuclides used and by whom; the types of treatment methods employed and the amount of "mixed waste" (ie., the small portion of LLW which contains hazardous chemicals) produced in the Commonwealth.

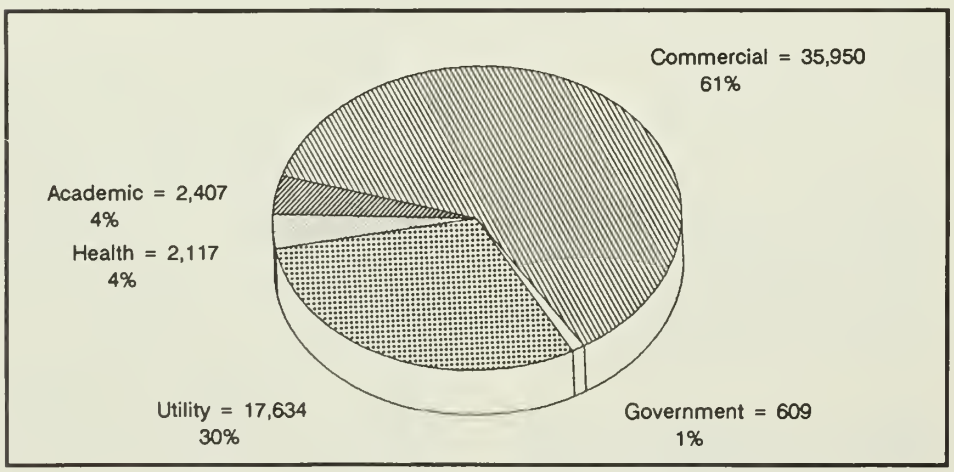


Figure 2 - 1989 LLW Volume Shipped by Generator Category (in cubic feet)

Survey Collects LLW Classification Data

Profile: Board Chairman John A. Mayer, Jr. PE

When John A. Mayer, Jr. was first elected to chair the Low-Level Radioactive Waste Management Board in 1989, he never dreamed that he would end up serving the maximum terms (3) as chairman, guiding the Board's initial phase of work leading to a decision whether or not to site a LLW storage, treatment or disposal facility within the Commonwealth.

Board Members elected him early on because he is an academic, a nuclear engineer, a mechanical engineer and an environmentalist!

And indeed, this scholarly gentleman has all of these qualities. However, it was his background and professional training in engineering that led to his appointment as one of the seven public members of the Management Board who are chosen to "act in the public interest."

Prof. Mayer wears several hats besides the one reserved for Management Board Chairman. A graduate of Columbia University with a Masters in Nuclear Engineering, he is the Director of the Nuclear Engineering Program at Worcester Polytechnic

continued on page 4

continued from page 1

millicurie (10^{-3}) is one-thousandth of a curie; a microcurie (10^{-6}) is one millionth of a curie.

Decay -- the process by which radioactive atoms change into stable atoms by one or a series of nuclear disintegrations (which emit radiation in the form of particles or energy).

Half-life -- the time required for a radioactive substance to lose 50 percent of its activity by decay.

Concentration -- the number of curies per unit volume of waste.

Type of radiation emitted -- several types of radiation or particles at different energy levels which can be emitted from radioactive material disintegrations. Alpha particles can be very damaging but don't travel through one layer of paper; beta particles are more penetrating, can travel as much as one centimeter through water, but are not as damaging as alpha particles; and x-ray and gamma rays can be highly penetrating types of radiation with effects similar to beta particles.

Biological half-life -- for materials ingested or inhaled, the time which they remain in the body.

Biological effect -- the impact on tissues dependent on the type of radiation, type of radioactive material, and energy level of the radiation.

LLW must be managed in ways which are appropriate to the level of potential hazard, risk or other concern associated with each type of waste. The system used by the Low-Level Radioactive Waste Management Board to characterize and categorize these concerns is called the Massachusetts LLW Classification System.

The Massachusetts system incorporates the U.S. Nuclear Regulatory Commission's "disposal" classification system for LLW (Class A, B, C and Greater than Class C) and the U.S. Environmental Protection Agency's hazardous waste classification system for chemical hazards (ignitability, corrosivity, and reactivity, for example), into a "total hazard-total management" program which enables the Commonwealth to make management decisions about LLW storage, treatment and disposal.

In order to classify LLW in Massachusetts by its various characteristics, the Management Board annually collects data from all radioactive materials users and LLW producers. Responses to the 1991 LLW Classification Survey are currently being tabulated, and will be issued in a report later this year.

Classes "A," "B," "C" and GTCC

References are frequently made to the Class A, B, C and GTCC categories in the NRC's LLW disposal classification system. They are described briefly as follows:

Class A – characterized by their low concentrations of long-lived radionuclides and concentrations of short-lived radionuclides that will decay to acceptable levels within 100 years.

Class B – contain higher levels of short-lived radionuclides than Class A, and must meet stability requirements so that the waste form or the waste container can maintain its physical properties and identity over 300 years.

Class C – has the greatest concentrations of long-lived or short-lived radionuclides of any LLW which state government is mandated (by federal law) to manage and dispose.

GTCC – are higher concentrations than Class C. They continue to be the federal government's responsibility.

Other States and Compact Regions Take Action To Manage

Ever since the passage of the two federal laws governing LLW, which assigned responsibility for LLW management and disposal to the states, actions to deal with LLW have occurred in numerous states around the country.

Most of the country is organized into regional "compacts," through legislation approved by the individual states and ratified by Congress. Each compact region has named a "host state" in which a LLW disposal facility is to be sited, built and operated.

In the New England area, Connecticut and New Jersey have formed a compact, but each is still planning to develop its own site. The other New England states, plus New York, are each contemplating separate LLW disposal facilities. The federal government considers Massachusetts to be a state "in the process of siting," even though the Management Board has not yet voted on whether or not the necessity exists to site a facility here. The Management Board continues to pursue agreements with other states while preparing for the possibility that a site may be necessary within the Commonwealth.

The concern in the states over LLW management stems from the mandates of federal law which require each state to provide for its LLW disposal by January 1, 1996, and if failing to do so, requires the state to assume ownership and liability for all waste produced within its borders. These burdensome provisions have the potential to cost the citizens of the Commonwealth millions of dollars. A solution must therefore be found!

Other state's
LLW management activities

Appalachian Compact (Delaware, Maryland, Pennsylvania, W. Virginia) Host state: Pennsylvania. Exclusionary site screening process underway; approx. 25 percent of state eliminated from consideration. Hope to identify three finalist sites by end, 1992.

Central Compact (Arkansas, Kansas, Louisiana, Nebraska, Oklahoma) Host state: Nebraska. License application for disposal facility (multi-barrier, above-ground vaults) in Boyd County near Butte has been determined to be "complete" by the state agencies. Technical review of the application continues.

Central Midwest (Illinois, Kentucky) Host state: Illinois. License application for disposal facility (multi-barrier, above-ground vaults) in Martinsville has been determined "complete" for review purposes. State awaiting response from developer/operator Chem-Nuclear to 1200 initial comments and questions.

Hearings held by Siting Commission on suitability of the Martinsville site. A determination is necessary that site meets all state's criteria before license can be issued.

Midwest (Indiana, Iowa, Minnesota, Missouri, Ohio, Wisconsin) Host state: Ohio. Following expulsion of Michigan as host state, Ohio named new host, and has begun work to enact a LLW management and disposal law.

Northeast (Connecticut, New Jersey) Host state: Each planning to

continued on page 5

A Profile of Chairman John Mayer

continued from page 3

Institute (WPI) in Worcester. Recipient of another M.S., in Mechanical Engineering, he is also an Associate Professor of WPI's Department of Mechanical Engineering, and is a registered professional engineer in both Massachusetts and New York.

He also has an environmental cap in his repertoire of careers. A graduate of the State University of New York Maritime College, Prof. Mayer holds a Bachelor's degree in Marine Engineering. At WPI, he supervises thesis activities in the areas of environmental impact, energy policy and energy and resource utilization while also teaching undergraduate and graduate courses in Nuclear Engineering and Power Systems Analysis.

As a result of his interest and capabilities in these various career fields, Prof. Mayer was selected by the American Society of Mechanical Engineers to serve a year-long fellowship as a Congressional staff member in Washington, D.C. He worked as a staff member of the Environment, Energy and Natural Resources Subcommittee of the House Committee on Government Operations, authoring the subcommittee's various reports on the cost of government-assumption of the West Valley (New York) nuclear fuel reprocessing site.

Prof. Mayer brings to the Management Board a keen sense of the important and complex technical issues which are so intertwined in the Board's policy decisions. His participation in Board activities is an obvious outgrowth of his many interests and professional activities. When not busy at WPI or with Management Board staff, he is active in such societies as the American Academy of Environmental Engineers, the American Nuclear Society, the American Society of Mechanical Engineers and the American Society for Engineering Education.

and Dispose of their Low-Level Radioactive Waste

site a disposal facility. Following Conn. announcement of three possible finalist sites, Gov. Weiker recommended review of his state's siting process by key state officials. Conn. Legislature considering proposals to evaluate a nuclear power plant site for interim storage, and to start the site screening process over, with modified siting criteria.

New Jersey has begun pre-characterization of entire state; hopes to name candidate disposal sites by mid-1992. Is also considering a land-owner "volunteer" siting program.

Northwest (Alaska, Hawaii, Idaho, Montana, Oregon, Utah, Washington) Host state: Washington. Its site in Hanford will cease to be available nationally on Jan. 1, 1993, but will remain open for its compact region and the small contiguous Rocky Mountain compact.

Rocky Mountain (Colorado, Nevada, New Mexico, Wyoming) Host state: Colorado. This compact, which produces a relatively small amount of LLW, has an agreement to use Washington's disposal site.

Southeast (Alabama, Florida, Georgia, Mississippi, N. Carolina, S. Carolina, Tennessee, Virginia) Host state: N. Carolina. Two sites selected for detailed site characterization, but work delayed until recently by court injunctions. Final site selection scheduled for late 1993, and facility operation in early 1996.

Southwestern (Arizona, California, N. Dakota, S. Dakota) Host state: California. License application for disposal facility in the Mojave Desert under state review. Site technology is shallow land burial with several enhancements (such as using grout instead of sand as backfill material, and deeper burial depth). Operations expected to begin in early 1993.

Maine State-wide site screening identified 29 potential candidate sites. Three other sites volunteered by land owners. LLW Authority will narrow sites to 10 for pre-characterization studies, then select preferred candidate sites for detailed site review. Maine also discussing possibility of joining with Texas in a new compact.

Will Barnwell be Available?

South Carolina's governor has proposed to keep open the Barnwell LLW disposal site until North Carolina's facility opens in 1996. Governor Campbell's proposal would link access fees to a generator's location: a $6 per cubic foot (cf) surcharge would be paid by LLW generators within South Carolina; $40 per cf would be charged generators from the other Southeast Compact states, and all out-of-region generators would pay $160 per cf.

If the South Carolina Legislature adopts this plan, approval also is required by the Southeast Compact Commission and the commission's designee from South Carolina. Any one of the three can block waste importation.

New York Governor Cuomo suspended siting activities and changed Authority membership and siting process following massive citizen unrest in New York. Draft facility licensing regulations issued. Legislation pending to authorize the old "West Valley" LLW disposal site near Buffalo to serve as a temporary storage facility and perhaps, later, a permanent disposal site.

Texas Legislature changed area for review of possible disposal site (after picking another area for site characterization years ago). Siting Authority to submit facility license application in Spring, 1992. Legislature also authorized formation of a regional compact with small waste-generating states, to accept no more than 16,000 cubic feet per year from outside Texas. Numerous states have met with Texas to discuss compacting, including Vermont, Maine, Connecticut, New Jersey, Massachusetts and New Hampshire.

Vermont Disposal facility siting rules recently approved by legislative committee. Other regulations necessary for a disposal facility, such as design, licensing and review standards and procedures for public comment, are being developed by the Agency of Natural Resources.

New Hampshire, Rhode Island, Puerto Rico and the District of Columbia all produce very small quantities of LLW. They are awaiting siting actions by other states and compact regions, in the hopes of negotiating access to the new disposal facilities. It is unclear what plans are underway in the state of Michigan, which was recently ousted from membership in the Midwest Compact.

LLW UP-FRONT *is a quarterly newsletter, published by the Massachusetts Low-Level Radioactive Waste Management Board.* *Submit inquiries or comments to 100 Cambridge Street, Room 903, Boston, MA 02202 or call (617) 727-6018.*

Yankee Rowe Plant is Shut Down

Yankee Atomic Electric Company recently announced its decision to permanently shut down its 185-megawatt nuclear power plant in Rowe, rather than seek U.S. Nuclear Regulatory Commission (NRC) approval to restart the facility. There were 8 years left before the utility's operating license was to expire.

Since October, 1991, the Rowe reactor had been shut down voluntarily by Yankee Atomic in response to NRC staff concerns over the testing necessary to evaluate 32 years of operation on the reactor vessel.

Yankee plans to prepare the facility for decommissioning -- ie., to remove the plant safely from service and to reduce any residual radioactivity to a level that permits termination of the license and the release of the property for unrestricted use. Decommissioning may take three or more years, depending upon the company's accessibility to LLW and HLW disposal facilities. The company does not anticipate delaying decommissioning for a decade or more, or "entombing" the waste on-site, which are the other two options besides immediate decommissioning which are allowed by the NRC.

While decommissioning activities are underway, beginning with the development of a comprehensive decommissioning plan for NRC approval, the low-level radioactive waste present at the Rowe site will remain in storage. According to Yankee's 1991 survey report to the Management Board, decommissioning will produce a total of 164,000 cubic feet of extra waste containing 10,000 curies.

All users of radioactive material that produce LLW will be storing their waste on-site after Dec. 31, 1992, when the three commercial disposal sites which currently accept LLW will close their doors to the nation. Please watch upcoming issues of **LLW Up-Front** for reports on the state's plan to monitor this waste.

Upcoming Activities

* Meeting times and locations are subject to change. Please call for directions and other details before you attend.

Low-Level Radioactive Waste Management Board Meetings
100 Cambridge St., Room 905, Boston, MA, at 10:00 a.m.

May 6, May 13, June 24, 1992.

Low-Level Radioactive Waste Management Board-sponsored Meetings with Radioactive Materials Users

Holyoke Community College
Building A, Room 311
May 28, 1992, 1 p.m. - 4 p.m.

Framingham State College
College Center Forum
June 3, 1992, 1 p.m. - 4 p.m.
(Management Board Meeting, same location and date, 11:00 a.m.)

Public Participation Position Being Filled; Activities to Resume

The Low-Level Radioactive Waste Management Board is filling the positions of Environmental Engineer I and Public Participation Coordinator, which was recently left vacant by the resignation of Harry Manasewich. Information about the positions is available from the Management Board's office, (617) 727-6018.

Once filled, the new PPC will continue the work of conducting programs on the use and characteristics of LLW, on LLW storage, treatment and disposal, and on the mandates of federal law regarding LLW management. The Public Participation Advisory Group will also be established.

Massachusetts Low-Level Radioactive Waste
Management Board
100 Cambridge Street, Room 903
Boston, MA 02202

Address Correction Requested

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 2 - Number 1 - January, 1993

The Massachusetts Low-Level Radioactive Waste Management Board

HEARING SCHEDULE

Mon., Feb. 22, 7 p.m. -- BOSTON (Gardner Auditorium, State House)

Tues., Feb. 23, 7 p.m. -- PLYMOUTH (Memorial Hall)

Thurs., Feb. 25, 7 p.m. -- WORCESTER (Worcester State College)

Tues., March 2, 7 p.m. -- SPRINGFIELD (Spfd. Tech. Comm. College)

Wed., March 3, 7 p.m. -- GREENFIELD (Greenfield Middle School)

Thurs., March 4, 6:30 p.m. -- PITTSFIELD (Pittsfield High School)

Tues., March 9, 7 p.m. -- ATTLEBORO (Hill-Roberts Elem. School)

Wed., March 10, 7 p.m. -- HAVERHILL (Northern Essex Comm. College)

State Seeks Comments On Draft Regs, Management Plan

Public input needed -- the more, the better.

Evening hearings scheduled for February and March will set state government on the path to a long-range program for the safe management of low-level radioactive waste (LLW). On January 21, culminating years of planning, the Massachusetts Low-Level Radioactive Waste Management Board, together with the Massachusetts Departments of Environmental Protection and Public Health, issued drafts of an LLW Management Plan and regulations that will shape policy decisions for years to come.

The drafts will be revised after a thorough critique from the citizens of the Commonwealth. Copies may be found at public libraries or town halls, or obtained from the Management Board (Phone 617-727-6018).

(See HEARINGS, page 4)

Jan. 21 — *Drafts Issued*

⇨

Feb. & March — *Public Hearings, Oral & Written Comments*

⇨

March 31 — *Comment Deadline*

⇨

April — *Comments Discussed* *(TO LOWER LEFT)*

May — *Regulations Revised*

⇨

June — *Regulations Adopted*

⇨

July — *Vote on Long-range LLW Management Program*

⇗ *Vote To Initiate In-state Siting Process*

OR

⇘ *Vote To Continue Seeking Out-of-state Solution*

Publication Number: 17264-4-5,000-1/93-$.12 ea.
Approved by Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Shope Brings Philosophical Environmentalism to Board

Judith Shope

Now in her tenth year as Legislative Director for the Environmental Lobby of Massachusetts (ELM), Judith Shope serves as one of the three Management Board members chosen for their training and experience in environmental protection.

Judy, who did graduate work in philosophy at Columbia University after majoring in the subject at Boston University, also brings a healthy skepticism to the Board.

"My philosophy background has marked me with a tendency to question underlying assumptions," she says. "I try to see what all the arguments are."

Born in Philadelphia, Judy spent most of her childhood in Providence. After Columbia, she and her husband settled in Wellesley. Although motherhood was her main concern then, she yearned to get involved in public issues. When her children were old enough, she threw herself into volunteer work for the League of Women Voters of Massachusetts. Soon, she found herself working with diverse interests to shape legislation, as the League's specialist for energy issues.

From preservation to pollution, there are hundreds of environmental issues that demand Judy's attention today. But one, like a Cartesian riddle, hooked her interest early and continues to intrigue -- the management of low-level radioactive waste (LLW). In the early 1980s Judy was involved in the unsuccessful attempts to create a New England compact.

"I still think multiple-state involvement is the best way to resolve the issue," says Judy, who is keeping an open mind about the possible siting of a disposal facility in Massachusetts. The Management Board is expected to vote on that question this summer.

Judy's search for a solution to the LLW disposal problem has made her a believer in "Murphy's Law" -- if something can go wrong, it will.

"The public is quite justified in being wary, since this waste has been so mishandled in the past," she explains. "We need to be always ready to re-examine issues such as radiation exposure levels. But we can't get away from the waste issue. I've never been a fan of nuclear power, but radioactive materials are vital in medicine and medical research. We can't just leave the 20th Century."

Ask Judy why a woman with a family and a successful career, a woman who loves the simple pleasures of bicycling, gardening, cooking and drawing at home, would put so much time into studying such a vexing puzzle, and she'll tell you: "I guess I just like really complex, difficult problems!"

Low-level radioactive waste can still be shipped out of state, but not for much longer.

Board Signs Contract for Barnwell Extension

Companies and institutions that ship low-level radioactive waste (LLW) out of state have been granted a maximum of 18 months of continued access to the LLW disposal facility in Barnwell, South Carolina.

Under a contract between the Management Board and the Southeast Compact Commission, the access is conditional upon the Commonwealth making progress toward a long-term disposal solution. This spring, and again in the fall, the Compact Commission will judge whether Massachusetts' efforts in that direction are worthy of continued access to Barnwell, the only disposal facility now available to Massachusetts LLW generators.

Price Hike

The agreement includes a substantial price hike for disposal at Barnwell. On top of fees levied by the facility's operator, there is now an access fee of $220 per cubic foot of waste, $160 of which will go to the state of South Carolina. This brings the overall disposal cost to at least $2,000 for a 55-gallon drum.

There is no indication that the South Carolina Legislature will lengthen the potential extension period beyond June 30, 1994. If access is denied before Massachusetts has made other arrangements for long-term LLW disposal, generators will have to store the waste on their own premises, under strict federal guidelines.

1991 Survey Report Highlights

Results of the latest annual survey of users of radioactive materials in Massachusetts show the Commonwealth as the fourteenth largest producer of low-level radioactive waste (LLW) among the 50 states, in terms of the volume of LLW shipped out of state for disposal in 1991.

In terms of the radioactivity of the shipped waste, Massachusetts ranks seventh.

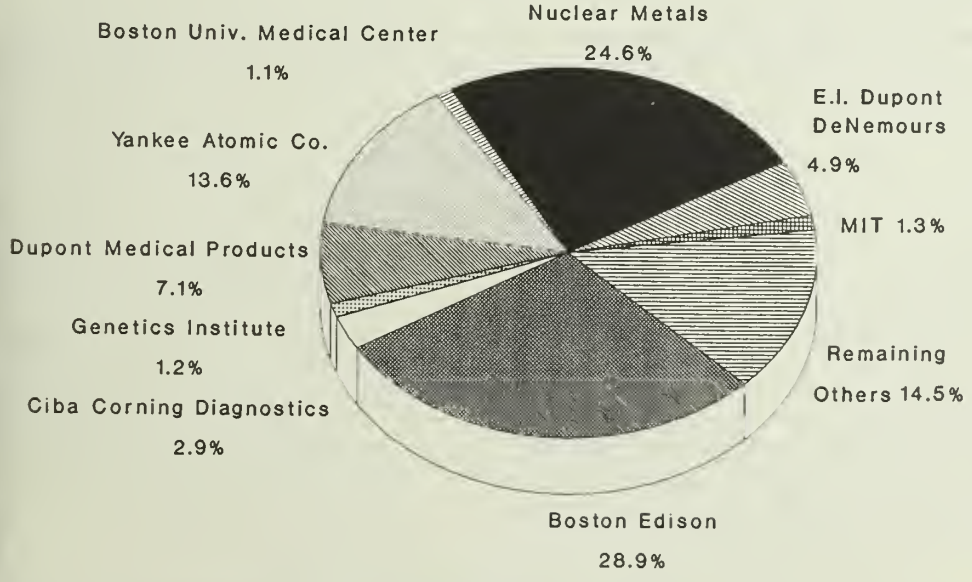
Recently published and now available to the public, the *1991 Massachusetts Low-Level Radioactive Waste Survey Report* provides a detailed view of who is producing what types of LLW in what quantities, and how the waste was managed in 1991. The data, compiled from a form sent to LLW generators, is essential to a comprehensive LLW management program. It should also prove helpful to citizens planning to comment on the draft Management Plan and regulations that would bring about such a program in Massachusetts (See page 1).

More than 450 hospitals, universities, government agencies, biotechnology firms, and other businesses are licensed to use radioactive materials in Massachusetts. Of these organizations, more than 100 shipped LLW to a disposal site in 1991. As of January 1, 1993, there is only one disposal site -- in Barnwell, South Carolina -- open to Massachusetts, and only on a temporary basis (See page 2).

Massachusetts LLW generators produced a total of 152,292 cubic feet of LLW in 1991, of which 28 percent (42,686 cubic feet) was shipped for disposal, either directly from the generator or from a treatment facility. The rest of the volume was either stored for decay on site (25.1 percent); stored for future off-site disposal (5.5 percent); or eliminated from volume calculations (41.4 percent) by means of compaction, recycling, incineration, or sewer discharge (allowed for small quantities of certain radionuclides).

By volume, most of the waste shipped for disposal was from commercial firms and utility companies (Figure 1). By radioactivity, however, the commercial sector produced more than 95 percent of the shipped waste. Almost all of the waste shipped from Massachusetts in 1991 will decay to acceptable levels within 100 years. A small amount, however, will remain radioactive for 500 years and beyond, necessitating special packaging and other measures. Such measures will be among the many subjects up for discussion at the forthcoming public hearings.

Figure 1: Generators That Shipped More Than One Percent of the LLW Shipped Out of State in 1991, By Volume [one of many illustrations in the Survey Report]



Due to a better computerized data base and extra effort by the Management Board staff, the new *Survey Report* contains some new "reader-friendly" charts and more detailed information than last year's report, including an "Economic Analysis" section. Copies of the report, in book form or on computer disk, are available free from the Management Board office.

Gov. Weld Appoints New Board Members

New Management Board members will be present for the public hearings in February and March (See page 1), now that Governor William Weld has made three appointments.

Named to fill a vacant seat which under state law must be held by someone with training and experience in the field of radiological health was Joseph Ring, of Harvard University. Dr. Ring resides in West Groton.

Mashpee attorney Michael Crossen will fill the seat requiring training and experience in public administration.

North Hadley resident Timothy W. Brennan, executive director of the Pioneer Valley Planning Commission, was reappointed to another term. One of the three Board members with training and experience in environmental protection, Mr. Brennan is the only member from western Massachusetts.

In addition to the three members appointed by Governor Weld, Secretary of Health and Human Services Charles Baker has named a new designee to attend Board meetings on his behalf. He is Francis X. Masse, of the Massachusetts Institute of Technology.

All members of the Board are required by law to represent the public interest as a whole. Except for two state cabinet secretaries, whose membership is automatic, the members are chosen by the Governor from lists of nominees submitted by organizations with statewide membership.

HEARINGS *(Continued from page 1)*

The hearings will be informal enough to allow for questions and answers. Comments on the documents need not be technical. Written comments will be accepted through March 31. The following is a list of the documents:

- The draft LLW Management Plan, a comprehensive plan for the near-term and long-term management of LLW in the Commonwealth, containing background information on the whole issue as well as choices confronting Massachusetts.

- Draft regulations to implement the Management Plan.

- Draft regulations regarding the licensing, development, operation, closure, post-closure observation and maintenance, and institutional control of any storage, treatment, or disposal facility for LLW, should the Management Board vote (after all the draft documents have been revised, finalized, and adopted) to site such a facility in Massachusetts.

- Draft regulations regarding LLW source minimization, volume minimization, and storage for decay.

- Draft siting criteria regulations for identifying potential sites, and ultimately a superior site, should the Board vote to begin the siting process.

- Draft regulations establishing criteria for the selection of a company that would operate a facility, should facility siting begin.

- A report on the public health, environmental, social, and economic impacts of LLW management practices and regulations proposed by the Department of Public Health.

Board Produces Video

"On Borrowed Time -- The Challenge of Low-Level Radioactive Waste" is the title of a new half-hour video program on this important topic.

Produced by the Management Board under contract with Boston video producer/director David Adler, the educational program shows some of the ways low-level radioactive waste (LLW) is generated in Massachusetts.

"The more people learn about the LLW disposal problem, the more likely they will be to come to a hearing," explained Ben McKelway, the Board's Public Participation Coordinator. "And the more comments we get on the drafts, the better the final regulations will be." (See page 1.)

The Management Board is encouraging local access television stations to cablecast the program throughout January and February. A VHS tape of the show can be borrowed from the Management Board office (See address below).

Mass. Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

ADDRESS CORRECTION REQUESTED

Printed on Recycled Paper

State House Library
State House
Room 341
Boston, MA 02133

The Massachusetts Low-Level Radioactive Waste Management Board

LLW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 1 - Number 3 - September, 1992

Supreme Court Nixes "Take-title"

The United States Supreme Court has taken away the biggest "club" that Congress held over the states, in the federal government's effort to compel state governments to manage low-level radioactive waste (LLW). However, other "hammers" remain.

In its 6-3 decision on *New York v. United States et al.*, issued June 19, the high court struck down the "take-title" provision of the Low-Level Radioactive Waste Policy Amendments Act of 1985. The provision would have required each state government to take title (ownership) and liability for any LLW generated within its borders, at the request of any generator, if the state had not provided for the disposal of the waste by 1996.

Federal law requiring states to take responsibility for disposing of LLW was initially adopted in 1980. It established timetables and deadlines for states to develop new LLW disposal sites, either alone or in regional compacts with other states. However, by 1985 it was clear that states would not meet the deadlines. As a result, Congress added the "take-title" provision, along with new deadlines and incentives. For instance, companies generating LLW in states that showed progress were allowed continued access and lower disposal fees at the three existing disposal sites in Washington, South Carolina, and Nevada. The law also allows these three states to exclude waste from other states after January 1, 1993.

Since 1985, with varying degrees of reluctance, states have been working towards providing for LLW disposal. Forty-two states have joined together in 10 compacts, each of which would share a disposal site. Another eight states, including Massachusetts and most other New England states, chose to make their own arrangements for disposing of LLW.

(See COURT, page 3)

"...Congress may not commandeer the States' legislative processes by directly compelling them to enact and enforce a federal regulatory program, but must exercise legislative authority directly upon individuals."

-- Justice Sandra Day O'Connor
New York v. United States et al.

Public Hearings Coming Soon to a Town Near You

The Low-Level Radioactive Waste (LLW) Management Board, the Department of Public Health (DPH), and the Department of Environmental Protection (DEP) are drafting the following documents for a series of public hearings this fall and winter:

- The LLW Management Plan (Board)
- Regulations to implement the Management Plan (Board)
- Regulations for storage, treatment, and disposal facility licensing, development, operation, closure, post-closure observation and maintenance, and institutional control (DPH)
- Regulations for source minimization, volume minimization, and storage for decay (DPH)
- Regulations for siting a facility in Massachusetts -- criteria, guidelines, and procedures (DEP)
- Operator selection criteria regulations (Board)
- Public health, environmental, social, and economic impact report of LLW management practices and regulatory programs (DPH)

Following the hearings, revisions based on comments from the public, and the adoption of final regulations, the Management Board will evaluate the options for long-term LLW management. Members will then vote to site, or not to site, a storage, treatment, or disposal facility in Massachusetts.

Publication Number: 17186-2-5,000-9/92-$.08 ea.
Approved by Philmore Anderson III, State Purchasing Agent

Board Member Profile

Killian's Business Experience "Good Chemistry" on Board

Charles Killian

Charles "Charlie" Killian, vice chairman of the Management Board, brings with him the knowledge and experience of a 42-year career in the nuclear materials business.

Charlie retired last March from E.I. duPont de Nemours and Company, a world leader in the production of radioactive tracers and other chemicals essential to biological research and medical diagnosis.

Charlie was environmental control director for the New England Nuclear (NEN) company when DuPont took over that firm in 1981. In charge of safety at NEN's facilities in Boston, Billerica, Newton, Westwood, and Worcester, he already had a working knowledge of the many U.S. Nuclear Regulatory Commission regulations concerning radioactive materials. A Boston native, he had plenty of contacts in addition to his experience. DuPont's management knew a good thing when they saw it; they promoted Charlie to manager of external affairs.

As one of the state's chief generators of low-level radioactive waste (LLW), DuPont has a special responsibility to set an example for smaller firms when it comes to the treatment, storage, and disposal of such waste. Charlie established programs to minimize the company's waste stream. In addition, by instituting an annual open house at the Billerica facility, he made every effort to reassure the residents that safe practices were in effect. He served on the Boston Fire Department's emergency planning team, and he has also trained policemen and firefighters how to respond to accidents involving radioactive materials.

It was in the early 1980s when state government first tapped Charlie's broad experience. He was named to the Special Legislative Commission on Low-Level Radioactive Waste, the group that wrote the state's LLW management law. Like the Management Board today, the Commission had members representing LLW generators, environmentalists, government, and the general public.

"Radioactive materials have proven to be an asset to saving lives and improving the quality of life," he says. "The problems with respect to waste are serious problems, but they are not unsolvable."

Though retired, Charlie is still involved in various business associations and volunteer activities. The upcoming series of public hearings on the Board's Management Plan and associated regulations will draw him away from his home in Duxbury, as he continues his service to the Commonwealth.

***LLW UP-FRONT** is a quarterly newsletter published by the Massachusetts Low-Level Radioactive Waste Management Board. Reprinting of articles is encouraged. Submit inquiries or comments to 100 Cambridge Street, Room 903, Boston, MA 02202, or call (617)727-6018.*

Waste Generators Attend July Meetings

Representatives from universities, hospitals, and biotechnology research firms were among the participants at the Management Board's semiannual meetings for all Massachusetts-based users of radioactive materials.

There were two sessions, in order to minimize travel time for those attending from each end of the state. In Holyoke July 13 and in Framingham July 15, the representatives divided into small groups to discuss with Board members timely issues including extended access to the Barnwell, South Carolina, low-level radioactive waste (LLW) disposal site; on-site storage; and the Board's annual LLW survey.

Participants expressed strong approval of the Board's work to retain access to the South Carolina disposal site. While most LLW generators are planning to enlarge their present on-site storage facilities, they would rather continue shipping their wastes to Barnwell.

Many licensees also showed an interest in the on-site-storage technical assistance project, which the Board will offer to help generators prepare for the interim period before another disposal facility is available.

A small number of the licensees volunteered to work with the Board's technical staff to "fine-tune" the annual survey of radioactive materials use and LLW production. A yearly requirement of state law, the survey gives the Management Board the data necessary to evaluate short and long-range management policy.

COURT *(Continued from page 1)*

The Supreme Court action resulted from New York State litigation challenging the federal law. New York siting officials had identified potential in-state disposal sites, but residents in those areas protested, and in 1990 the state sued the federal government, charging that the whole 1985 act unconstitutionally impinged on state autonomy. Legal briefs supporting part or all of New York's argument were filed by 17 other states, including Massachusetts.

A lower federal court had thrown out the lawsuit, but the Supreme Court, in an opinion written by Justice Sandra Day O'Connor, concluded that Congress had exceeded its authority. Congress may offer financial incentives to the states or pass legislation that displaces state laws, wrote the former Arizona state senator, but may not "commandeer the legislative processes of the states by directly compelling them to enact and enforce a federal regulatory program."

Other financial inducements and the basic framework of the federal LLW law remain in effect under the ruling, including the assignment of responsibility to each of the 50 states for LLW disposal. However, without the threat of trucks unloading drums of radioactive waste on their Statehouse doorsteps, some state governments may be more likely to drag their feet, thus avoiding controversy over the siting of new disposal facilities.

No Policy Change in Massachusetts

Massachusetts, acting through the Low-Level Radioactive Waste Management Board, accepts responsibility for planning the safe disposal, treatment, or storage of LLW produced in the Commonwealth. The Supreme Court ruling has not affected the Board's two concurrent plans: (1) to continue discussions with other states and compacts in the hope of gaining access to an out-of-state disposal site; and (2) to adopt regulations and an LLW Management Plan containing policies relating to in-state facility development, if necessary.

A series of public hearings will enable citizens to comment on the regulations and Master Plan (See box, page 1).

Photo courtesy of Chem-Nuclear Systems, Inc.

ON BORROWED TIME -- Trenches like this one in Barnwell, South Carolina, have for years accepted the lion's share of low-level radioactive waste generated by Massachusetts companies, but time is running out. Packages are stacked by forklift or by crane, depending on radiation levels.

Board Seeks Barnwell Extension

Management Board Chairman Susan Fargo has requested 18 months of continued access to the low-level radioactive waste (LLW) disposal facility in Barnwell, South Carolina, for Massachusetts businesses generating such waste.

Permission to ship waste to Barnwell will be contingent upon terms and conditions to be determined by the Southeast Compact Commission, which has offered to negotiate separate contracts with other compacts and with unaligned states, such as Massachusetts. After December 31, 1992, Barnwell and the other two LLW disposal sites in Nevada and Washington have the right, under federal law, to close their doors to states outside their respective regions. Because the South Carolina government depends on the Barnwell site for revenue, that state authorized an extension until July 1, 1994.

Although the Commission's overall "import policy" toward states outside of the Southeast had not been issued when this newsletter went to press, the guidelines are expected to require additional surcharges and link continued access to continued progress toward the construction of other disposal facilities.

At the Barnwell site, which is drier than Massachusetts, wide trenches, 20-30 feet deep, are dug in the clay soil. When filled with waste containers and sand, they are capped with layers of compacted clay, gravel, and topsoil, and grass is planted on top.

Governor Weld Proposes Bonds

Governor William F. Weld has filed a $45 million capital budget for the management of low-level radioactive waste.

Referred to the Ways and Means Committee of the Massachusetts House of Representatives, the bill authorizes the Commonwealth to issue bonds to support the cost of identifying a site within the state for a low-level radioactive waste (LLW) storage, treatment, or disposal facility, or to institute other LLW management solutions, such as a contractual agreement with another state willing to accept Massachusetts LLW in its disposal facility.

The Management Board will not vote on the siting question until public hearings have been completed on a number of LLW-related regulations of the Board, the Department of Public Health, and the Department of Environmental Protection (See box, page 1).

Board, Generators Plan for Longer On-site Storage

If Massachusetts loses access to all low-level radioactive waste (LLW) disposal facilities, the firms licensed to generate this waste may have no other choice but to store it in their own buildings.

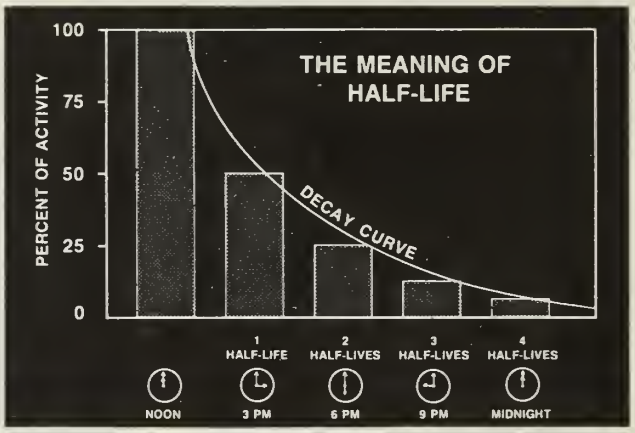
Because it would take years to site and construct an in-state disposal facility and other states have thus far shown little interest in taking Massachusetts LLW, this on-site storage scenario appears more likely with each passing month.

Technical Assistance Offered

As the lead agency for LLW management in Massachusetts, the Management Board requires assurance that the material will be stored in accordance with federal safety standards, and that all new structures and systems are in place when needed. Toward this end, a consulting firm will be hired to provide technical assistance to licensees that need to establish or expand on-site-storage programs.

All LLW generators have been notified that they should prepare to store more LLW in the future. Some firms already store such waste on their grounds, on a temporary basis. Of the 450 Massachusetts companies licensed by the U.S. Nuclear Regulatory Commission to use radioactive materials, about 110 shipped LLW out of state in 1991.

The time it takes a material to lose half of its original radioactivity is called its half-life. A quantity of the material depicted in the chart at right will lose half of its radioactivity in three hours, but half-lives of radionuclides vary from a fraction of a second to millions of years. As a radionuclide gives up its radioactivity, it often changes to an entirely different element —one that may or may not be radioactive. Eventually, this decay chain produces a stable element. Some radioactive wastes with very short half-lives can be stored for decay on the site where they are generated, for ultimate disposal as nonradioactive trash.



Source: "Understanding Radiation" U.S. Department of Energy

Brief Encounters

Although there will be time for questions and answers at the Board's upcoming hearings (see page 1), the more that citizens know about the issues ahead of time, the more productive the hearings will be for all concerned.

With this in mind, the Board is scheduling informal "briefing sessions" throughout the state. At the invitation of a local government or community group, Public Participation Coordinator Ben McKelway will appear for a short discussion about the choices confronting the Commonwealth regarding LLW.

To arrange for a briefing session in your community, call the Board's Boston office at (617)727-6018. Or you can send us a message by FAX to 617-727-6084, or by mail to 100 Cambridge Street, Room 903, Boston, MA 02202.

Mass. Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

ADDRESS CORRECTION REQUESTED

Printed on Recycled Paper

State House Library
State House
Room 341
Boston, MA 02133

The Massachusetts Low-Level Radioactive Waste Management Board

LLW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 2 - Number 2 - May, 1993

More Briefing Sessions Planned

Board Extends Comment Period to July 15

The Massachusetts Low-Level Radioactive Waste Management Board and the state Departments of Public Health and Environmental Protection have extended the deadline for comments on the draft Low-Level Radioactive Waste Management Plan and associated draft regulations. The new deadline is July 15.

If you have already commented at a hearing or by letter, you can use the extra time to elaborate on your comments (the more specific, the better), or to comment on a different document altogether if you wish.

If you have not yet commented, the deadline extension gives you time to do so. Copies of the draft documents may be obtained by phoning the Management Board office at (617)727-6018 or writing to the address on Page 4. If you have finished your review of the documents, please pass them on to a friend or neighbor who may be interested.

Because of the time needed to summarize and discuss the comments received from the public, and to revise the draft documents as deemed necessary by the Management Board and the two departments, the Board's vote on whether or not to site a low-level radioactive waste facility in Massachusetts is now expected in December, 1993, or January, 1994.

In an effort to reach new people, the Management Board will be holding eight more informal meetings, called briefing sessions, around the state in May and June. Questions will be welcomed after a brief presentation, and comments received at these meetings will be given the same weight as comments received at the public hearings held in February and March. In three towns -- Athol, Concord, and Brockton -- the Board will also hold a regular business meeting, including a public comment period, earlier in the day. The schedule is as follows:

Wednesday, May 12: Athol
1 p.m.: Board meets in Memorial Hall, 584 Main St.
7 p.m.: Briefing session, same room.

Thursday, May 13: North Adams
7 p.m.: Briefing session in City Hall Council Chambers, 10 Main St.

Tuesday, May 18: Palmer
7 p.m.: Briefing session at new Palmer High School, Main St.

Wednesday, May 26: Concord
1 p.m.: Board meets at Ripley School Little Theater, 120 Meriam Rd.
7:30 p.m.: Briefing session, same room.

Thursday, May 27: Worcester
7 p.m.: Briefing session at YWCA, One Salem Square.

Wednesday, June 2: Lee
7 p.m.: Briefing session at Lee Senior Citizens Center, Airoldi Building, 45 Railroad St.

(See EXTENSION, page 4)

Photo by Francisco Samuel

Attleboro Mayor Judith Robbins, shown here at the March 9 hearing in her city, was one of many speakers who urged the Management Board not to rush the adoption of the Management Plan and associated regulations.

Publication No. 17347 - 4 - 6000 - .06 - 5/93 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Public Service a Full-Time Job For "Westerner" Tim Brennan

Tim Brennan

"I've got public servant in my blood," says Tim Brennan, one of the Management Board's busiest members and the only representative from western Massachusetts.

As executive director of the Pioneer Valley Planning Commission, Tim knows how volunteer boards can work for the public good. From its office in West Springfield, the Commission and its staff coordinate a variety of programs for a 43-town region with a population greater than the whole state of Vermont. The challenge is to preserve and enhance the region's character and quality of life.

Tim puts in long hours, often at evening meetings, to convince public officials and local citizens that bylaws providing groundwater protection, affordable housing, conservation land, public transportation, and other such investments in the future are worthy endeavors. He often has to navigate through a labyrinth of federal, state, and local bureaucracies.

The North Hadley resident is attuned to the prevailing impression that Boston policymakers tend to neglect western Massachusetts. "There is a sense people often have that they are disenfranchised," he says. "It's there, it's felt, and it's real. These are my neighbors." Appointed originally by Governor Dukakis and reappointed by Governor Weld, he serves as one of three Management Board members chosen for their training and experience in environmental protection.

Tim fell in love with the Pioneer Valley when he came to Amherst for graduate school at the University of Massachusetts. After growing up in New Jersey, he was impressed with the valley's natural beauty, historical character, and diverse population. The region includes the city of Springfield as well as picture-book New England church-steeple towns.

Soft-spoken and articulate, Tim has a way of distilling an issue to its essence. He is courteous, almost courtly, but he has some firm opinions about why government should be involved in the management of low-level radioactive waste:

"There's no getting around the fact that this waste is being generated. We're using the products and services. Until such time as we learn to produce none of it, we've simply got to deal with it; it's a collective responsibility. And because we want to maintain the highest standards of public health and safety, government has to be involved. Because we've had the luxury of sending the waste out of state, we've had the luxury of not thinking about it. Now that those days are almost over, we have to take responsibility."

LLRW News From Other States

All across the country, intense public opposition combined with 20/20 hindsight have stalled or slowed efforts to construct new disposal facilities for low-level radioactive waste.

The controversial issue takes a different twist in every state or compact that tangles with it. Here is a cursory update on some recent newsmakers:

In **Nebraska**, the state chosen by the Central Interstate Compact to build the compact's first disposal facility, Governor Ben Nelson has voiced doubts that the necessary consent was obtained from the sited community, and has filed suit against his own compact's commission to stop the siting process. The Nebraska Departments of Health and Environmental Quality have announced their intent to deny the license application for the facility, due to wetlands on the site. The situation caused the Southeast Compact Commission to terminate the contract that allows generators of low-level radioactive waste in the Central Compact states to ship their waste to its South Carolina disposal facility, effective July 1.

After spending $85 million to plan for a disposal site that was eventually rejected on scientific and procedural grounds by a special panel, **Illinois** is starting its site selection process over again. Illinois and Kentucky form the Central Midwest Interstate Compact.

In **New York**, five previously identified sites are on hold while the state studies disposal technologies. Legislators are considering a bill to use the old West Valley disposal site. A government panel is also examining the feasibility of a centralized storage facility for Class A low-level radioactive waste from the state's medical and academic generators.

Connecticut is going forward with a new voluntary siting process; the selected site must be approved by local

(See OTHER STATES, page 3)

OTHER STATES

(Continued from page 2)

referendum. A previous siting process had selected three sites on scientific grounds, but Governor Lowell Weicker terminated that unpopular process last year. Connecticut recently offered a $100 million up-front payment to Texas, in hopes of gaining access to that state's planned disposal facility.

A **Texas** facility that would take waste from other states remains a hope for Vermont and Maine as well. Both have been negotiating for a possible deal with the Lone Star State, and a bill before the Texas legislature would make Texas, Vermont, and Maine the initial parties in a new interstate compact. The Texas Low-Level Radioactive Waste Disposal Authority has submitted a license application for the 16,000-acre site identified earlier by the legislature.

Generators of low-level radioactive waste in **Maine** are without access to a disposal site because state law requires a referendum before a contract with the Southeast Compact Commission (like the contract that preserves access to the South Carolina facility for Massachusetts generators) can take effect. The Maine legislature is considering a waiver of that requirement until the November ballot. In other news, Maine has narrowed its number of candidate disposal sites from twelve to six, while continuing talks with Texas (See above).

Vermont has been holding a series of meetings in the town of Vernon, which will be one of three towns with a candidate disposal site. The final site must be approved by the state legislature and the host town. See above for news of a possible link-up with Texas.

California's Ward Valley disposal site is beleaguered by lawsuits regarding land transfer procedures and the area's endangered desert tortoise. A re-evaluation of the transfer of the 1,000 acres of public land from federal to state government is expected to delay the project another six to nine months.

Questions We Hear...

Below, in italics, are three of the many questions that have arisen at Management Board hearings and briefing sessions around the state:

Why should government be involved in the disposal of low-level radioactive waste?

Federal laws passed in 1980 and 1985 require state governments to coordinate and oversee the process. Although the companies and institutions that generate low-level radioactive waste could store their waste on their own premises, this would result in more than a hundred de facto storage sites in Massachusetts -- this is not considered to be the safest scenario for long-term waste isolation.

MB Hires Dames & Moore For Storage Guidance

The Management Board has hired the consulting firm of Dames & Moore to assist in the review and evaluation of interim on-site storage programs on the premises of businesses and institutions that generate low-level radioactive waste in Massachusetts.

In the likely event that states outside the Southeast lose access to the Barnwell, South Carolina, disposal facility July 1, 1994, the Board wants to make sure that Massachusetts generators are prepared, in compliance with all U.S. Nuclear Regulatory Commission licensing specifications, for the period between the cutoff and the availability of another disposal facility.

Dames & Moore has extensive experience in the waste management area, including assistance to the New York State Energy Research and Development Authority.

The program will have two major aspects. Technical and regulatory information will be distributed to Massachusetts generators, and some generators that presently ship low-level radioactive waste for disposal in South Carolina will be visited for a discussion of their plans for interim storage of such waste.

A centralized facility, along with the property it is built on, would be owned by the Commonwealth. However, the waste generators and the facility operator would remain liable for any problems.

If the Management Board votes to start the siting process, why should taxpayers be expected to contribute to the costs?

Like highways and airports, centralized waste management facilities can be seen as part of the society's basic infrastructure. In striving for the safest, most efficient system, public funding can help ensure a solution that is in the public interest. Another point to consider: businesses that generate the waste, if saddled with the tab for siting a facility, could pass on costs to consumers anyway, through their products and services. Finally, there is concern that high assessments to the waste generators could force some businesses to leave the state. The decision on how or whether any siting funds would be reimbursed to the Commonwealth could be made by the Legislature, if it approves a bond authorization or some other funding method. Or, it could be made later through an agreement between the Commonwealth, the facility operator, and the generators.

What would an in-state disposal facility look like?

Representatives of the site community would choose the final design in the course of negotiating a contract with an operating company. It could be a mined, concrete-lined cavity, an above-ground structure, or a near-surface structure, but in no case can it be just a trench in the ground -- simple burial of this waste is prohibited by state law. One design calls for large concrete vaults containing concrete cells in which different types of low-level radioactive waste could be isolated, monitored, and retrieved if necessary. A surface or near-surface facility might be mounded with earth and landscaped. Related structures such as offices and service buildings would look like similar commercial structures in an industrial park.

EXTENSION *(Continued from page 1)*

Thursday, June 10: Harvard
7 p.m.: Briefing session at Harvard Elementary School "Cafetorium," 27 Massachusetts Ave., Harvard.

Wednesday, June 16: Brockton
1:30 p.m.: Board meets in Lewison Board Room of the Student Union Building, Massasoit Community College, One Massasoit Blvd.
7 p.m.: Briefing session in classroom (to be announced).

Please note: It would be best to call the Management Board office at (617)727-6018 the week of the session you plan to attend, to confirm the date, time, and location.

Written comments will be accepted through July 15, and should be sent to the office of the Management Board (address below). Comments regarding only proposed DEP or DPH regulations should be sent to the appropriate agency, whose address appears on each document cover.

Mailing List Update

If you want less or more in the mail than you are currently receiving from the Management Board, let us know! Just fill out this form by checking only the things you want on a regular basis and send it to: Low-Level Radioactive Waste Management Board, 100 Cambridge Street, Room 903, Boston, MA 02202. *(If you don't send the form, you'll keep getting what you're getting now.)*

☐ Newsletter

☐ Board Meeting Agendas

☐ Board Meeting Minutes

☐ Other (Please specify): _____

☐ Mail from the Board is reaching me, but you've got my address wrong -- see my correct address below.

☐ Please remove my name from all Management Board mailing lists.

Name (Please print): _____

Full Address: _____

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

ADDRESS CORRECTION REQUESTED

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 2 - Number 3 - Fall, 1993

Board, DEP, DPH Mull Public Comments

Three state agencies are going over hundreds of comments received from the public on the subject of managing low-level radioactive waste (LLRW) generated in Massachusetts.

Some of the comments, received from January to July at hearings and briefing sessions, by mail, and by telephone, could influence the Departments of Public Health and Environmental Protection to revise their draft regulations dealing with how an in-state facility for the treatment, storage, or disposal of the waste would be sited, licensed, and operated.

Other comments will result in revisions to the Draft Low-Level Radioactive Waste Management Plan, the overall plan for dealing with short- and long-term LLRW management. Generators of the waste expect to lose access next year to the South Carolina disposal facility where much of the Commonwealth's LLRW is currently shipped.

The Low-Level Radioactive Waste Management Board makes all its decisions at regular public meetings, so citizens still have the opportunity to tell the Board how they think the Management Plan can be improved. The Board usually meets in Room 905 of the Saltonstall Building, 100 Cambridge Street, in Boston. The next five Board meetings are scheduled for that location at 10 a.m. on the following dates:

Upcoming Management Board Meetings

- **October 13**
- **October 27**
- **November 10**
- **December 8**
- **December 22**

The comments have been summarized and grouped by the Management Plan chapters to which they apply. The Board's schedule calls for the Management Plan and the regulations to be adopted and reprinted by December or January. A separate report will summarize the comments and all agency responses.

The public comments, which came from businesses, environmental groups, and municipal boards as well as individuals, covered many topics relating to LLRW management, including the roles of state and local governments, liability, health effects, hydrology, and the all-important question of whether Massachusetts needs its own disposal facility. While some commenters opposed such a facility, others urged the Board to begin the siting process. Several commenters asked the Board to stop using "LLW" as an abbreviation for low-level radioactive waste, asserting that it misled the public to leave out reference to the word "radioactive." On August 11, the Board voted to switch to "LLRW."

The biggest block of comments came in the form of a petition submitted just before the July 15 deadline by the citizens' group MASS A.L.E.R.T. (Massachusetts Alliance to Limit and Eliminate Radioactive Trash). More than 3,300 people signed the petition, which opposed a $45 million legislative proposal to have the public finance the costs of arranging for long-term access to a disposal facility (See Page 2). The petition also called for public hearings on the health effects of exposure to radioactive wastes and urged the Board to emphasize efforts to reduce and prevent the generation of such wastes in the first place.

In January or February, at the end of a widely publicized public hearing, will come the long-awaited vote on siting. If six of the nine Board members vote to begin the search for a suitable site for an in-state LLRW facility, the search would begin.

printed on recycled paper

Publication No. 17433 - 4 - 6200 - .07 - 9/93 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Ring's Scientific Knowledge An Asset to Management Board

Joe Ring

Under state law, one member of the Management Board must have professional training and experience in the field of radiological health. As senior health physicist for Harvard University, Groton resident Joe Ring is well-suited for that position.

Joe oversees the use of radioactive materials in various Harvard research laboratories, helping to design life-science experiments that trace atoms through living tissue in test animals and microorganisms. His responsibilities include worker protection, environmental monitoring, and management of the university's low-level radioactive waste (LLRW).

And then there is teaching, at Harvard's School of Public Health and the Lowell campus of the University of Massachusetts. It was on that campus, when it was called the University of Lowell, that Joe earned his master's degree in radiological sciences and protection and his doctorate in physics. Before he was hired by Harvard, he worked at Yankee Atomic Environmental Lab, in Westborough.

Growing up in Marshfield's Green Harbor section, Joe watched the construction of Pilgrim Station, Boston Edison's nuclear power plant across the bay in Plymouth. He worried about health effects from the plant's emissions, and could not have guessed that he would one day do a graduate school internship at the power plant itself.

Experience has given him the perspectives of both a concerned individual and a scientist. However, Joe acknowledges the limits of science. For one thing, he points out, it is often confusing.

''For example, the limits for releases of radionuclides to the environment are set by using complicated mathematics to calculate the maximum potential dose,'' he explains. ''The person assumed to be at risk is a hypothetical person who would spend all his or her time at the area of the maximum dose rate, eat only food that contained the greatest amount of radioactivity, and get all his/her water from the most contaminated area. In reality, there is no such person -- that's one thing that makes the whole issue so complex.''

"The subject of radiation exposure is a very difficult one," says Joe. "Science is only one aspect of the picture, and there is even debate among scientists. The interests of the public must be considered. The best policy is to continuously review the exposure risks. In the end, we have to make sure that we make the best decisions we can. I look forward to working with my fellow Board members and the public for the responsible management of LLRW."

Board Schedules Seminar on Health Effects

The Management Board will hear presentations from a panel of experts on low-dose radiation at a special seminar Wednesday, November 3, from 7 to 11 p.m. in Amphitheater 2 at the University of Massachusetts Medical Center in Worcester (55 Lake Avenue North).

The seminar is open to the public, who will be encouraged to question the panelists after the Board members have finished examining them, Congressional-hearing style, to clarify points that may be helpful to the Board in revising Chapter 3 ("Radiation Sources, Health Effects, and Protection Standards") of the draft Low-Level Radioactive Waste Management Plan.

The panel, selected to represent differing viewpoints, will address issues relating to the question, "What health effects can be expected from exposures to ionizing radiation at levels within U.S. Nuclear Regulatory Commission dose limits for protection of the public?"

$45 Million Bond Bill In House Committee

A legislative bill that would authorize up to $45 million dollars in bonds for future low-level radioactive waste (LLRW) management decisions has been amended to require reimbursement from the generators of the waste.

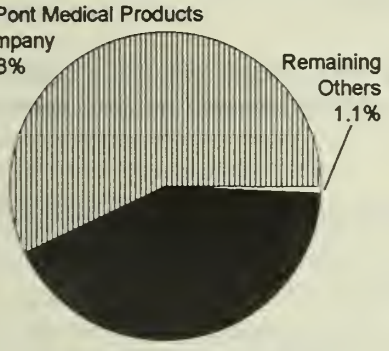
The bond money would cover the costs of identifying an LLRW facility site in Massachusetts or the costs of negotiating a contract with another state, depending on the path chosen by the Management Board.

After a June hearing, the Legislature's Joint Committee on Natural Resources and Agriculture amended the bill and sent it on to the House Ways and Means Committee. Interested people should make their views known to this committee; the bill could evolve further as it makes its way toward a final floor vote.

Highlights of 1992 *Survey Report*

Decommissioning and remediation projects boosted the amount of low-level radioactive waste (LLRW) shipped out of state in 1992.

The totals, measured by volume (cubic feet) and by radioactivity (curies), came to 119,004 cubic feet (up from 42,686 in 1991) and 76,363 curies (up from 32,531 in 1991).

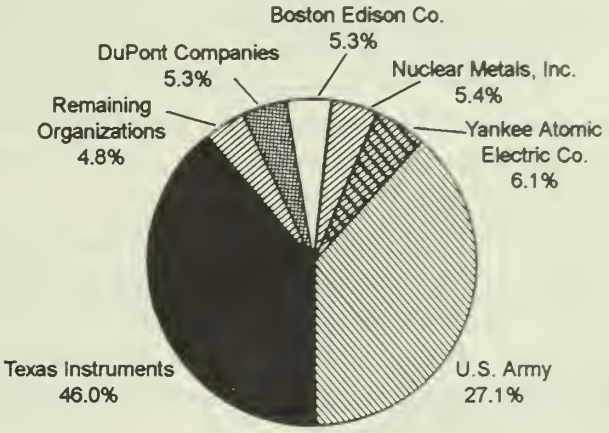


Generators That Shipped More Than One Percent of the LLRW Shipped Out of State in 1992, by Radioactivity

The figures are from the soon-to-be-published *1992 Massachusetts Low-Level Radioactive Waste Survey Report*, which provides a detailed summary of who is producing what types of LLRW in what quantities, and how this waste was managed in 1992. Compiled from a questionnaire sent every year to the more than 400 businesses and institutions licensed to possess radioactive materials in Massachusetts, the data are essential to the Management Board's planning efforts.

Most of the additional radioactivity in last year's waste stream was from 115 cubic feet of irradiated reactor hardware containing 32,080 curies, shipped by Yankee Atomic Electric Company from its closed nuclear power plant in Rowe to the Barnwell, South Carolina, commercial disposal site.

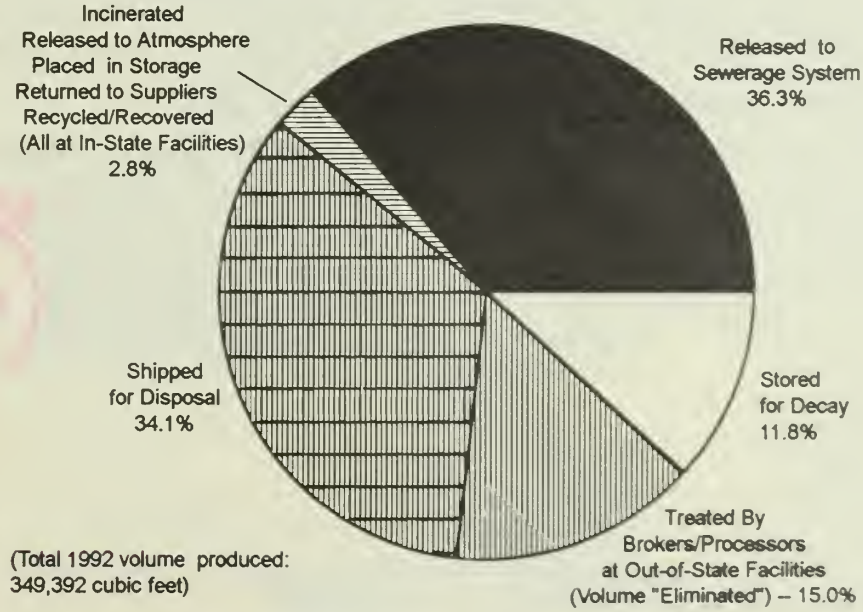
Most of the additional volume of LLRW was from the decommissioning of the U.S. Army Materials Technology Laboratory test reactor at the Watertown Arsenal in Watertown and from a Texas Instruments, Inc., remediation project in Attleboro. These projects produced large quantities of low-radioactivity waste typically comprised of soils and building rubble. Texas Instruments shipped 48 rail cars holding 54,719 cubic feet containing 0.765 curies to the Envirocare disposal site in Clive, Utah. The Army shipped 32,291 cubic feet containing 76.2 curies to South Carolina.



Generators That Shipped More Than One Percent of the LLRW Shipped Out of State in 1992, by Volume

Of the organizations surveyed, 263 (60 percent) said their use of radioactive materials generated LLRW. The remainder said they produced no waste or did not possess radioactive materials in 1992. Of the 263 waste generators, 106 indicated they had shipped at least a portion of their waste out of state during 1992. Some of this waste is reduced in volume through treatment processes, including compaction and incineration, at out-of-state treatment facilities before it is disposed of. The other generators said they managed their waste by other methods in 1992 -- storage for decay, storage for future shipment, in-state incineration, return to manufacturer/supplier, recycling/recovery, atmospheric release, and sewerage system disposal.

The new *Survey Report* includes more detailed information regarding the radiological characteristics of the Massachusetts waste stream. Copies of the report, in book form or on computer disk, are available from the Management Board office .



Disposition of 1992 Massachusetts LLRW Volume -- by Management Method

Volunteers Help Shape Public Participation

Thirteen volunteers with diverse viewpoints have been advising the Management Board's Public Participation Coordinator, Ben McKelway.

Required by the Massachusetts Low-Level Radioactive Waste Management Act, the Public Participation Advisory Committee (PPAC) provides advice on the Board's public information programs. The group first met last January to discuss ground rules and publicity for the public hearings on the draft Management Plan and draft regulations. The focus of their second meeting in March was a discussion of the system for summarizing public comments for review by the Management Board.

McKelway also consults PPAC members by mail or telephone whenever he needs input on public information programs, such as the upcoming panel discussion on radiation health effects in Worcester (See Page 2). At its next meeting, the committee will plan ways to help secondary school science teachers teach about radioactive materials.

Here's who serves on the PPAC:

Philip Connors, physics and engineering professor at Massachusetts Maritime Academy, from Princeton.

Stanley Fielding, senior environmental scientist with Engineering Science, Inc., from Wilmington.

Elizabeth Hildt, free-lance television producer and writer, from Newburyport.

Mary Lampert, community organizer and former teacher, from Duxbury.

Dale MacLeod, past coordinator of the Citizens Awareness Network, from Shelburne Falls.

James Muckerheide, Massachusetts State Nuclear Engineer, from Needham.

Kent Portney, political science professor at Tufts University, from Newton.

Robert Rottenberg, administrator for the Franklin County Solid Waste Management District, from Greenfield.

Leonard Smith, health physicist with the Medical Products Department of E.I. DuPont de Nemours & Co., Inc., from Boston.

Thomas Sowdon, chief radiological scientist with the Boston Edison Company, from Plymouth.

David Steindler, antiques dealer and chairman of the Southern Berkshire Solid Waste Management District, from Sheffield.

James Tocci, radiation protection officer at the University of Massachusetts, from Belchertown.

Murray Watnick, senior radiologist at Noble Hospital, from Longmeadow.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

ADDRESS CORRECTION REQUESTED

Printed on Recycled Paper

BOSTON OCT 07'93 MA PB METER 7003395 $0.29 U.S. POSTAGE

Michael L. Davis
2 LaRose Pl., Apt. 7
Brighton, MA 02135

DAVI0002% 0213533334 1992 10/08/93
FORWARDING TIME EXPIRED
DAVIS
6AP PLEASANT ST
FRAMINGHAM MA 01701-2803
RETURN TO SENDER

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 3 - Number 1 - Winter 1993-94

Board To Consider Siting Options Feb. 16

The long-anticipated decision on whether or not to commence the siting process for an in-state low-level radioactive waste (LLRW) disposal facility hinges on a vote scheduled for Wednesday, February 16, by the Low-Level Radioactive Waste Management Board.

Immediately preceding the vote will be a public hearing, beginning at 10 a.m. in Hearing Room A-1 at the State House, in Boston. A two-thirds vote of the Board (six of nine members) is required to begin the siting process.

The Board's Management Plan and various regulations have been adopted by the Board and the state Departments of Public Health and Environmental Protection, so the Board is now authorized to choose one or a combination of short- and/or long-range policy options for LLRW management under the authority of Massachusetts General Laws Chapter 111H, the Massachusetts Low-Level Radioactive Waste Management Act.

These options include:

- Continuation of efforts to negotiate out-of-state disposal solutions.
- Interim storage of all LLRW at the various sites where this waste is generated, for at least five years.
- Initiation of in-state siting to identify a location for a centralized LLRW storage facility that would receive waste for at least five years.
- Initiation of in-state siting to identify a location for an LLRW disposal facility.
- Postponement of action.

If the Board does not vote to begin the in-state siting process, the Southeast Compact Commission (SECC) may deny Massachusetts LLRW generators access to the LLRW disposal facility in Barnwell, South Carolina. The SECC has indicated it needs evidence that Massachusetts intends to comply with the federal law that gives each state the responsibility for devising a long-term plan for LLRW disposal.

The Commonwealth's contract with the SECC is anticipated to expire anyway on June 30, in accordance with the Commission's intent to close the Barnwell facility on that date to states that don't belong to the Southeast Compact.

However, there are some indications that the Barnwell site may continue to accept out-of-region LLRW beyond June 30, and the Management Board, which successfully negotiated a contract with the SECC, may seek to extend access for the Commonwealth's generators.

If the Board votes to begin the in-state siting process, the earliest a disposal facility could begin operation would be around the year 2,000. It would accept LLRW for 30 years or more. Until then, if there is no other disposal facility available to Massachusetts generators, they

(See SITING VOTE, page 2)

OVERHEAD PREDICTION -- Panelists at the November 3 seminar on the health effects of low-dose radiation discussed risk assessment, but there were no hard numbers. Story on page 3.

Publication No. 17492 - 4 - 6600 - 1/94 - .10 - C. R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Former Activist Barry Connell Now Works on the Inside

Barry Connell

"Some of my old friends think I've sold out," says Barry Connell, an example of the idealist turned policymaker.

At 42, Barry is an original member of the Management Board, chosen in 1988 by former Governor Michael Dukakis for his training and experience in environmental protection. Formerly science department chairman of a public school system, the Newburyport resident now works for Dana Duxbury & Associates, a firm specializing in solid and hazardous waste management.

In the late 1970s Barry organized a group of local residents opposed to the construction of the Seabrook nuclear power plant, just across the border in New Hampshire.

"I was trying at first to work outside the traditional political process," says Barry. "What I found was an industry that had manipulated the political system under the protective shroud of 'national defense.' But I had faith that you could use the political process and make it work in the public interest, so I stopped banging my head against the wall."

The "wall" began to take notice. In 1982, Barry was a director of the successful campaign for a statewide referendum that requires voter approval before a new reactor or nuclear waste storage, incineration, or disposal facility can be sited in Massachusetts. It passed by a greater margin than the Bottle Bill or Proposition 2½.

"The referendum gave those of us on the outside a chance to step up to the table, to demand closer scrutiny of the nuclear industry, to have a hand in how decisions are made," Barry asserts.

In 1983, he went to work at the State House, as staff director for a state representative. He was appointed to the special commission that wrote the Massachusetts Low-Level Radioactive Waste Management Act (Chapter 111H). He met Saturday mornings with Governor Dukakis, eventually convincing him to oppose the licensing of Seabrook, on the grounds of inadequate emergency plans.

"Most of it never got to court," Barry explains. "Whenever it became clear that Seabrook was not in compliance with the rules, the U.S. Nuclear Regulatory Commission (NRC) would just change the rules. I'm a very harsh critic of the NRC; I don't think they have taken their role as regulator very seriously."

And so it goes, not too easily, working within the system. The non-profit C-10 Foundation which he helped found in the mid-1980s conducts radiological monitoring of Seabrook under contract to the state Department of Public Health. And, technically, Barry's term on the Board expired in July. He has requested reappointment.

The former outsider walks a political tightrope, balanced between environmental idealists and an entrenched industry. "I don't believe the interests of the public and the nuclear industry are incompatible," he says. "It's going to take a lot more work, however, to find the point where they meet."

SITING VOTE *(Continued from page 1)*

will have to store their waste on their own premises.

In 1992, 106 Massachusetts companies and institutions produced LLRW long-lived enough to require long-term isolation. An additional 157 generators are storing short-lived waste on site, to allow it to decay to a nearly non-radioactive state for disposal as regular trash.

This newsletter story serves as the notice to interested parties, pursuant to M.G.L. c.30A, of the Management Board's intent to conduct the vote on possible initiation of site selection. Written comments on the Board's pending action will be accepted through the public hearing February 16, and may be sent to Board Chairman Charles Killian at the Board's office, 100 Cambridge Street, Room 903, Boston, MA 02202. For more information, call the office at (617) 727-6018.

Legislature Passes LLRW Bond Bill

A bill that authorizes $45 million dollars in bonds for future low-level radioactive waste (LLRW) management decisions was one of the last items passed by the 1993 session of the Massachusetts Legislature the night of January 4.

Once the bill is signed by the Governor, the bond money could cover the costs of identifying an LLRW facility site in Massachusetts, or the costs of a contract for disposal, storage, or treatment of LLRW at a facility in another state. Funds expended would be reimbursed by LLRW generators after the year 2000.

There was lobbying by all sides right up through the last day. The bill that passed the House of Representatives in December contained language that apparently would have set limits and conditions on the amount of reimbursement required from the generators. Another section would have added two new seats to the Management Board. The Management Board voted December 22 to lobby against these two passages, and both were removed from the Senate version and the final bill.

Board Hosts Health Effects Seminar

Eighty people attended a four-hour panel discussion on the health effects of low-dose radiation November 3 in Worcester. Arranged by the Management Board at the request of interested citizens, the seminar took place in a lecture hall at the University of Massachusetts Medical Center.

The four panelists agreed there is no hard scientific proof of adverse health effects from exposure to radiation at very low doses (1 to 25 millirem) -- the levels of interest to the Management Board which pertain to the maximum annual exposure allowed from a low-level radioactive waste disposal facility. However, the experts differed in their interpretations of data on the effects of higher doses, and in their extrapolations of data from higher-dose effects to potential lower-dose effects. Their spirited discussion sparked questions from the Board and the audience. The audience tended to be skeptical of the nuclear industry in general and wary of an LLRW facility in particular.

The panelists were **Richard W. Clapp**, Sc.D., an epidemiologist and director of Boston's JSI Center for Environmental Health Studies; **John B. Little**, M.D., a radiologist and professor of radiobiology at Harvard School of Public Health and director of Harvard University's Kresge Center for Environmental Health; **Edward W. Webster**, Ph.D., a physicist and director of the Radiological Sciences Division of Massachusetts General Hospital and a professor of radiology at Harvard Medical School; and **Steven B. Wing**, Ph.D., an epidemiologist and assistant professor at the University of North Carolina.

EMPANELED -- Panelist Richard Clapp (hand raised) makes a point during the four-hour discussion. Looking on at left are panelists Edward Webster and John Little. To the right are panelist Steven Wing and moderator Stanley Adelstein.

Stanley J. Adelstein, M.D., Ph.D., who is a professor of medical biophysics and dean for academic programs in the faculty of medicine at Harvard Medical School, served as moderator.

At its November 10 meeting, after reading scientific papers in the field, the Management Board adopted a policy statement that says federal and state health protection standards are "believed to be adequate, based on current knowledge and acknowledgment of scientific uncertainty regarding the health effects of ionizing radiation at very low doses (1-25 millirem), such that development of LLRW facilities can proceed if the Board votes to develop such facilities in the Commonwealth." The Board resolved that it will "actively monitor radiation health studies, and related science and technology, and will revise development plans and standards as required to reflect the latest information."

To borrow the November 3 program on VHS cassette, write to the Management Board at 100 Cambridge Street, Room 903, Boston, MA 02202, or call (617) 727-6018.

"AND FOR MY NEXT HOUR . . ." -- Dr. John Little gave a concise, informative presentation but teased the audience that he would exceed his time limit. His dry wit had Management Board Member Dr. Joseph Ring reaching for the ice water pitcher. Panelist Steven Wing is to the left.

Publications Available

Several publications relating to LLRW management are or soon will be available, free of charge, to the public. For Management Board publications, simply put a check mark by the titles of the documents you need, then mail this whole page back to us -- our address is in the black-bordered box below. *If you have ordered documents previously, they will be sent; please don't duplicate the order here.* Management Board publications are:

___ **1992 Massachusetts Low-Level Radioactive Waste Survey Report** (detailed summary of who produced LLRW in what quantities in 1992, and where it went)

___ **1993 Annual Report – Volume I** (overview of Management Board activities in 1993)

___ **1993 Annual Report – Volume II** (minutes of 1993 Management Board meetings)

___ **Public Comment Response Report** – comments from the public on draft LLRW Management Plan and related regulations, with responses from the Management Board, the Department of Public Health (DPH), and the Department of Environmental Protection (DEP)

___ **LLRW Management Plan** (comprehensive near- and long-term plan, containing background information, management options, etc.)

___ **LLRW Management Plan Implementation Regulations** (345 CMR 1.00) (regulations effectuating the Management Board's policies contained in the plan)

___ **LLRW Facility Operator Selection Criteria Regulations** (345 CMR 3.00) (regulations establishing criteria for the selection of a company that would operate an in-state LLRW facility, should facility siting occur)

___ **Overview of the Massachusetts Low-Level Radioactive Waste Management Act (M.G.L. Chapter 111H)** (summarizes the law)

DPH and DEP regulations regarding LLRW management may be purchased from the State Bookstore; State House, Room 116, Boston, MA 02133; telephone (617)727-2834 [in western Massachusetts call (413)784-1376]. The regulations are:

DPH Licensing and Operational Regulations for LLRW Facilities (105 CMR 120.800) (regulations regarding licensing, development, operation, closure, and other phases of an in-state LLRW facility)

DPH LLRW Minimization Regulations (105 CMR 120.890) (regulations encouraging LLRW minimization)

DEP LLRW Facility Site Selection Criteria Regulations (310 CMR 41.00) (regulations spelling out methods for identifying potential sites for an in-state LLRW facility)

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

FORWARD AND ADDRESS CORRECTION

The Massachusetts
Low-Level Radioactive Waste
Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board
Volume 3 - Number 2 - Spring 1994

Siting Process Begins for LLRW Disposal

The Low-Level Radioactive Waste Management Board voted February 16 to begin the siting process for an in-state disposal facility for low-level radioactive waste (LLRW). At the same time, the Board voted to keep seeking an out-of-state disposal agreement, a possibility that would make an in-state facility unnecessary.

Other motions passed the same day committed the Board to pressing for further minimization of LLRW generated in the Commonwealth, and to possibly lobbying Congress for changes in federal LLRW law.

The votes came after a public hearing in the State House, attended by more than 100 people. Of the 48 who spoke their views, all but eight were opposed to siting. Some threatened civil disobedience in the future. The siting motion passed the Board by a vote of six to three. The yeas came from Warren Church, Michael Crossen, John Mayer, Joseph Ring, Leo Roy, and Chairman Charles Killian. The nays were from Timothy Brennan, Barry Connell, and Judith Shope.

In the discussion leading up to the siting vote, Brennan said he would only vote to site a temporary in-state storage facility. Shope said the siting process would be divisive and expensive. She suggested putting off the decision for two years and mounting a more aggressive campaign to negotiate an out-of-state solution. She also said she did not feel any Board member voting to initiate siting was "any less environmental" for taking that position.

Connell said monitorability and retrievability of LLRW (required in Massachusetts) should be minimum standards, and that negotiations for an out-of-state disposal solution should not continue if the design of the other state's facility does not meet those standards. The rest of the Board wouldn't go that far, but did vote to establish, by April 16, guidance for conducting such negotiations.

SPEAKING UP – Ruth Rowley, a member of the Duxbury Board of Health, urged the Management Board to delay its siting vote. She was one of 48 to speak at the February 16 hearing in the State House.

"All Options Open"

After June 30, the facility that accepts most of the Commonwealth's long-lived LLRW will close to all but the southeastern states. Dr. Ring felt the state should begin the siting process while also pursuing out-of-state options. He and other Board members felt that a vote to initiate siting would keep "all options open" to the Commonwealth, while retaining the Board's ability to stop the siting process, if another solution were successful.

"It's not as if siting was our first choice," said Board Chairman Charles Killian. "But we had to face up to our responsibility. This waste exists now, and it will continue to be generated in the future. We have to face up to the waste disposal problem," he added.

The vote triggers a process that will, over the next three years, gradually narrow the search until the Board chooses a "superior site," where a disposal facility can be built. State law prohibits the landfilling, or "shallow land burial," of LLRW in Massachusetts. Shallow land

(See VOTE, page 2)

Publication No. 17550 - 4 - 6600 - 4/94 - .10 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Warren Church Joins Board as Sec. Baker's Designee

Warren Church

Warren Church, the newest member of the Management Board, was appointed in January by Secretary of Health and Human Services Charles Baker. Baker, like Environmental Affairs Secretary Trudy Coxe, is a member of the Board by law but has named a designee to serve in his place.

A career devoted to measurement has led Warren to speak carefully. Regarding the Board's February 16 vote, so soon in his tenure, on whether to begin the in-state siting process: "It wasn't a happy time. I feel that it was a necessary thing to do, but it was a very tough decision."

At the hearing before the vote, he wished the format had allowed him the opportunity to respond to some of the siting opponents. "For one thing," he says, "they made it sound like we would be landfilling the waste. We have to make it clear that there would be concrete barriers, monitoring, and other precautions."

A certified health physicist with degrees in engineering, Warren is radiation safety officer for the University of Massachusetts at Lowell, which has its own nuclear reactor. He makes sure all radiation-related activities there are in accordance with federal and state standards. He also trains others how to minimize exposure and waste. Even non-ionizing radiation, such as radio waves from the campus radio station and lasers used in physics and chemistry research, fall under his purview.

Previously, Warren worked for the U.S. Food and Drug Administration, advising state governments on the testing and inspection of x-ray machines and other equipment. In the Sixties, Warren helped monitor a below-ground nuclear explosion in Colorado, just in case any radiation escaped to the surface, as part of an experiment to see if nuclear detonations could help extract oil from shale. He was also part of a federal program to monitor radioactive fallout from nuclear weapons testing. Every day, air and water samples from every state in the union would arrive at his laboratory outside of Washington, D.C. Even after atmospheric tests were banned, the fallout was circulating in the stratosphere and could be brought down by rainstorms.

At home in Dunstable, where he serves on the Board of Health, Warren still cannot escape waste issues. Dunstable is in the process of capping its solid-waste landfill. The local Board has also initiated a successful recycling program.

"I think a lot of the fear of radiation is residual from fear of nuclear weapons," Warren says, reflecting again on the things he heard from siting foes at the February hearing. "This is the last arena for putting an end to the nuclear business – if you don't have a place to put waste, then that's it. But the use of isotopes in medical research, for instance, is just so basic that you couldn't imagine a modern university or research hospital continuing to function without a solution to the waste problem."

"As long as we believe that the use of radioactive materials has value," he continued, "especially considering all the jobs those uses provide here in Massachusetts, we will always have to deal with the waste."

VOTE *(Continued from page 1)*

burial is a disposal technique that has failed at some now-closed disposal sites in other states. The law requires the site community to choose the facility disposal method, which must include barriers, such as concrete vaults, to separate waste containers from the soil, and must enable the waste to be retrieved in intact containers, if necessary. In addition, the site community would choose the facility operator.

Yet to be decided is the size of the facility, which will require approximately 100 to 400 acres, depending on whether other states send waste to it. Forming a compact with one or more states, which could share siting and/or construction costs, could make the facility less expensive and would also allow the exclusion of waste from states outside the compact.

Still Seeking Out-of-State Agreement

On the other "track," the Board will continue to pursue an agreement with another state or compact that is further along in its siting process and may have an LLRW disposal facility built within the next few years. Previous overtures to states and compacts have been unsuccessful, but it is possible that, once new facilities are up and running, they will be more willing to open their gates to states such as Massachusetts.

In the meantime, the generators of LLRW will store their waste on their own premises. More than 250 Massachusetts businesses and institutions generate LLRW, some of which is simply stored until its radioactivity has dropped to background levels. This is called "storage for decay." Other waste is long-lived enough to require very, very long-term storage -- the type of "disposal" plan contemplated by state law. It, too, is already stored on site, often for months at a time, while awaiting shipment to a disposal facility. In 1993, about 80 Massachusetts generators shipped LLRW out of state.

Upcoming Board Meetings

May 18 — Boston
June 22 — Northampton

Major Steps in Site Selection

The Board's February 16 decision to begin the search for an LLRW disposal site marked the beginning of what the state LLRW law calls Phase II, a long and careful site selection process. A new disposal facility would not be ready to receive waste until the year 2000 at the earliest. *No towns or regions in the state are being considered for the site at this early stage.* At every step in the process, public participation will be encouraged. Major steps, and the tentative dates for them, are as follows:

This Summer and Fall:

- Conducting meetings to get the public's ideas about the details of a "volunteer sites" program. The Board will develop a volunteer program which includes grants for communities wishing to evaluate the economic impacts of an LLRW disposal facility within their borders. A volunteer site would be subject to the same environmental criteria as sites chosen through the statewide screening process.
- Hiring an environmental consulting firm that will oversee statewide "screening," the deliberative process of eliminating areas that are environmentally unsuitable for a disposal facility and narrowing the search to suitable sites.
- Deciding whether or not the facility will accept waste from other states, and the amount of land required.

1995:

- Publishing a *Statewide Mapping and Screening Report*, which will eliminate, or "screen out," a sizable portion of the state from consideration as a possible site. Public meetings will be held to receive comments on the report.

1995/96:

- Publishing a *Possible Locations Report*, which would "screen in" certain areas that appear to meet the state's environmental criteria for a possible site. Public meetings will be held in the vicinity of each possible location.

1996:

- Publishing a *Draft Candidate Site Identification Report*. This report would name two to five parcels of land in the Commonwealth which the Board believes are best able to satisfy the site selection criteria. This report, which must include draft plans for detailed site characterization at each candidate site, would go to the Secretary of Environmental Affairs, who must implement the public review and comment procedures of the Massachusetts Environmental Policy Act (MEPA), to evaluate whether the report is technically adequate and conforms to the Department of Environmental Protection's siting criteria. Public meetings must be held in each community containing a candidate site. After public review, the Management Board must vote to accept the report, possibly with amendments, before detailed site characterization can begin.
- Establishing a Community Supervisory Committee (CSC) in every candidate site community. Appointed by the chief executive officer (CEO) of the community, the committee will consist of the CEO or a designee; chairpersons or designees of the Board of Health, Planning Board, and Conservation Commission; and three residents approved by a majority vote of the City Council or Board of Selectmen. The CSC will represent the interests of the candidate site community by helping to develop the scope of the detailed site characterization plan; monitoring the characterization; and interviewing certified applicants for facility operator. Each CSC will receive funds to hire staff and technical consultants.
- Acquiring property interests at each candidate site, for the purpose of conducting detailed site studies.

1996/97:

- Performing detailed characterization (environmental studies) of each candidate site over four seasons.

1997:

- Publishing a *Draft Detailed Site Characterization Report*. At least one public meeting must be held in each candidate site community. This report requires another evaluation of technical adequacy by the Secretary of Environmental Affairs.
- Selecting a superior site by a two-thirds vote of the Management Board, after the Board has accepted or modified the *Draft Detailed Site Characterization Report*. If on private property, the site will be acquired by the state. Two residents of the superior site community will be added to the Board.
- Appointing, by the Secretary of Environmental Affairs, a Citizens Advisory Committee, comprised of CSC members and other citizens. This committee will help develop the scope of the environmental impact report required by the MEPA process.

UP-FRONT Back-Page Notes

Generators Appear Ready for Longer On-Site Storage

Massachusetts LLRW generators either already have or can soon establish the on-site storage facilities they will need to keep all their LLRW longer, anticipating loss of access to the Barnwell, South Carolina, disposal site on June 30.

This conclusion, consistent with past communications from generators to the Management Board, was confirmed by an evaluation that included visits to most of the 104 businesses and institutions identified as potential sources of waste that would remain radioactive beyond the traditional two-to-three-year "storage for decay" period. A report, entitled *Evaluation of Licensee Programs for Interim Storage of Low-Level Radioactive Waste*, will be published this spring.

The report anticipates that LLRW normally shipped for disposal will be stored at 83 facilities located in 11 of the state's 14 counties (all but Berkshire, Dukes, and Nantucket counties). More than 70 percent of the storage locations are in Middlesex and Suffolk Counties, due to the high concentration of biotechnology companies, universities, and research hospitals there.

Current U.S. Nuclear Regulatory Commission guidelines discourage on-site storage for more than five years, and the Management Board has always felt that long-term storage at many different sites in Massachusetts is not the solution to the LLRW problem, as the chance of an accident increases with the number of storage sites.

An estimated 105,000 cubic feet of LLRW, containing approximately 112,000 curies, is expected to accumulate at the 83 sites over a five-year period without access to a disposal facility.

Board Discusses Minimization

One of the motions passed by the Management Board February 16 was a unanimous commitment to "voluntarily and aggressively pursue a source and volume minimization program designed to bring about significant and ongoing reductions of LLRW produced within Massachusetts on both a short- and long-term basis."

Robert Hallisey, Director of the state Department of Public Health's (DPH's) Radiation Control Program, told the Board March 30 that he has asked the U.S. Nuclear Regulatory Commission (NRC) to allow early implementation of the DPH minimization regulations.

Promulgated in January, these regulations require LLRW generators to institute minimization programs for review by DPH. The Board had expected their implementation would be delayed until 1995, when the NRC is expected to grant Massachusetts "Agreement State" status. Agreement States are allowed to take over much of the NRC's regulatory authority.

"Volume minimization" refers to compaction, incineration, and other treatments that reduce the number of cubic feet of LLRW produced, usually concentrating the waste's radioactivity in the process. "Source minimization" means using less radioactive material, substituting other substances, or redesigning procedures in order to produce less LLRW in the first place.

The Board and DPH will also conduct workshops for LLRW generators. The goal will be to bring in guest speakers on the "cutting edge" of new minimization techniques, as well as to encourage similar generators to learn from each other. High disposal costs, expected to remain high at any future disposal site, provide an incentive to minimize.

Hallisey said the emphasis should be on reducing the radioactivity of the waste.

Lobbying Ahead for Board?

Another motion passed unanimously by the Management Board February 16 was to adopt, by June 16, a position in favor of whatever amendments the Board decides to propose to the federal Low-Level Radioactive Waste Policy Amendments Act of 1985.

At press time, the Board had not yet formulated a position, but was expected to consider such amendments as requiring the U.S. Department of Energy to assume reponsibility for "mixed" waste disposal; a clarification of the "take title" requirement as it relates to regional compacts; and language relating to Superfund liability at LLRW facilities.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 3, Number 3 - Summer, 1994

S.C. Disposal Site Closes on Schedule To Massachusetts LLRW Generators

Since the end of June, Massachusetts businesses that used to ship low-level radioactive waste (LLRW) out of state have been storing this waste on their own premises. This storage is expected to continue for several years until the Massachusetts Low-Level Radioactive Waste Management Board can build an in-state disposal facility or arrange for access to a facility in another state.

Cutoff Applies to 26 Other States

In accordance with a federal law that gives states the responsibility for managing their own LLRW, Massachusetts and 26 other states outside the South lost access June 30 to a disposal site in Barnwell, South Carolina, the only facility that was still available to these states.

In anticipation of the cutoff, the Management Board has been monitoring the preparations of the Commonwealth's waste generators, some of whom are constructing or allocating new storage space under license provisions of the U.S. Nuclear Regulatory Commission. A report published by the Board this spring, *Evaluation of Licensee Status for Interim Storage of Low-Level Radioactive Waste*, found that LLRW normally shipped out of state for disposal will be stored at about 80 facilities located in 11 of the state's 14 counties (all but Berkshire, Dukes, and Nantucket counties).

On-site storage is nothing new. Long-lived waste, which eventually must be isolated in a disposal facility, has always been stored between shipments to a disposal or treatment facility. Also, most short-lived radioactive waste is stored "for decay" on the premises of approximately 200 Massachusetts LLRW generators.

The Management Board voted in February to start looking for an in-state disposal site for the Commonwealth's LLRW. At the same time, the Board voted to keep seeking a disposal agreement with another state, a possibility that would make an in-state facility unnecessary. Still, the vote triggered a process designed to gradually narrow the in-state search until the Board chooses a "superior site," where a disposal facility could be built. Such a facility would not be ready to take waste until around the year 2000.

A view inside an LLRW on-site storage warehouse.

In 1985, Congress gave the three states with operating LLRW disposal sites (South Carolina, Nevada, and Washington) the option of excluding waste from other states after 1992. Other states were left to manage their own waste, either alone or in regional groups. On December 31, 1992, the disposal site in Nevada closed altogether, and the one in Washington closed to all but northwestern and Rocky Mountain states. However, the South Carolina Legislature voted to extend the date of exclusion from the Barnwell site by 18 months, until June 30, 1994. On June 2 the Legislature adjourned without authorizing another extension.

Many Forms, Sources

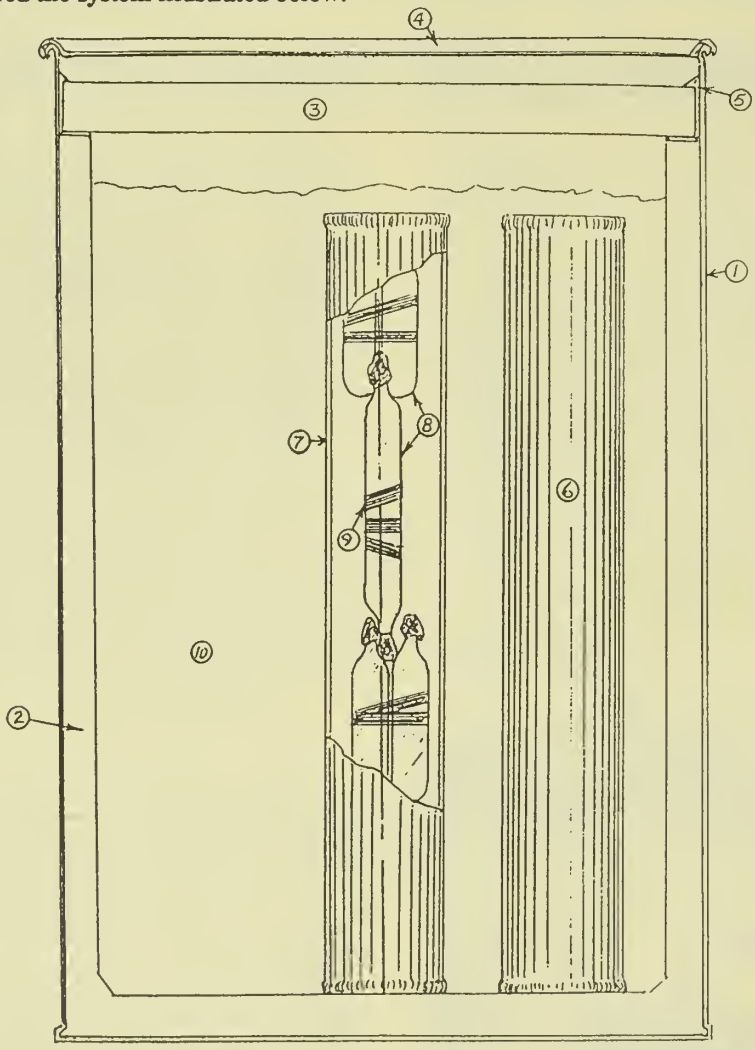
LLRW is distinguished by its relatively low concentrations of long-lived radioactive atoms. It takes many forms, and is the by-product of numerous activities in the Commonwealth, including the diagnosis and treatment of diseases by hospitals; the production of various products by commercial companies; the operation of one nuclear power plant (Pilgrim Station, in Plymouth) and the dismantling of another (Yankee Rowe, in Rowe); and a diversity of research projects by universities, biotechnology companies, and other businesses. Pilgrim Station generates radioactively contaminated sludges and metals in the course of normal maintenance. Contaminated cloth, plastic, glassware, wood, and paper come from all categories of waste generators.

Publication No. 17588 - 4 - 6600 - 8/94 - 0.10 C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

Packaging LLRW

Tritium System Reduces Volume

In response to high disposal costs for low-level radioactive waste (LLRW), some companies have devised packaging techniques that go beyond the safety standards of the U.S. Nuclear Regulatory Commission. One such company is DuPont Medical Products, which ships radioactive tracers to hospitals and life-science research laboratories all over the world. Tracers are radioactive atoms used by researchers to tag and follow a chemical, as when testing an experimental drug on a laboratory animal. Turning reactor-generated radionuclides into pure tracers creates substantial amounts of waste. For example, tritium waste from DuPont's Boston manufacturing facility constitutes most of the radioactivity in the Commonwealth's LLRW waste stream. To stabilize and concentrate this radioactive isotope of hydrogen for disposal, DuPont engineers developed the system illustrated below:



Drawing courtesy of DuPont

Up to 6,000 curies of tritium can be packaged in a single 55-gallon high-integrity drum with steel walls and cover (1) and (4), sealed with epoxy (5) when ready to ship. The walls and cover are lined with high-tensile-strength cement (2) and (3). Each drum contains up to 12 welded aluminum canisters (6) wrapped in plastic film, each 4 inches in diameter with 1/8-inch walls (7). Inside each canister is absorbed liquid tritium, in sealed glass flasks (8) enclosed in mylar bags and secured with vinyl tape (9). An absorbent similar to "kitty litter" is included in each flask and also packed around the flasks in each canister. Before the drum is shipped for disposal, spaces between the canisters (10) are filled with low-density concrete.

Board Developing Volunteer Sites Program

The Management Board is in the process of developing a draft volunteer sites program to present at meetings of community leaders throughout the state. Comments from the meetings will be considered when the program is written in the form of draft regulations, which will go out to public hearings next year.

Any site eventually selected by the Board for an in-state low-level radioactive waste (LLRW) disposal facility must meet certain environmental criteria, whether it is volunteered by a municipality or private landowner or suggested by the consulting firm that will be conducting a scientific evaluation of the whole state.

Sometime next year, the Board will publish the *Statewide Mapping and Screening Report*. This report, the first of several in the technical screening process, will exclude environmentally unsuitable portions of the state.

What Would a Town Want?

In a nutshell, the Board wants to know what sort of compensation a community would want in exchange for volunteering to solve the state's LLRW disposal problem. Grants will be available to communities that want to evaluate the economic impacts of hosting a facility, but a chosen site community is entitled to other benefits yet to be established. Other procedures, such as how a site may be volunteered and how late in the process a volunteered site could be withdrawn, are yet to be worked out.

At some point, the technical screening process could be halted, to allow communities more time to consider volunteering a site. State law does not require that the facility be located at a volunteer site, however.

Aside from whatever benefits would come to a community as a result of volunteering a site, state law already requires that the "superior site" community receive the following benefits:

(See BENEFITS, page 3)

BENEFITS *(Continued from page 2)*

- Property tax payments from the facility operator, from the time of the issuance of a facility license through all the years of facility development, operation, closure, and post-closure observation and maintenance. The state takes over the payments during the institutional control period, when the operator is no longer involved.
- An annual payment to the site community, during the facility's operation, of 4 percent of gross operating revenues. This payment must range between $240,000 and $400,000.
- $150,000 per year from the time the facility begins operations, and ending five years after the issuance of the facility license.
- Funds for local reviews of the site's ability to meet technical criteria.
- Membership on the Management Board, which will control the facility.

Also, there will be other compensation and impact payments to the superior site community, arising out of negotiations between the operating company and the site community, and out of contract negotiations between the operating company and the Board. For instance, there could possibly be:

- Reimbursements for road maintenance or reconstruction, or other increased infrastructure costs resulting from facility siting, development, or operation.
- Guarantees from the operator to hire locally, or to purchase goods and services locally.
- Community-wide health monitoring programs.
- Payments or equipment for emergency services.
- Funds to monitor facility operation and closure.
- Payments for things such as schools, libraries, swimming pools, or parks.
- Other compensation or impact payments identified and negotiated by the site community.

Board Hosts Seminar On Waste Reduction

The Management Board hosted a seminar at the State House June 21 to encourage the generators of low-level radioactive waste (LLRW) to reduce the amount of waste their businesses produce.

The information exchange demonstrated the Board's commitment to work toward significant and ongoing reductions of LLRW produced in Massachusetts on both a short- and long-term basis. The Board is charged by state and federal law with the responsibility for overseeing the safe management of the Commonwealth's LLRW.

Substitute Tracers

Lecturers from two Massachusetts companies -- Dr. Maurice Kashdan, a market development manager for DuPont NEN Research Products, and Suzanne Blohm, an applications specialist for Amersham Life Science, Inc., discussed new techniques for substituting non-radioactive materials for radioactive "tracer" atoms in biological and medical research.

For example, instead of using radioactive hydrogen (tritium) or carbon-14 to follow, or trace, a new drug through the body of a test animal, to test human blood for the HIV virus, or to locate certain fragments of a DNA molecule, scientists can now perform many such experiments with new dyes or luminescent chemicals.

Some new non-radioactive tracers have a longer shelf life and can speed up an experiment, in addition to reducing the radiation exposure levels of laboratory workers. Some new techniques can be automated. None produce LLRW.

Molten Metal

A third speaker, Anna Protopapas of Molten Metal Technology, Inc., told the group of 50 generators that her company is developing a new process that will inject LLRW into a container of molten metal. Compounds will be broken down into basic elements that can be recycled, she explained, leaving the radioactive portions greatly reduced in volume.

Dr. Maurice Kashdan

The final speaker of the day was Dr. Gordon Kaye, president of Waste Reduction by Waste Reduction, Inc., who discussed his new method of "digesting" the carcasses of animals used in laboratory research. Through this method, animal tissue is dissolved so that it can be flushed through municipal sewer systems under regulations of the U.S. Nuclear Regulatory Commission. Without this process, such carcasses, which often contain small amounts of radioactive tracers, must be incinerated or stored until a disposal facility is available.

Robert Hallisey, Director of the Radiation Control Program for the Massachusetts Department of Public Health, answered questions from the generators regarding new LLRW minimization regulations that require more than 250 licensed Massachusetts enterprises to institute minimization programs for review by his office. High disposal costs, expected to remain elevated in the future, provide an additional incentive for LLRW generators to minimize their waste volumes.

UP-FRONT Back-Page Notes

Curriculum Project

The Management Board plans to supplement the curricula of Massachusetts high schools with information on radiation, the use of radioactive materials, and LLRW management issues.

The mandate for such a program, which is gradually taking shape, can be found in the Massachusetts Low-Level Radioactive Waste Management Act (M.G.L. Chapter 111H). In its listing of the duties of the Board's Public Participation Coordinator, the Act calls for "...continuing public informational programs on the use of radioactive materials, the nature and characteristics of low-level radioactive waste, current and developing technologies, and the hazards associated with low-level radioactive waste and the improper management thereof...."

The Act also requires Public Participation Coordinator Ben McKelway to obtain advice and assistance from the Public Participation Advisory Committee (PPAC), representing a range of public opinion, in establishing and conducting educational programs. In its Management Plan, the Board suggests classroom programs, curriculum units, or teachers' workshops to reach young people. How to approach the project was the main topic at the May meeting of the PPAC.

The consensus there was to focus on basic science, raising social and political questions for classroom discussion at the end of whatever curriculum materials are produced. The Board may contract with an experienced curriculum consultant or university to work with a special PPAC project subcommittee to be named soon by McKelway. The consultant would seek advice from the Massachusetts Association of Science Teachers, the Massachusetts Association of Science Supervisors, and the Department of Education.

Speakers Bureau Planned

The Management Board will seek qualified volunteers to speak to community groups and students on the subjects of radiation and low-level radioactive waste management. Like the curriculum project (see above), this project is only in the formative stages, but the tentative plan is to compile a list of speakers who can respond to a request for an informational talk, or perhaps a debate.

New Brochure Available

"Site Selection," an eight-panel brochure explaining the process for selecting a site for an in-state low-level radioactive waste disposal facility, is now available free of charge from the Management Board's office (see address below). The brochure provides a quick overview of the steps that lie ahead -- everything from excluding unsuitable areas, to naming candidate sites, to the role of the site community.

Board Needs Notice of NRC License Termination

The Management Board monitors the more than 380 companies and institutions that use radioactive materials in Massachusetts. However, the number of licensed users varies from time to time, due to the expiration or termination of some licenses and the issuance of new ones. To keep its records up to date, the Board requests prompt notification from any organization that terminates its U.S. Nuclear Regulatory Commission license to use such materials, or its state Department of Labor and Industries registration, whether it generates LLRW or not.

Upcoming Board Meetings

August 24 -- Boston, 10 a.m.
September 14 -- Boston, 10 a.m.
October 12 -- Barre, 1 p.m.
November 30 -- Newburyport, 1p.m.
December 14 -- Boston, 10 a.m.

Note: All Boston meetings will be in Room 905 at 100 Cambridge Street (the Saltonstall Building). Meeting rooms for the October and November meetings had not been arranged at press time. For more information, call (617) 727-6018.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202

FORWARD AND ADDRESS CORRECTION

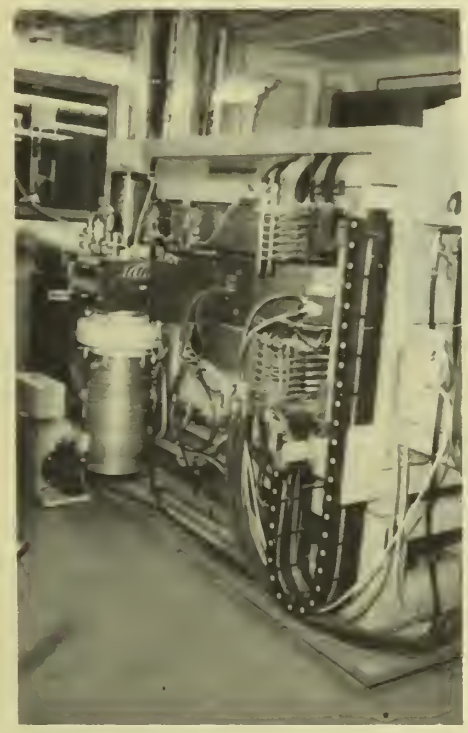
BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 3 - Number 4 - Fall, 1994



This is a cyclotron. Although its name may have the ring of a Tom Swift adventure, it is used routinely to create radionuclides for medical use. See story, page 2.

Compact Decision Near; Winter Meetings Ahead for Siting Plan, Volunteer Program

The Management Board is expected to decide, possibly at its December 14 meeting, whether or not an in-state disposal facility would accept low-level radioactive waste (LLRW) from one or more other states.

If the Board decides to regionalize, it would invite states that have expressed interest in a regional compact to begin discussions. At a later date, the partner state or states would be chosen, and would contribute to siting costs.

Under federal law, a compact (two or more states) has the right to exclude waste generated outside of the compact.

Regardless of the decision on compacting, the planning process will continue this winter and spring with public meetings on a Draft Siting Plan for the lengthy and deliberative process of selecting a site for the facility.

The draft will identify the major decision points in the site selection process and summarize the roles of federal, state, and local government. This overall plan will include the Volunteer Sites Program, which will spell out the procedures by which, in a later phase of the process, parcels of land may be studied

(See PLANNING, page 4)

Upcoming Meetings

- **Nov. 30** – Regular Management Board Meeting – 1-4 p.m., Newburyport High School, east wing basement conference room, 241 High St., Newburyport.
- **Nov. 30** – Discussion on the Site Selection Process – 7-10 p.m., Cafeteria, Rupert A. Nock Middle School, 70 Low Street, Newburyport.
- **Dec. 14** – Regular Management Board Meeting –10 a.m. - 1 p.m., New Bedford.
- **Jan. 18** – Regular Management Board Meeting – 10 a.m. - 1 p.m., Boston.
- **Feb. 15** – Regular Management Board Meeting – 10 a.m. - 1 p.m., Boston.
- **Late Jan. (tentative)** – Meeting of Radioactive Materials Users.

Note: All Boston meetings will be in Room 905 at 100 Cambridge St. (the Saltonstall Building). Locations not shown above had not been arranged at press time. Call (617) 727-6018 for more details, and to confirm the above information in case of changes.

Board Writes to Clinton, Congressional Delegation

The Massachusetts Low-Level Radioactive Waste Management Board has asked President Clinton and Congress to consider, should they conduct a future review of the Omnibus Low-Level Radioactive Waste Compact Consent Act, some recommendations on the 1985 federal law that makes the management of low-level radioactive waste (LLRW) a state responsibility.

In letters sent October 7 to the President and the Massachusetts Congressional delegation, Board Chairman Charles Killian said the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA) has improved LLRW management nationally, but noted that the process has been "slow and expensive." "In addition," the letter continues, "the Board is concerned that adding as many as 11 new disposal facilities to the currently operating sites would provide more disposal capacity than is necessary in the country."

The Board encourages the federal government to offer more incentives that would promote the consolidation of regional LLRW compacts (groupings of states allowed under the LLRWPAA and

(See LETTER, page 4)

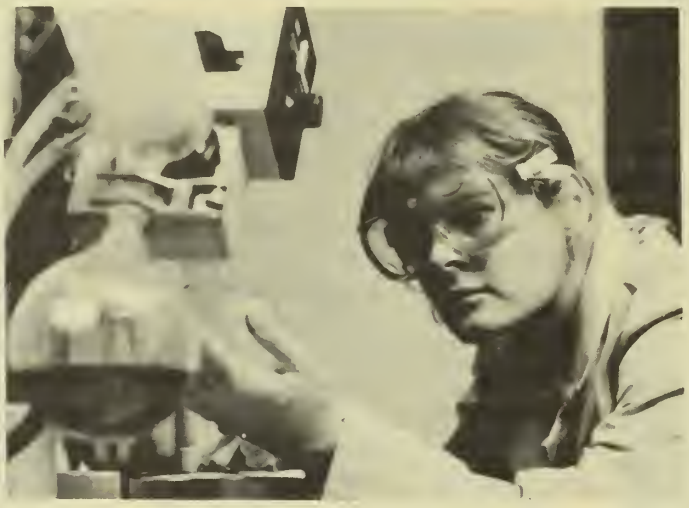
Publication NO. 17639 - 4 - 6500 - 11-94 - .10 - C R
Approved by, Philmore Anderson III, State Purchasing Agent

Nuclear Medicine Is Linked to Long-Lived LLRW

Nuclear medicine appears to be here to stay, but how does it relate to policy deliberations on the disposal of low-level radioactive waste (LLRW)?

The medical use of radionuclides for diagnostic imaging, thyroid evaluation, cancer treatment, and other procedures continues to expand. These radioactive atoms provide reliable information about organ function and disease status, reducing the need for exploratory surgery.

At first glance, the waste produced by these medical procedures seems insignificant to LLRW disposal issues. Because most clinically important radionuclides are either reused or tend to lose their radioactivity quickly (most have half-lives of less than 10 days), there is little LLRW generated directly from diagnostic and therapeutic procedures -- the amount of LLRW long-lived enough to require off-site disposal is almost negligible.



Uniphoto -- Ron Sherman

Medical research produces more long-lived LLRW than diagnosis or treatment procedures, especially during the manufacturing process.

On the other hand, the manufacture and purification of some of these radionuclides present a different story. Many of these materials are fission products, created in nuclear reactors in other states or nations. Others are produced in particle accelerators, such as the cyclotron at Massachusetts General Hospital, in Boston. Unavoidably, many long-lived radionuclides are created along with the short-lived ones used in medicine. Some of these have other uses, but most have no practical use. Sooner or later, they end up as waste.

Some of the long-lived radionuclides are used in medical research. Here, too, it is clear that the manufacturing end of the process is the source of most medically-related LLRW. The production of radioactive tracers for biomedical research generates a significant amount of LLRW that does require disposal, and the Massachusetts waste stream proves the point -- the lion's share of its radioactivity is tritium (radioactive hydrogen) produced at the Boston laboratories of Du Pont Medical Products, a company that ships radioactive tracers all over the world. The biotechnology firms, research hospitals, and university research labs that purchase and use certain radioactive tracers also generate long-lived LLRW, in the form of research animal carcasses, absorbed liquids, and trash (paper, rubber gloves, syringes, glassware, etc.).

Another consideration is the disposition of the many kinds of radionuclide clusters known as "sources." In teletherapy, the irradiation source is not in direct contact with the tissue to be treated. Gamma-emitting sources, such as cobalt-60, housed in heavy shielding, are convenient and can be used repeatedly with little maintenance. The goal is to irradiate and destroy cancerous tissue, so a physician may use a "gamma knife" to direct a beam of radiation to a brain tumor, for instance. Another method, brachytherapy, brings the radiation source into direct contact with the tumor. This method is used widely in the treatment of cervical cancer, for example. Over time, due to natural radioactive decay, irradiation sources weaken, and eventually must be returned to the manufacturer for reactivation, repair, or disposal. There may have been LLRW generated on those premises when the source was originally purified and packaged, also.

Yet another link is calibration. Equipment used to administer certain radionuclides for diagnosis or therapy must be calibrated periodically to ensure that the patient gets the proper dose. Long-lived radiation sources, such as cobalt-57 (accelerator-produced) and cesium-137 (reactor-produced), are used to calibrate these instruments. Some LLRW is created as a by-product of their manufacture. Later, when the calibrating source is no longer strong enough to do the job, it is returned to the manufacturer.

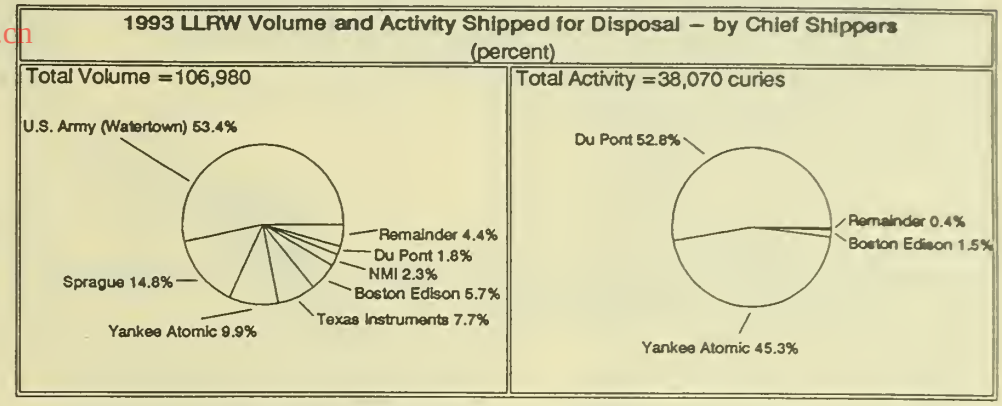
Because of the indirect connections between many medical procedures and long-lived LLRW, failure to find a comprehensive solution to the LLRW disposal dilemma could affect the availability of clinical radionuclides on which so many Massachusetts hospitals, and patients, rely.

Highlights of *1993 Survey Report*

For the second year in a row, decommissioning and remediation projects boosted the amount of low-level radioactive waste (LLRW) shipped to out-of-state disposal facilities.

The 1993 totals, measured by volume (cubic feet) and by radioactivity (curies), came to 106,980 cubic feet and 38,070 curies.

The figures are from the soon-to-be-published *1993 Massachusetts Low-Level Radioactive Waste Survey Report*, which provides a detailed view of who is producing what types of LLRW in what quantities, and how this waste was managed in 1993. Compiled from a questionnaire sent to businesses and institutions licensed by the U.S. Nuclear Regulatory Commission to possess radioactive materials in Massachusetts, the data are essential to the Management Board's planning efforts.



Du Pont & Yankee Rowe

A little more than half (52.8%) of the radioactivity in last year's shipped waste was generated by the Boston laboratories of Du Pont Medical Products during the manufacture of radioactive tracer chemicals for life science research. Most of the other half (45.3%), in terms of radioactivity, came from Yankee Atomic Electric Company, which is dismantling its nuclear power plant in Rowe. Shipped waste from this power plant included major components of the reactor cooling system, the steam generators, and other irradiated hardware.

Still measuring by radioactivity, more than half (53%) of the shipped LLRW was tritium, an isotope of hydrogen that is left over after the purification of research tracers. Of the remaining 47%, all but 2% came from the Yankee Rowe plant and from Boston Edison's Pilgrim Station in Plymouth, the Commonwealth's only operating nuclear power plant. These radionuclides were silver-110m, iron-55, cobalt-60, cadmium-109, and nickel-63. The *Survey Report*, which is available free of charge from the Management Board office, contains a complete list of radionuclides found in LLRW shipped out of Massachusetts in 1993.

When the same waste stream is measured by volume, it is seen to be dominated by high-volume, low-activity (HVLA) waste, such as contaminated soils and building rubble from the decommissioning of sites such as the U.S. Army's Materials Technology Laboratory in Watertown. That site accounted for 53.4 percent of the LLRW shipped out of state in 1993. Other HVLA-producing projects in 1993 included an ongoing remediation effort in Attleboro by Texas Instruments, Inc., and the wrap-up of another decommissioning in North Adams by Spellco (Sprague Electronics Company).

Most shipped waste went to South Carolina and Utah, with less than 1% of the volume going to Washington State. Although the Utah disposal facility remains open for HVLA waste and certain other wastes may be accepted at the Washington site, other LLRW that will remain radioactive long enough to require disposal must now be stored by the generator until the Management Board makes other arrangements. On June 30, the South Carolina facility closed to all but eight southern states.

Number of Generators

Of the 382 organizations surveyed, 261 (68.3%) said their use of radioactive materials generated radioactive waste. The remainder said they produced no waste or did not possess radioactive materials in 1992. Of the 261 waste generators, 78 indicated they had shipped at least a portion of their LLRW out of state during 1993, accounting for 66.6 percent (by radioactivity) of all radioactive waste generated in the state that year (not including high-level radioactive waste, which is still the responsibility of the federal government). Some of this waste was reduced in volume through treatment processes, including compaction and incineration, prior to disposal.

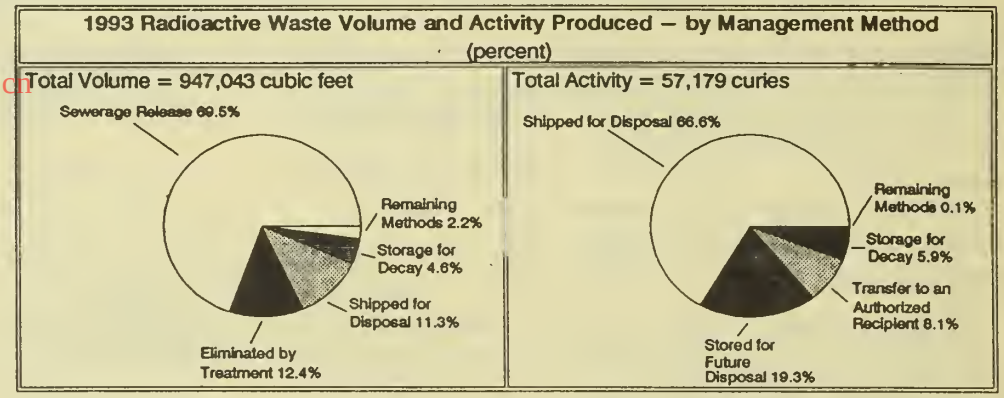
(See SURVEY, page 4)

Radionuclides Contributing More Than One Percent to 1993 Activity Shipped for Disposal
(curies)

Radionuclide	Half-life	Activity	% of Total	Major Contributor
Hydrogen-3 (Tritium)	12.3 years	20,174.065	53.0	Commercial
Silver-110m	250 days	5,960.003	15.7	Utility
Iron-55	996 days	5,703.521	15.0	Utility
Cobalt-60	5.27 Years	3,815.937	10.0	Utility
Cadmium-109	462 days	956.118	2.5	Utility
Nickel-63	100 years	691.549	1.8	Utility
Remaining Nuclides	N/A	768.795	2.0	N/A
Total	N/A	38,069.988	100.0	

SURVEY *(Continued from page 3)*

Whether they shipped waste or not, many generators managed some of their waste by other methods in 1993 -- storage for decay (for short-lived radionuclides only); storage for future disposal; incineration; transfer to an authorized recipient (such as returning a sealed source to the manufacturer); atmospheric release; and sewerage system release. Before treatment, shipment, or release, the total volume of LLRW produced came to 947,043 cubic feet. The radioactivity totalled 57,179 curies.



LETTER *(Continued from page 1)*

approved by Congress), and thus reduce the number of planned LLRW disposal facilities. No state or compact has yet broken ground for this new generation of facilities. There are two existing disposal sites in South Carolina and Washington state, but these are now closed (as permitted under the LLRWPAA) to waste produced outside their respective regions.

The letter also encourages a review of the following possible federal government actions:

- Requiring the U.S. Department of Energy to provide for the disposal of commercial mixed waste -- LLRW containing toxic chemicals as well as radioactive material.
- Clarifying the liability that ownership of an LLRW facility could pose under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), commonly known as "Superfund."
- Requiring radioactive materials users nationwide to plan LLRW minimization programs, as Massachusetts has done.
- Devising strategies for the federal government to assist states in making progress toward LLRW management solutions. Strategies suggested in a background paper accompanying the letters included financing legal costs and expediting federal reviews, permits, or land transfers.

PLANNING *(Continued from page 1)*

as potential sites. The Board intends to issue draft regulations to accompany the Draft Volunteer Sites Program.

After the Board adopts the Siting Plan next spring, a consulting firm will begin "mapping and screening" -- using the state's Geographic Information System (GIS) to identify and exclude areas of the Commonwealth that would be unsuitable for an LLRW disposal facility under the environmental siting criteria regulations. Only after unsuitable areas have been excluded, probably late next year, will the Board accept volunteered parcels for evaluation.

NOTE: Although the Board uses the term "disposal" due to federal requirements, LLRW disposal under Massachusetts law would be more like very, very long-term storage.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board
Volume 4 - Number 2 - Spring, 1995

Draft Documents Issued April 28

Three-Month Public Comment Period Begins

Massachusetts citizens have until 5 p.m. July 31 to comment on three draft documents issued by the Low-Level Radioactive Waste Management Board on April 28.

In addition to taking spoken testimony at three public hearings in June (see meeting schedule, this page), the Board will hold three briefing sessions -- small-group discussions to present information and answer questions about the draft documents and the process of selecting a site for a low-level radioactive waste (LLRW) disposal facility.

Written comments on the drafts will be encouraged throughout the comment period.

Copies of the draft documents have been mailed to every town or city hall, state legislators, and organizations that have shown an interest in LLRW management policy. Individuals may obtain copies by calling or writing the Management Board's office (see page 4 for address and telephone number).

The documents are:

- ***The Draft Siting Plan*** for the lengthy and deliberative process of selecting a site for an in-state LLRW disposal facility. This document is intended as a "road map" to identify the major decision points in the upcoming site selection process, and to summarize the roles of government and the public in this process.
- ***The Draft Volunteer Sites Program Plan*** (See page 3). This program will establish procedures by which landowners may volunteer sites to be evaluated for possible siting of the facility. Only after environmentally unsuitable areas have been identified through the Statewide Mapping and Screening process sometime next year would the Board accept Expression of Potential Interest Forms. A private landowner submitting a form would have to submit a copy to the municipality's Chief Executive Officer.
- ***Draft Regulations*** (proposed amendments to 345 CMR 1.00, the implementation regulations for the Board's Management Plan). These documents, though bound together, cover two separate issues. First, they spell out, in legal language, exactly how

(See DOCUMENTS, page 4)

Public Meeting Schedule

April 28 -- Draft documents issued. Public comment period begins.

May 10 -- Regular Management Board Meeting -- 10 a.m. - 1 p.m., State House, Hearing Room A-1, BOSTON, and
Briefing Session -- 7-10 p.m., Lasell College, Wolfe Hall, 1844 Commonwealth Ave., 3rd Floor, Room 302-303, NEWTON.

May 24 -- Briefing Session -- 7-10 p.m., Berkshire Community College, South County Campus, Room S-1, 343 Main Street, GREAT BARRINGTON.

June 13 -- Public Hearing -- 7-10 p.m., Adams Memorial Middle School Auditorium, 30 Columbia Street, ADAMS.

June 14 -- Regular Management Board Meeting -- 10 a.m. - 1 p.m., Chicopee City Hall, Aldermanic Chambers, 4th Floor, Market Square, CHICOPEE, and
Public Hearing, 7-10 p.m., Chicopee City Hall, Aldermanic Chambers (same as above), CHICOPEE.

June 15 -- Public Hearing, 7-10 p.m., First Church Unitarian Universalist, Fellowship Hall, 15 West Street, LEOMINSTER.

June 28 -- Briefing Session, 7-10 p.m., Bridgewater-Raynham Regional High School Cafeteria, Corner of Center and Mt. Prospect Sts., BRIDGEWATER.

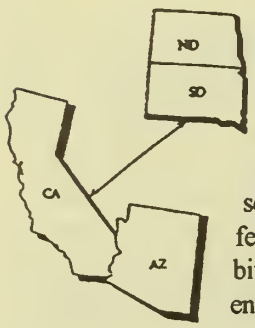
July 31 -- Public comment period closes.

Call (617) 727-6018 for more details.

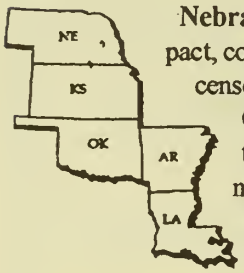
Publication No. 17674 - 4 - 6500 - 5/95 - .07 - C. R.
Approved by: Philmore Anderson III, State Purchasing Agent

LLRW News From Other States

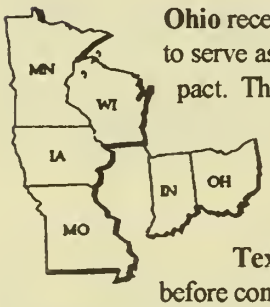
States across the country, most of which are grouped together in regional compacts, are grappling with the same LLRW disposal facility siting issues facing Massachusetts. None have yet voiced an interest in taking waste from Massachusetts, but see recent developments in South Carolina reported below. Here's a quick update on what's happening in some other areas:



California, the host state of the Southwestern Compact, already licensed its desert disposal facility planned for Ward Valley. However, two lawsuits opposing the license prompted a delay of the U.S. Interior Department's decision to sell the facility site, which is located on federal land. Interior Secretary Bruce Babbitt asked the National Academy of Sciences to review certain site issues before making his decision on the land transfer.

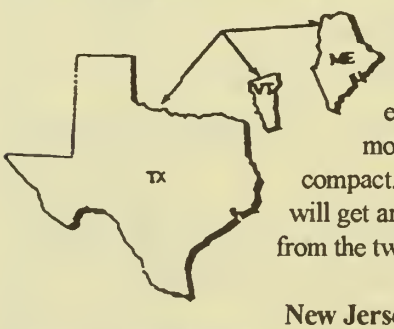


Nebraska, the host state for the Central Compact, continues its review of U.S. Ecology's license application for a facility near Butte. Once the state determines that the application is complete, the public will have 14 months to comment. One issue delaying this determination is whether a small area of the site buffer zone is or is not a wetland.

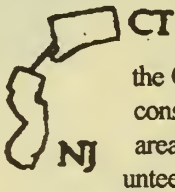


Ohio recently passed legislation that will allow it to serve as the host state for the Midwest Compact. This legislation establishes a new agency to oversee LLRW disposal, siting criteria, and a siting process that provides for public involvement.

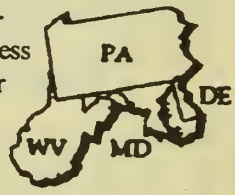
Texas will need at least one more year before completing its review of the state's proposed disposal facility at Faskin Ranch. Meanwhile, Texas is waiting for Congress to decide whether to let **Maine** and **Vermont** join Texas in forming the Texas Compact. Texas will receive $12.5 million each from Maine and Vermont once Congress ratifies the compact. When the site opens, Texas will get another $12.5 million apiece from the two states.

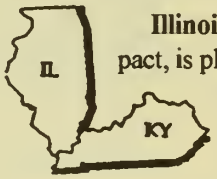


New Jersey and **Connecticut**, each planning a site for the unique Northeast Compact, continue their efforts to find volunteer sites. New Jersey recently finalized its new volunteer siting plan. Officials in two potential Connecticut volunteer communities have publicly expressed their interest in learning more about siting and the Connecticut volunteer process. One of the two is considering a regional agreement of support from 10 area towns. (Compensation in the Connecticut volunteer program encourages regional proposals.)



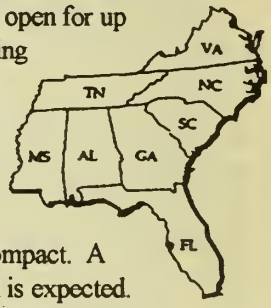
Pennsylvania, host state for the Appalachian Compact, has begun a screening process that will identify 50 to 100 suitable areas for LLRW disposal. This process is temporarily on hold, pending the development of a volunteer process to blend with the technical screening activities.





Illinois, host state for the Central Midwest Compact, is planning its second effort to select a site for a disposal facility. A task group has been interviewing other state authorities for ideas on public participation and other issues.

South Carolina's Governor David Beasley has expressed anger at North Carolina for moving too slowly with its new facility for the Southeast Compact. He has proposed to keep the Barnwell disposal facility in his state open for up to 10 more years, and to consider accepting LLRW from states outside the compact. In early May, when the Compact Commission voted down a motion allowing such access, Governor Beasley threatened to withdraw his state from the compact, and possibly to create a new compact. A second vote of the Compact Commission is expected. (The Barnwell facility closed to LLRW generators in all but the eight states in the Southeast Compact on June 30, 1994, and was scheduled to close altogether at the end of this year.)



New York, an unaffiliated state, may eliminate its LLRW Siting Commission. The state legislature cut $4.3 million originally allocated for the commission. Although the budget has not yet passed through State Operations, which allocates spending, the commission's budget is unlikely to change. State Senator James Seward plans to introduce legislation to abolish the commission and transfer its authority to another state agency.

NOTE: The 11 states in the Rocky Mountain and Northwestern Compacts send their LLRW to the Hanford reservation in eastern Washington. Massachusetts, Michigan, New Hampshire, Rhode Island, Puerto Rico, and Washington, D.C. are unaffiliated.

Draft Volunteer Program -- The Basics

Wouldn't it be nice if the majority of citizens in a community chosen for the site of an LLRW disposal facility wanted the facility? When the relatively low risks and generous financial benefits of such a facility are understood, such a scenario is not out of the question, provided there are fair procedures on the books for volunteering a site. The Management Board hopes that comments from the public on the ***Draft Volunteer Sites Program Plan*** and its implementing regulations will help make the Volunteer Sites Program the fairest it can be. Here are the main provisions of the proposed plan as set forth in the draft:

Potential Interest Forms

After environmentally unsuitable areas have been excluded from consideration by the Statewide Mapping and Screening process (expected to be completed sometime next year), any landowner can submit a form declaring potential interest in volunteering an unexcluded site. The submission of a form does not obligate the community in any way.

As soon as Mapping and Screening is completed, state grants of up to $50,000 each will be available to communities from which a potential interest form has been filed. These grants are for studying the local impacts of a disposal facility. Accepting a grant does not obligate a community.

Local Agreement

After municipal officials have had the opportunity to discuss the matter with the Management Board and to conduct public meetings, they could choose to negotiate a Volunteer Site Agreement, through which the municipality would receive extra benefits in return for volunteering. However, the agreement would take effect only if it is approved by local referendum. (In fact, the agreement is not even signed before such approval.) Although most of the benefits to a volunteer community would not come unless the volunteered site is chosen by the Board as the final site for the facility and the facility is licensed and built, the negotiated agreement could possibly contain benefits that would accrue earlier.

After soliciting volunteer sites, the Board will resume its technical screening process, using the Massachusetts Department of Environmental Protection's site selection criteria. Eventually, the Board will identify two to five Candidate Sites. All Candidate Sites, whether volunteered or chosen on a strictly technical basis, will be evaluated in depth over four seasons. Finally, the Board will chose one of the Candidate Sites as the site for the facility.

Although many benefits will come to the site community whether the site was volunteered or not, the Board is proposing that the operation of a facility at a *volunteered* site would entitle the community to an extra 1 or 2 percent of the gross operating receipts from the facility for every full year of operation. The facility would be expected to operate for 30 years or more. This is the primary financial incentive for volunteering a site.

Percentage Formula

State law says the site community, volunteer or not, shall receive an annual sum equal to 4 percent of gross operating receipts for every full year of facility operation, or 5 percent if there are no "neighboring communities" to receive (or split up, if there are more than one) their statutorily authorized 1 percent. The Board is proposing a maximum of 6 percent to a volunteer community, so the unknown "neighboring community" factor is why the extra payments could be either 1 or 2 percent. (A "neighboring community" is a city or town with at least 20 percent of its population within three miles of the site.) The law also provides that the minimum amount of the 4- or 5-percent annual payments shall range between $240,000 and $400,000, depending on the amount of waste accepted at the facility that year.

the Volunteer Sites Program would work. Second, they establish procedures for issuing technical assistance grants to Community Supervisory Committees (CSCs). These are local committees to be appointed years in the future, if and when the Management Board names Candidate Sites for an LLRW facility. State law mandates that a CSC, assigned to represent its community's best interests, be given grants by the Board for technical assistance and planning. Just what that would entail is the subject of these draft regulations.

All three draft documents are subject to change after public input, before they are adopted by the Management Board in the late summer or fall. The Board's staff will summarize the public comments in August for the Board's review.

"Focus Questions"

The draft documents raise many issues, both general and specific. Although the Board does not wish to limit comments on the drafts to certain issues, some commenters may wonder on which particular topics the Board is especially hoping for suggestions. For this reason, a short handout entitled "Public Comment Focus Questions" is available from the Board's office. Among the discussion points covered in this handout, which leaves spaces for brief written comments, are the following topics:

- Safeguards required at an LLRW disposal facility.
- The potential for Massachusetts to form a regional compact with one or more states. By forming such a compact with, and accepting LLRW from, one or more other states, the Commonwealth could receive funds to help pay for facility costs and gain the right (under federal law) to exclude LLRW from outside the compact region.
- Arrangements to encourage two-way communication between the Management Board and the public during the site selection process.
- Assigning relative values to preference criteria later in the site selection process, after the screening of potential sites on the basis of exclusionary and conditional criteria. State regulations adopted in 1994 allow the Board to assign more "weight" to certain preference criteria, and even to apply additional preference criteria. (The site selection regulations, along with summaries of the criteria, are available from the Board's office.)
- The local referendum required by the ***Draft Volunteer Program Plan***. As proposed, a municipality would not be considered a "Volunteer Site Community" unless the site and an agreement (negotiated between the Management Board and the community) were approved by a local referendum.
- The draft proposal that a community could receive grants of up to $50,000 each to study the impacts of an LLRW disposal facility before officially volunteering a site. The draft plan states that certain environmental studies would be funded later, and not out of the $50,000 study grants.
- Incentives and assistance appropriate to a community whose volunteered site later becomes the final choice for the facility. Under the draft plan and draft implementation regulations, such a community would receive 6 percent of the facility's gross operating receipts for every year of facility operation. This is 1-2 percent higher than the amount that would be received by a non-volunteer site community. (See page 3.)
- The funding level for CSCs. The draft regulations propose that a CSC may receive up to $100,000 each year from the Board for consultants and administrative and clerical personnel, following the submission and approval of a budget for the money.
- Restrictions on the use of Board funding by CSCs. The draft regulations prohibit funding for judicial proceedings, or for on-site environmental investigations that are being conducted by the Board or its contractors (unless the Board approves such an investigation).

Summer Board Meetings
(Both 10 a.m. to 1 p.m.)
July 19 – 100 Cambridge St., Room 905, Boston.
Aug. 16 – 100 Cambridge St. Room 905, Boston.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617) 727-6018

FORWARD AND ADDRESS CORRECTION

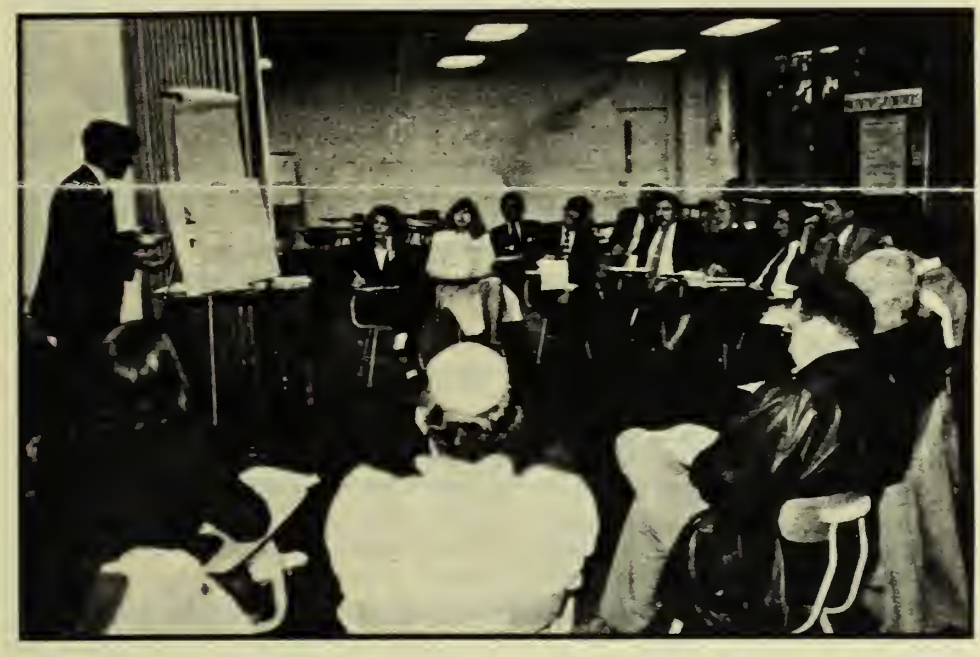
Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 4 - Number 3 - Summer, 1995



ENCOUNTER GROUP – Management Board staff engineer Richard Fairfull answers a question about LLRW at the Newton briefing session in May.

Board Ponders Public Comments After Spring Hearings, Briefings

The Low-Level Radioactive Waste Management Board is reviewing public comments and deciding what changes to make before finalizing the *Siting Plan*, its *Volunteer Sites Program Plan*, and associated regulations.

The three documents were issued April 28 for a three-month comment period that included three informal "briefing sessions" where the issues were discussed, and three recorded public hearings. Comments voiced at the hearings and received in writing by July 31 were summarized and grouped by topic in a memo to the Board, to facilitate deliberations at the Board's August and September meetings in Boston.

The comments, which came from businesses, local officials, health and environmental advocacy groups, and individuals, covered many topics relating to the management of low-level radioactive waste (LLRW). For example, several commenters felt that towns abutting the community where an LLRW disposal facility is sited should have more say in the process and should share in the monetary benefits.

Because the *Draft Siting Plan* covered the entire site selection process, all comments were relevant. Additionally, the Board is focusing on its proposals that would add to existing regulations, such as the Volunteer Sites Program Plan. This

(See COMMENTS, page 4)

Barnwell Reopens

The low-level radioactive waste (LLRW) disposal facility in Barnwell, South Carolina, is open to all states again after shutting out all but eight southern states for a year.

The reason for the policy reversal is that South Carolina's new Governor saw surcharges on LLRW as a lucrative source of funds for his state's school system. After failing to convince the Southeast Compact Commission to go along with his plan to make Barnwell a national site once again, Governor David Beasley pulled South Carolina out of the compact. His legislature approved the plan in early July. Like Massachusetts, South Carolina is now an "unaffiliated" state.

Although the shallow-land-burial facility could remain open as long as 10 more years (estimates vary), it does not qualify for the long-term disposal solution that the Massachusetts Low-Level Radioactive Waste Management Board is seeking for LLRW generated by nuclear power plants, research laboratories, and other Massachusetts businesses.

Nevertheless, it means LLRW requiring disposal in a licensed facility no longer has to accumulate for years on the premises of these LLRW generators.

The 237-acre, state-owned Barnwell site has been accepting waste for 24 years. Under federal law, South Carolina had the right to exclude waste from all but the states in the Southeast Compact after 1992. The Management Board negotiated an 18-month extension for Massachusetts

(See BARNWELL, page 2)

Publication No. 17719 - 4 - 6300 - 9/95 - .08 - C. R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board Finalizing M & S Contract

The Management Board is putting the final touches on a technical services contract with Foster Wheeler Environmental Corp. for Statewide Mapping and Screening. This is the first major phase of the technical site selection process, by which environmentally unsuitable portions of the state are to be identified and excluded from further consideration in the search for an in-state low-level radioactive waste disposal site.

The Board's tentative schedule calls for the report on excluded areas to be issued late next year. Public hearings will be held on the report, which will contain various maps of wetlands, major water supplies, 100-year flood zones, and other areas where a facility cannot be built under state regulations (see box at right).

"It's a first cut," explained Carol Amick, the Board's executive director. "We know we will miss some sensitive areas in this first report, but they will be identified and excluded later in the process."

The contract also calls for Foster Wheeler to draft procedures for the process, which will use computerized maps to "screen" the state. There are various ways maps can be examined and presented, and the Board will seek public comment on the draft procedures. An open house will be scheduled, to demonstrate the use of the mapping system.

BARNWELL *(Continued from page 1)*

generators, but after that, on June 30 of last year, the Commonwealth was one of 27 states that lost access to the facility.

Barnwell was scheduled to close altogether at the end of this year, to be replaced by the compact's new facility in North Carolina. That project is behind schedule.

The new arrangement requires LLRW generators to arrange transport permits with the state of South Carolina and contracts with Chem-Nuclear Systems, Inc., the state-licensed operator of the Barnwell site. Chem-Nuclear is also the contractor for the North Carolina site.

EXCLUSION CRITERIA

The upcoming Statewide Mapping and Screening Process will exclude areas in accordance with Massachusetts Department of Environmental Protection regulations (310 CMR 43.00). Any characteristic below would be enough to exclude land from further consideration.

Within Zone III of an existing public water supply with a maximum approved pump rate of 100,000 or more gallons per day, or within Zone II of any existing public water supply.

Over a sole source aquifer, or over a potential productive aquifer qualified for development as a public drinking water system, unless the site is proposed to be outside of the Zone II of any system and outside of the Zone III for systems pumping 100,000 or more gallons per day.

Probable waste management area (WMA) would be within the watershed of a Class A public surface drinking-water supply, or within any of the following areas of a Class B public surface drinking water supply: 400 feet from the 100-year flood plain elevation extending 1/2 mile upgradient from the supply intake and extending 200 feet downgradient from the supply intake or the physical spillway, whichever downgradient distance is less.

Within the zone of contribution of an existing or potential private groundwater source or non-community water system, unless the source/system is on land to be acquired by the state and used only for the facility.

Minimum depth to water table would be insufficient to prevent intrusion of groundwater into the waste, or average horizontal gradient in the uppermost aquifer is more than 0.01.

Water table below the bedrock surface, if between the bedrock and the bottom of the probable waste management unit there would be less than a minimum total thickness of 10 feet of (unsaturated) soil units (natural or placed) with a maximum saturated hydraulic conductivity of $1X10^{-4}$ cm/sec.

Probable WMA would be within any 100-year flood plain, or within 100 feet of a resource area protected by the Wetlands Protection Act, M.G.L. c. 131, s. 40, and 310 CMR 10.00.

A coastal high-hazard zone, or land that drains poorly and is subject to periodic flooding or frequent ponding, or could not be adequately analyzed and monitored with respect to hydrology, geology, etc., or is subject to inundation by the failure of an existing dam.

Upland drainage areas unable, by natural drainage patterns and normal engineering drainage controls, to reliably channel the surface runoff expected from a statistical 100-year flood without significantly eroding or inundating the probable WMA, or a hydrogeologic unit within the probable WMA discharges groundwater to the surface.

Local tectonic processes reasonably likely to adversely affect the ability of the probable WMA to meet Massachusetts Department of Public Health (DPH) performance objectives, or that preclude adequate modeling and prediction of long-term impacts.

Probable WMA would have an average slope greater than 20 percent, or would be located in the vicinity of surface geologic processes such as mass wasting, erosion, slumping, landsliding, which occur with such frequency and extent that such events would be reasonably likely to adversely affect the ability of the site to meet any DPH performance objectives, or would preclude adequate modeling and prediction of long-term impacts.

Existing population density, projected population growth, or future development in the vicinity is reasonably likely to interfere with the ability of the facility to meet DPH performance objectives, or probable WMA is in proximity to sensitive population locations, as a result of which (a) it is reasonably likely the site will not be able to meet the DPH performance objectives; or (b) the exposure to radiation or toxic materials (if mixed waste is to be accepted at the site) which a member of the affected sensitive population is reasonably likely to receive in the event of a release of radiation or hazardous waste from the site would result in a significantly higher-than-normal risk of adverse effect on the health of the sensitive population.

Commonwealth unable to obtain title, or site too small to contain a WMA, a buffer zone, and other facility components, or to otherwise meet the minimum land areas determined by the Management Board to be required for suitable facilities.

Not reasonably likely to meet DPH performance objectives based on a performance assessment that, at a minimum, incorporates the facility design standards of probable suitable technologies in 105 CMR 120.815.

Probable location of the WMA in relation to nearby activities is reasonably likely to adversely affect the ability of the site to meet DPH performance objectives, or probable location of the WMA in relation to nearby past or present activities is reasonably likely to significantly impair the environmental monitoring program, including, without limitation, existing or past activities or natural sources that emit radioactivity or release non-radioactive material into the environment to the extent that it is reasonably likely to adversely affect the ability of the environmental monitoring program to detect or monitor the existence or magnitude of emissions or releases from the facility or the site.

Prime agricultural land, based on U.S. Soil Conservation Services soil classification or on designation as an agricultural incentive area pursuant to M.G.L. c. 40L, s. 1 et seq. on or before 12/31/92.

Area of Critical Environmental Concern designated pursuant to M.G.L. c. 21A, s. 2(7): St. '74, c. 806, s. 40(e) and 301 CMR 12.00, or scenic and recreational river or stream designated pursuant to 302 CMR 3.00.

Reasonably likely to adversely affect any national park, monument, lake shore, habitat of endangered species, or area protected by the Wilderness Act (16 USC ss. 1131-1136), the Wild and Scenic Rivers Act (16 USC ss. 1771-1287), the Fish and Wildlife Coordination Act (USC ss. 661-666c), or the National Historic Preservation Act (USC ss. 470-470m).

Perspectives

Two familiar voices at the public hearings in June were those of Tom McShane and Mary Elizabeth Lampert. Already familiar to Management Board members from their dueling comments at monthly Board meetings, Tom and Mary spoke from different points of view. For what could become an occasional feature in LLRW UP-FRONT, *we asked them to summarize, in 250 words, their opinions on the Board's proposed Volunteer Sites Program (VSP).*

VSP Is Sound Public Policy

By Tom McShane

In 1980, the federal government set a course regarding LLRW that was based on hysteria and politics and ignored science and technology. Massachusetts voted to begin a deliberative process of siting while continuing to pursue out-of-state options. As part of that process the Management Board has proposed an additional mechanism, the Volunteer Sites Program, whose intent is to provide an opportunity for citizens and government to find a solution together, with greater cooperation and less confrontation.

With the program regulations in place, a land-owner's offer to volunteer their land as a facility site must be publicly disclosed and debated, reviewed by local officials, and put to a voter referendum. Without the new program, such action could occur behind closed doors. We believe local citizens have a right to be kept informed and participate. While this program is not the whole solution, it provides inroads towards finding one, and it gives citizens the information they need to play a meaningful role.

Everyone wants a national solution, but we can't stick our heads in the sand and just continue to wait. Sixteen years of experience has taught us that the federal government will not protect our interests. Thirty years of experience has taught us that LLRW can be safely transported and disposed. And decades of experience as the nation's premier technological state has taught us how important the impacted industries are to Massachusetts.

The Volunteer Program is good, sound public policy. It just might be the new approach we need.

Tom McShane represents NELRAD, an association of Massachusetts radioactive materials users.

Not Here – Not Now – Not Fair

By Mary Elizabeth Lampert

Not here -- there is no waste crisis in Massachusetts. We are not a major producer. A handful of companies generates 99 percent of our waste. This does not justify a site.

Only one to three LLRW sites are needed nationwide. Massachusetts, with high population density, high water tables, icy roads, and frequent storms (northeasters and tornadoes), makes no sense.

Not now -- radioactive waste is not simply a Massachusetts problem. To succeed, we must first re-examine flawed national waste policies to:

- Redefine radioactive waste as ''high-'' or ''low-'' level according to hazard level and longevity.
- Minimize production of new waste.
- Determine exactly how many sites are really needed nationwide, and where they should be.

Not fair -- the Board's ''volunteer'' program:

- Ignores nearby towns that will be affected for thousands of years.
- Provides a ''referendum'' only in the "volunteer" community; and the town's vote can be ignored. Two-thirds approval, by voters in all affected towns, must be prerequisite to siting.
- Is premature. Decide first: How big a dump? For how many states? How much will be toxic for thousands of years?
- Does not permit adequate independent studies. Too little funding, for only ''Board approved'' studies, by only the "volunteer" community.
- Compensates only the ''volunteer community,'' and perhaps a few individuals within 0.5-1 mile. All affected towns deserve compensation. All within 5-10 miles need a fair opportunity to move.
- Inevitably saddles the town and the state with huge potential liability.

Mary Elizabeth "Pixie" Lampert is a citizen activist, homemaker, and former teacher.

COMMENTS *(Continued from page 1)*

would establish procedures by which landowners would be able to volunteer sites for further evaluation, but the program would not begin until after the first elimination of environmentally unsuitable areas has occurred through the Statewide Mapping and Screening Process.

The Board is proposing that the operation of a facility at a volunteered site that has the support of the municipal government and has been approved in a local referendum would entitle the community to an extra 1 or 2 percent of the gross operating receipts from the facility for every full year of operation.

The deliberative, lengthy site selection process is just beginning. No locations are being considered at this early stage. If an in-state site is selected, the facility could be up and running sometime around the year 2002 at the earliest. However, the Board's preference is still to negotiate a long-term agreement with another state to take the Commonwealth's LLRW.

Video, Health Paper Available to Public

The Management Board's new 15-minute video program, entitled "Searching for Solutions," is available on loan from the Board's office (address below).

Available free of charge is a 27-page staff technical position paper entitled "Responses to Comments on the Health Impacts of LLRW Management and Related Issues."

Shipped LLRW Totals Jumped Again in '94, Latest Management Board Survey Shows

For the third year in a row, decommissioning and remediation projects boosted the amount of low-level radioactive waste (LLRW) shipped out of state for disposal.

The 1994 shipped totals came to 1,082,172 cubic feet of LLRW containing 140,934 curies. Contaminated soil from the dismantling of the U.S. Army's Materials Technology Laboratory in Watertown accounted for 84 percent of the volume, yet contained less than one-tenth of a curie when measured by its radioactivity. On the other hand, reactor components from the dismantling of the Yankee nuclear power plant in Rowe contained 92.4 percent of the radioactivity, but by volume amounted to only 221 cubic feet. The 1993 totals were 106,980 cubic feet of waste shipped, containing 38,070 curies.

The contaminated soils went to a special site for such waste in Utah, but the more radioactive components went to the disposal facility in Barnwell, South Carolina. Although this facility was open to Massachusetts LLRW generators for only the first half of 1994, Massachusetts LLRW generators knew in advance that they would probably lose access to Barnwell, and no one knew when they would be able to ship their waste to such a facility again, or what the future disposal fees might be. Consequently, Yankee Atomic Electric Company stepped up its decommissioning efforts and shipped as much LLRW as it could to Barnwell before access ended.

The figures are from the Management Board's annual *Survey Report*, to be published this fall. The report will explain the types and quantities of LLRW produced in the Commonwealth and how the waste was managed in 1994. The data, which show trends, are essential to the Board's planning efforts.

H.S. Teacher Drafting Resource Packet

Barnstable High School chemistry teacher Erica Meister is working under contract with the Management Board to develop materials to help students learn about radiation, the use of radioactive materials, and the management of radioactive waste.

Designed for secondary school science teachers, the Teachers' Resource Packet (TRP) will be built around interactive learning activities, some of which may interest social studies teachers as well. After a pilot program, the TRP should be available sometime next year.

Upcoming Board Meetings
(All are 9 a.m. to 12 noon)

Sept. 20 – 100 Cambridge St., Room 905, Boston.
Oct. 18 – 100 Cambridge St. Room 905, Boston.
Nov. 15 – 100 Cambridge St., Room 905, Boston.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617) 727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 4 - Number 4 - Fall, 1995

Upcoming Board Meetings

- Dec. 6 – 9 a.m. - noon, Room 905, 100 Cambridge St., Boston.
- Jan. 10 – 10 a.m. - 1 p.m., Room 905, 100 Cambridge St., Boston.

Tentative Time-line For M & S Process

The Management Board has decided on a tentative schedule for public participation opportunities during the Statewide Mapping and Screening process.

Mapping and Screening is the first major phase of the technical site selection process, by which environmentally unsuitable portions of the state are to be identified and excluded from further consideration in the Board's search for an in-state low-level radioactive waste (LLRW) disposal site.

The time-line calls for public meetings in early 1996. These will be to familiarize the public with proposed procedures for developing exclusionary maps of the Commonwealth. The Board's staff also will conduct general public briefings around the state.

There are various ways data (about a wetland or flood plain, for instance) can be examined and presented, using the state's Geographic Information System (GIS). And the Board will have to decide which exclusionary criteria cannot be mapped at this stage because of a lack of adequate data. The goal is to let citizens help decide such procedures before Foster Wheeler Environmental Corporation, the Board's contractor, begins the actual mapping.

(See TIME-LINE, page 4)

Uncertainty Drives Siting Policy

Why should the Management Board continue looking for a suitable in-state site for a low-level radioactive waste (LLRW) disposal facility?

In a word, uncertainty.

Although the power plants, research labs, and other businesses that generate LLRW in Massachusetts can once again ship their waste to the Barnwell, South Carolina, disposal site, no one is certain how much longer that facility will accept such waste. South Carolina officials say it could be 7 to 10 years before the facility is full. Although innovative volume-reduction techniques could possibly add years to those estimates, the political pendulum could slice right through them.

Open and Shut Case

Barnwell was closed to most states from July 1994 to July 1995, and it was only a new governor's desire to raise money for South Carolina's education system that brought about the renewed access. But a coalition of conservation and civic groups has filed suit to challenge new legislation that permits the site to stay open beyond December 31, 1995, the date set previously for permanent closure of the site to all generators.

Because of this national uncertainty, the Management Board is seeking a long-term (at least 30 years) disposal solution. The Board is using the time available in its slow, deliberative siting process to continue discussions with other states about a possible agreement whereby another state would take Massachusetts LLRW. California and Texas, for instance, have already chosen sites for new facilities, but both have suffered political setbacks. It is anyone's guess if and when they will begin construction.

Although the out-of-state option is the Board's preference, it cannot count on such a scenario. So once again, uncertainty dictates the need to continue the cautious in-state siting process.

There is no shortage of rumors when it comes to LLRW disposal. Some say Envirocare, a privately owned facility in Utah, will soon get permits to accept more than the contaminated soils and other high-volume, low-activity LLRW that it takes now. Such competition could stretch out Barnwell's capacity and force disposal costs down.

There are also proposals to ship waste overseas. Such ideas have been around for years, but none has panned out.

Regardless of the immediate source, rumors tend to flourish in an environment of -- you guessed it -- uncertainty.

Kristen Erickson, radiation safety officer for Michigan State University, told a recent gathering of LLRW generators that training and close supervision are key to minimizing LLRW in a research setting. *See story, page 2.*

Publication No. 17728 - 4 - 6600 - 11/95 - .08 - C. R.
Approved by: Philmore Anderson III, State Purchasing Agent

Board-Member Profile

Turf Farmer L'Etoile Joins Board

Bonnie L'Etoile

Having been raised in a farming family, Bonnie L'Etoile has had hands-on experience with the environment on a daily basis for nearly her entire life. To those familiar with her commitment to public interest issues, it should be no surprise that Bonnie is concerned with the management of low-level radioactive waste (LLRW).

"We can't hide from a problem by simply exporting it out of state and out of mind -- the most suitable environmental site should be chosen," says Bonnie, recently appointed by Governor William Weld to serve as one of three Management Board members chosen for their experience, background, and professional training in environmental protection that enables them to act in the public interest. "The management of low-level radioactive waste is a serious issue which must be dealt with in an intelligent, honest manner."

Bonnie, who is the only representative on the Board from western Massachusetts, grew up on a potato farm in Rhode Island. In 1986, she, her husband, and their two sons moved to Northfield to own and operate Four Star Farms, Inc. Their farm includes 270 acres of turf and 30 acres of field-grown nursery stock.

Since moving to Northfield, Bonnie has been active on town boards and committees. Her first experience in public service was in 1989 when she ran for the Northfield Planning Board as an Independent, with the Republican Party nomination and Democratic Party endorsement. She won that race, was re-elected in 1994, and recently completed a two-year term as its chairman. As a member of the Planning Board, she has reviewed site plans, experience she can put to use with the Management Board.

Bonnie serves in another capacity on the state level, in addition to her membership on the LLRW Management Board. She is a member of the State Wetlands Monitoring Committee, which is studying the effects of the 1991 amendments to the Wetlands Protection Act. Bonnie is particularly interested in the consequences of the agricultural exemptions contained in the Act. She was also an original member of a group of citizens and businesses from towns on the Connecticut River that was organized to address concerns about the causes and extent of erosion along that river.

As a farmer from western Massachusetts, Bonnie brings a new perspective to the Board. She is eager to work with the public and other Board members on the management of the LLRW being generated in the Commonwealth. "No matter how one feels about the use of radioactive materials, we need to work towards finding a long-term solution to this problem," she says.

RAM Users Hear Talks on LLRW Minimization

Waste minimization was the focus of the Management Board's semiannual meeting for radioactive materials (RAM) users October 27 in Boston.

The event included presentations on LLRW minimization in a university setting and in the growing biotechnology field.

Robert Hallisey, director of the Department of Public Health's (DPH's) Radiation Control Program, summarized his latest activities to obtain Agreement State status from the U.S. Nuclear Regulatory Commission (NRC). As an Agreement State, Massachusetts, through DPH, would take over the regulation of RAM users now regulated by the NRC, except nuclear power plants and federal facilities.

Look for more on minimization techniques and the Agreement State program in the next issue of *LLRW UP-FRONT.*

NRC Orders Yankee To Halt 'Major' Decommissioning

The U.S. Nuclear Regulatory Commission (NRC) has ordered the Yankee Atomic Electric Company to stop further "major" dismantling or decommissioning activities at its nuclear plant in Rowe.

The October 12 order was in response to a July ruling by the U.S. Court of Appeals that a 1993 policy change, by which NRC reinterpreted its own decommissioning regulations, was illegal and "seemingly irrational." Under that interpretation, NRC allowed Yankee to begin decommissioning before approving its official decommissioning plan and without an Environmental Impact Statement or an adjudicatory hearing.

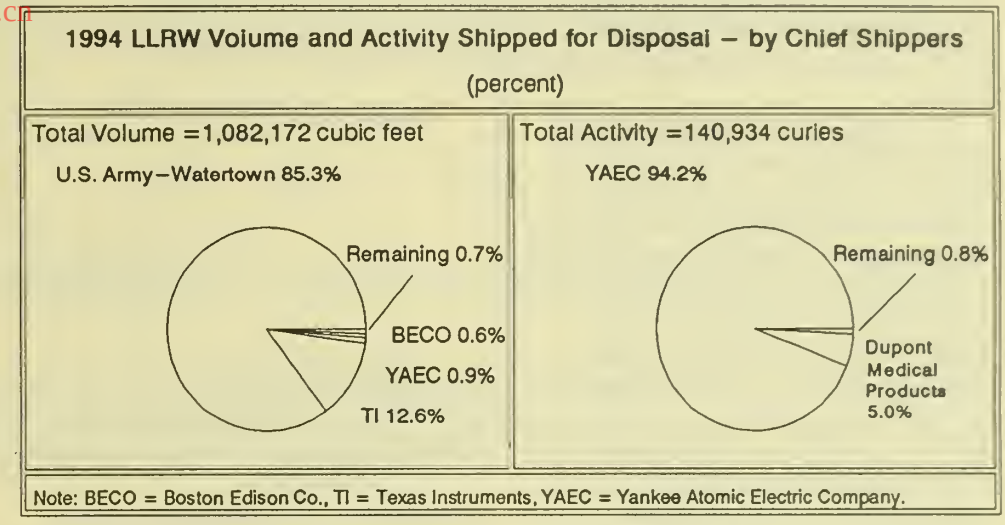
While awaiting the NRC's "expedited adjudicatory hearing process," Yankee will continue to ship LLRW from non-major decommissioning activities to the Barnwell, South Carolina, disposal site, according to a company spokesman.

The Management Board is monitoring the management and disposal of LLRW generated by Yankee as the Board evaluates present and future disposal needs in the Commonwealth.

Highlights of *1994 Survey Report*

For the third year in a row, major decommissioning and remediation projects boosted the amount of low-level radioactive waste (LLRW) shipped to out-of-state disposal facilities.

These projects generated more than 90 percent of the total LLRW shipped in 1994, measured both by volume and by radioactivity. Without these "non-routine" sources of waste, the totals would have come to 13,966 cubic feet and 8,192 curies. Counting these sources, the overall total of LLRW shipped came to 1,082,172 cubic feet and 140,934 curies. In 1993 the corresponding totals were 15,125 cubic feet and 20,824 curies of LLRW shipped before counting major decommissioning and remediation waste and 106,980 cubic feet and 38,070 curies shipped altogether.



Report To Provide Details

The figures are from the soon-to-be-published *1994 Massachusetts Low-Level Radioactive Waste Survey Report*, which provides a detailed view of who is producing what types of LLRW in what quantities, and how this waste was managed in 1994. The data is compiled from a questionnaire sent to businesses and institutions licensed by the U.S. Nuclear Regulatory Commission to possess radioactive materials in Massachusetts.

Nearly all (94.2 percent) of the radioactivity in last year's shipped waste was in cooling system components and other irradiated hardware from the Yankee nuclear power plant in Rowe. This plant is being dismantled by its owner, the Yankee Atomic Electric Company.

However, when the 1994 shipped waste stream is measured by volume, it is dominated by high-volume, low-activity (HVLA) waste. This is predominately contaminated soils and building rubble from the decommissioning of sites such as the U.S. Army's Materials Technology Laboratory in Watertown. That site accounted for 85.3 percent of the volume of LLRW shipped out of state in 1994.

Massachusetts LLRW generators had access to three disposal sites in 1994. Most HVLA waste was sent to a site in Clive, Utah. Some LLRW containing naturally occurring or accelerator-produced radioactive material (NARM) went to a site in Hanford, Washington.

Barnwell Took the Rest

The more highly radioactive LLRW, primarily from Yankee Rowe, was shipped to Barnwell, South Carolina. The Barnwell facility was open to Massachusetts generators through June 30, 1994, when it was closed to all but eight southern states. Massachusetts generators knew loss of access was likely, and planned accordingly. For instance, Yankee Atomic accelerated its decommissioning efforts and shipped as much LLRW as it could before June 30. A year later, in July 1995, the Barnwell site reopened.

Measured by radioactivity, nearly half (48.9 percent) of the shipped LLRW was iron-55, with cobalt-60 accounting for 38.7 percent and nickel-63 for 6.4 percent. Hydrogen-3 (known as tritium), an isotope of hydrogen that remains after the purification of research tracers, contributed only 5.2

(See SURVEY, page 4)

Radionuclides Contributing to 1994 Activity Shipped for Disposal (curies)

Radionuclide	Half-life	Activity	% of Total	Major Contributor
Iron-55	2.7 years	68,917	48.9	Utility
Cobalt-60	5.27 years	54,495	38.7	Utility
Nickel-63	100 years	9,044	6.4	Utility
Hydrogen-3	12.3 years	7,319	5.2	Commercial
Remaining Nuclides	N/A	1,159	0.8	N/A
Total	N/A	140,934	100.0	N/A

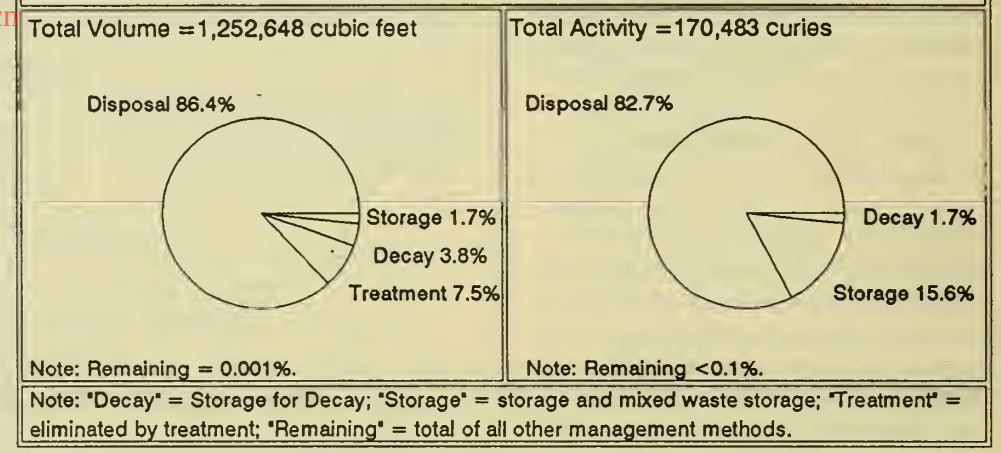
SURVEY *(Continued from page 3)*

percent to last year's total. The *Survey Report*, which is available free from the Management Board office, contains a complete list of radionuclides found in LLRW shipped out of Massachusetts in 1994.

Of the 583 organizations surveyed, 238 (40.8%) said their use of radioactive materials generated LLRW. The remainder said they produced no LLRW or did not possess radioactive materials in 1994. Of the 238 LLRW generators, 77 indicated that they shipped at least a portion of their LLRW out of state for disposal during 1994. LLRW shipped for disposal accounted for 86.4 percent by volume and 82.7 percent by radioactivity of all LLRW generated in the state that year. Some of this waste was reduced in volume through treatment processes, including compaction and incineration, prior to disposal.

Whether they ship LLRW out of state or not, generators manage some of their waste by other methods -- storage for decay (for short-lived radionuclides only); storage for future disposal; incineration; transfer to an authorized recipient (such as returning a sealed source of radiation to the manufacturer); and federally authorized non-LLRW releases to the atmosphere and sewer systems.

1994 LLRW Volume and Activity Reported – by Management Method
(percent)



Note: "Decay" = Storage for Decay; "Storage" = storage and mixed waste storage; "Treatment" = eliminated by treatment; "Remaining" = total of all other management methods.

Before treatment or shipment, the total volume of LLRW reported produced in 1994 came to 1,252,648 cubic feet and the radioactivity totaled 170,483 curies.

High-level radioactive waste is the responsibility of the federal government.

TIME-LINE *(Continued from page 1)*

After such procedures are finalized by the Board, probably next summer, there will be an open house and demonstration to explain the GIS system.

Mapping will then begin, and Foster Wheeler will draft the *Statewide Mapping and Screening Report* with input from Board members and staff. The draft report is tentatively scheduled to be issued for public comment in January 1997. Six public hearings will be held on the report that winter and spring. Comments will be recorded for use in the next step of technical screening -- the naming of Possible Locations for a disposal site.

As currently proposed, the Board's Volunteer Sites Program (VSP), under which a municipality can, through a referendum, volunteer a specific parcel of land for the Board's consideration, will precede the naming of Possible Locations. The Board expects to finalize the VSP later this fall.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 5 - Number 1 - Winter, 1996

Draft Procedures Issued Jan. 8

Board Seeks Participation Before Mapping Begins

The Massachusetts Low-Level Radioactive Waste Management Board is seeking public comments on how to map areas of the Commonwealth that would be unsuitable for a low-level radioactive waste (LLRW) disposal site.

On January 8 the Board issued its draft procedures for Statewide Mapping and Screening, a first-pass, broad-brush exercise that constitutes the first major step in a gradual and deliberative site selection process. Entitled the *Draft Statewide Mapping and Screening Protocol and Procedures*, this document will be the subject of three workshops in February. Written comments on the draft are strongly encouraged, and will be accepted at the Management Board's office until 5 p.m. March 15.

Once finalized by the Management Board, the Protocol and Procedures will guide the Board's mapping contractor, spelling out which computerized data will be used and how they will be depicted. Special Department of Environmental Protection site selection regulations require the consideration of drinking water sources, geology, land use, and additional criteria. Although other areas will be excluded later in the siting process, based on site-specific data, Statewide Mapping and Screening will exclude from further consideration large portions of the state that can be practically observed on statewide maps.

***Need a copy of the* Draft Protocol and Procedures?**
Write (address on page 4), call (617) 727-6018, or FAX to (617) 727-6084).

At the February workshops, elected officials, members of appointed town boards, and others with an interest in the process will learn about and discuss the draft procedures. Comments from people with knowledge of computerized Geographic Information Systems (GIS) will be especially helpful.

No specific localities are being considered for the disposal site at this early stage. After Statewide Mapping and Screening, landowners (including municipalities) will be able to volunteer potential facility sites for closer study. An in-state facility could not be ready to take waste until after the year 2000.

Although it is commencing its search for an in-state LLRW disposal site, the Management Board's preferred choice for meeting the Commonwealth's LLRW disposal needs continues to be an agreement to use another state's disposal site, a possibility that would make an in-state facility unnecessary. The Board is still vigorously pursuing this choice.

State law prohibits the landfilling of LLRW (an in-state facility would not be a "dump") and requires the site community to be involved in choosing the facility technology, which must include barriers to isolate the waste containers.

Public Meeting Schedule

Feb. 7 – Regular Management Board Meeting – 2-5 p.m., Bangs Community Center, Children's Activity Room, 70 Boltwood Walk, Amherst.

Feb. 7 – Briefing Session on *Draft M & S Protocol & Procedures* – 7-10 p.m., Bangs Community Center, Pole Room, 70 Boltwood Walk, Amherst.

Feb. 15 – Workshop – 7-10 p.m., Waltham Public Library, Lecture Hall, 735 Main St., Waltham.

Feb. 28 – Workshop – 7-10 p.m., Springfield College, Locklin Hall, Room 234, 210 Alden St., Springfield.

Feb. 29 – Workshop – 7-10 p.m., Pittsfield City Hall, City Council Chambers, 70 Allen St., Pittsfield.

March 15 – Public comment period closes.

March 20 – Regular Management Board Meeting – 10 a.m. - 1 p.m., 100 Cambridge St., Room 905, Boston.

Call (617) 727-6018 for more details.

Publication No. 17784 - 4 - 6,600 - .08 - 1/96 - C.R.
Approved by Philmore Anderson III, State Purchasing Agent

NRC to Act Soon

Agreement State Status Nears

Robert Hallisey

After a lengthy application process begun by Governor William Weld in 1992, the Massachusetts Department of Public Health (DPH) is poised to take over the regulation of most users of radioactive materials in the Commonwealth.

Robert Hallisey, director of the DPH Radiation Control Program, was the point man as the U.S. Nuclear Regulatory Commission (NRC) conducted a thorough review of his plans to expand his program to take on the extra work. Hallisey predicts the agreement will be signed by March. After the signing, Massachusetts will be an "Agreement State," like 29 other states. Hallisey's staff will grow by nine (seven professional and two clerical) in order to issue licenses and carry out inspections and reviews currently handled by NRC's regional office in Pennsylvania.

There are some exceptions to the switch -- federal government licensees and those who operate nuclear reactors (nuclear power plants and some universities) will still report to the NRC.

Agreement State status is needed for the full implementation of the Massachusetts Low-Level Radioactive Waste Management Act (M.G.L. Chapter 111H), including provisions that call for DPH to enforce its regulations that require licensees to limit the amount of radioactive material they use in the first place and to minimize their low-level radioactive waste (LLRW). Another facet of Agreement State status will be the authority of DPH to license an in-state LLRW disposal facility, if one is sited. If Massachusetts were not an Agreement State, such a license application would go through an NRC review process.

Hallisey expects the various fees that radioactive materials users will be charged by DPH to amount to only about one fifth of what NRC charges now.

In addition to determining that various state regulations are adequate for the transfer of authority and consistent with federal regulations and those of other Agreement States, the NRC review of the state's application included a close look at the Radiation Control Program's budget, staffing plans, laboratory, training, guidelines, inspection procedures and schedules, forms, and other preparations. DPH has submitted more than 2,250 pages of documentation to NRC.

NRC employees also have stepped up their efforts to complete all pending applications for license amendments before turning licensee records over to the state.

Once the transition is complete, Hallisey's staff will still have access to technical assistance from NRC, but NRC may bill the state for such assistance.

"I feel strongly that becoming an Agreement State is part of a comprehensive radiation control program to ensure that the citizens of the Commonwealth are being protected from all sources of radiation," Hallisey said.

Governor Proposes Elimination of Management Board

Governor William Weld's downsizing plan for state government calls for elimination of the Management Board and transfer of the Board's functions to three other state agencies.

The Board is one of 263 boards targeted by the plan, which also proposes five fewer secretariats and 76 fewer agencies. In addition, the plan would reduce the size of government by 7,500 employees and privatize many government functions.

At press time it was unclear how or when the Legislature would respond to the plan, which is part of the Governor's annual budget package.

Shope Resigns From Board

After seven years of service, Judith Shope has resigned from the Management Board. Legislative Director for the Environmental Lobby of Massachusetts (ELM) for over 10 years, Shope served as one of three Management Board members chosen for their professional training and experience in environmental protection.

Shope recently accepted a position as the Recycling Policy Coordinator for the Department of Environmental Protection's Division of Solid Waste. Although DEP employees can serve as Board members, Shope's decision to resign was a result of her desire to focus her efforts on this new position.

Management Board members are appointed by the Governor. Nominations for Shope's recently vacated seat can be submitted to the Governor's office by environmental organizations with statewide membership that have demonstrated an interest in LLRW management.

Another vacant seat is reserved by law for someone with professional training and experience in public administration. Nominations for this position can be made by organizations with statewide membership that have demonstrated an interest in public or municipal management.

Speakers Provide Minimization Tips

Four experts on the minimization of low-level radioactive waste (LLRW) explained their techniques at the Management Board's semiannual meeting for radioactive materials users October 27 in Boston. The emphasis was on reducing the amount of relatively long-lived LLRW -- the kind that must be shipped to a disposal facility.

"It's working," said Kristen Erickson, radiation safety officer for Michigan State University. Erickson described her success at minimizing the university's LLRW, chiefly through storage for decay and incineration. To make sure exposure limits for the general public are not exceeded, the university first stores much of its waste (in burnable fiber drums) long enough to allow radiation levels to drop to permissible limits before burning.

Training and close supervision of researchers permitted to use radioactive research tracers has paid off in terms of less waste that requires shipment to an out-of-state disposal facility, she explained. Faculty members know that broken rules can result in a closed laboratory.

Representatives of companies using radioactive materials pick up printed materials at a meeting last October on LLRW minimization techniques.

Since 1987 Erickson has required the separation of long-lived radionuclides from short-lived whenever possible. A special university tag on the waste container shows the explicit contents. All waste is carefully tracked in a computerized database.

Next to speak was Michael Dryzyga, radiation safety officer for the New-Jersey-based Hoffman-LaRoche pharmaceutical firm. Dryzyga said he detects a slow movement away from the use of radioactive research tracers, toward new chemo-luminescent tracers. Although this has reduced the company's LLRW waste stream somewhat, he noted that these non-radioactive substitutes may not be sensitive enough for some research.

Most Hoffman-LaRoche waste is liquid LLRW, and much of it can be diluted for sewerage disposal without exceeding federal radiation limits for such disposal. Longer-lived radionuclides can sometimes be filtered out and held until they lose some of their radioactivity before flushing.

Extra Incentive

As with the Michigan State minimization program, Dryzyga has instituted better training for scientists who use radioactive materials, an audit of waste handling procedures, and segregation of radionuclides when feasible. As an additional minimization incentive, he has added internal fees, paid by research departments based on how much LLRW they generate.

Much of the company's dry LLRW is compacted on site and held for radioactive decay. Radioactive carcasses of animals used in Hoffman-LaRoche drug research are either incinerated on site (with the ashes stored for radioactive decay) or dissolved in a solution of acids in order to produce a flushable slurry.

Next, Lou Todisco discussed LLRW management practices at Du Pont NEN Research Products, in Boston, where he is a safety and environmental affairs supervisor. He strongly emphasized involving all levels of employees and encouraging and rewarding practices that optimize the use of radionuclides.

Michael Dryzyga explains his company's disposal of liquid LLRW.

Todisco noted the importance of identifying and reviewing all large-volume operations. Du Pont did this and found several ways to minimize the volume of waste it ships for disposal. For instance, Du Pont has begun washing and reusing radioactive lab coats, which previously had been a significant portion of their shipped waste.

Du Pont NEN manufactures radioactive tracers, which are sold to life-science labs worldwide. The company generates a large amount of tritium-contaminated waste each year, but it has developed a process for recycling 40 to 50 percent of its higher-concentration tritium waste for reuse in the production process. For some tritium waste shipped for disposal, the company developed the Special Stabilized Package (SSP), a unique ten-gallon container. The SSP packages the waste more effec-

(See MINIMIZE, page 4)

Court Decision Alters Assessment Policy

The Massachusetts Supreme Judicial Court (SJC) issued a ruling on October 17, 1995, that has affected the way the Management Board assesses the Commonwealth's generators of low-level radioactive waste (LLRW).

The SJC ruled on a case brought against the Board by Concord-based Nuclear Metals, Inc., which had challenged the Board's assessment law. While the decision validated the assessment law, it also directed the Board to review and change its assessment procedures.

An assessment is composed of two parts: 1) a $75 fee charged to all NRC licensees and Massachusetts Department of Public Health registrants, and 2) a proportional fee based on the volume and activity of LLRW that is "shipped for disposal or stored for later disposal."

Because LLRW decays while in storage, the Board had previously assessed such stored waste in the year in which it was shipped for disposal, in order to get the most accurate measurement of the activity requiring disposal.

However, the court, in a decision centering on the meaning of the word "or," ruled that LLRW stored for future disposal instead should be assessed the year it is placed into storage.

The Board has implemented the SJC ruling in calculating the Fiscal Year 1996 (FY 96) assessments, and has conducted a review of waste in storage to determine what volumes and activities are being "stored for future disposal" and what volumes and activities are not. Waste stored for complete decay is not assessed.

For FY 96, eligible LLRW has been assessed at a base rate of $9.96 per cubic foot for Class A, B, or C waste. High-volume, low-activity waste will be assessed at $0.62 per cubic foot. These rates were applied to volume and activity data averaged from 1993 and 1994 to calculate the FY 96 assessments.

MINIMIZE *(Continued from page 3)*

tively and safely than traditional means. Up to 10,000 curies of tritium -- instead of the 8 curies allowed by earlier methods -- now can be packaged into a single 83-gallon High Integrity Container and shipped for disposal.

Carolyn Owen, from Lawrence Livermore Laboratory, focused on LLRW management issues confronting small biotechnology companies. These companies, many of which are located in and around Boston, cannot benefit from the economies of scale that the large waste generators utilize to minimize volume, she pointed out.

While acknowledging the limitations faced by companies with few employees and limited space, Owen outlined a number of ways any LLRW generator could improve its waste management practices.

She also urged small companies to implement radioactive waste quality assurance programs and to eliminate the use of common waste rooms. She said a quality assurance program should include fully labeling all wastes; using qualified staff to remove waste; and setting up a storage area for sorting waste streams into drums by type and radionuclide.

"If you don't know what's in it, you can't get rid of it," she said.

Owen also advised limiting the use of radionuclides with long half-lives whenever possible.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

Gubernatorial Appointees:
Barry Connell
Charles B. Killian
Bonnie L'Etoile
John A. Mayer, Jr.
Joseph P. Ring

Cabinet Secretaries:
Trudy Coxe (Environmental Affairs)
Gerald Whitburn (Health & Human Services)

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 5 - Number 2 - Spring, 1996

Mapping Put Off, Planning To Continue

Some Siting Tasks Suspended

The Massachusetts Low-Level Radioactive Waste Management Board voted March 27 not to proceed with certain scheduled tasks that would have moved the Board closer to selecting an in-state site for an LLRW disposal facility.

A "Pause"

By a 6 to 1 vote, the Board reaffirmed the siting vote it made in February, 1994, but agreed to cease certain Statewide Mapping and Screening activities for the time being. Leo Roy, vice chairman of the Board and undersecretary of environmental affairs, compared the vote to pressing the "pause" button on a videocassette recorder.

The Board also reaffirmed other votes taken two years ago, to:

- Continue discussions with other states and regional compacts that have existing disposal facilities or are developing new ones, about possible access for Massachusetts LLRW generators.
- Aggressively pursue radioactive source and LLRW volume minimization.
- Communicate to federal officials certain Board recommendations regarding federal LLRW management law. These changes include requiring radioactive materials users nationwide to implement minimization programs and encouraging federal assistance to states who are trying to implement LLRW management solutions.

About 40 people attended the public hearing preceding the vote. Representatives of NELRAD (an organization of radioactive materials users) and Associated Industries of Massachusetts urged the Board to slow down the siting process in order to avoid wasting money on sting steps that may prove to be unnecessary.

The Board's budget is funded by fees from the companies and institutions that generate the waste. In addition to yearly assessments, a state bond authorization earmarked for either in-state siting activities or an "entry fee" for long-term access to some other state's disposal facility remains on the books. If bonds are ever issued, state law requires the funds (up to $45 million) to be paid back by the generators who use the facility.

Barnwell a Factor

The generators also urged the Board to monitor pertinent developments in other states, such as the reopening last summer of the disposal site in Barnwell, South Carolina, to states outside the South; the expansion of Envirocare of Utah's license allowing that company to accept most Class A waste; and the possibility that the next governor of Washington State might reopen the Hanford disposal site.

Longtime siting opponents from citizens' groups including Don't Waste Massachusetts and Greenpeace contended that the Commonwealth is inappropriate for a disposal site. They also argued that the Board should reverse its earlier siting decision because over 60 municipalities (out of 361) had passed anti-siting resolutions.

What Will Cease, What Won't

The Board's vote specifically means that it will put off for the time being the mapping of areas that would be excluded from further consideration in its search for an in-state LLRW disposal facility. This in turn means a report on the maps, previously scheduled for publication and public review early next year, also will be postponed.

The work that the Board voted to continue includes:

- Finalizing the procedures for Statewide Mapping and Screening (see page 3).
- Completing revisions to the *Siting Plan,* still in draft form.
- Completing revisions to the *Volunteer Sites Program Plan,* still in draft form.
- Establishing policies on conditional and preference siting criteria.
- Continuing to collect data in order to predict the types and quantities of Massachusetts LLRW likely to require disposal over the next 30 years. This data is used by the Board in discussions with other states.
- Reviewing siting progress in Massachusetts and activities in other states.

(See SUSPEND, page 2)

LLRW Liability Issues At Next RAM Users Mtg.

J. Raymond Miyares, the Management Board's legal counsel, will discuss issues of liability relating to the management of low-level radioactive waste (LLRW) at a meeting for radioactive materials users, scheduled for 9 a.m. to 1 p.m. Friday, June 7, in Conference Room 2 on the 21st floor of the McCormack State Office Building, One Ashburton Place, in Boston.

Hosted by the Management Board, the meeting also will include the latest information about Agreement State status.

Publication No. 17794 - 4 - 6600 -5/96 -.08 - C. R.
Approved by: Philmore Anderson III, State Purchasing Agent

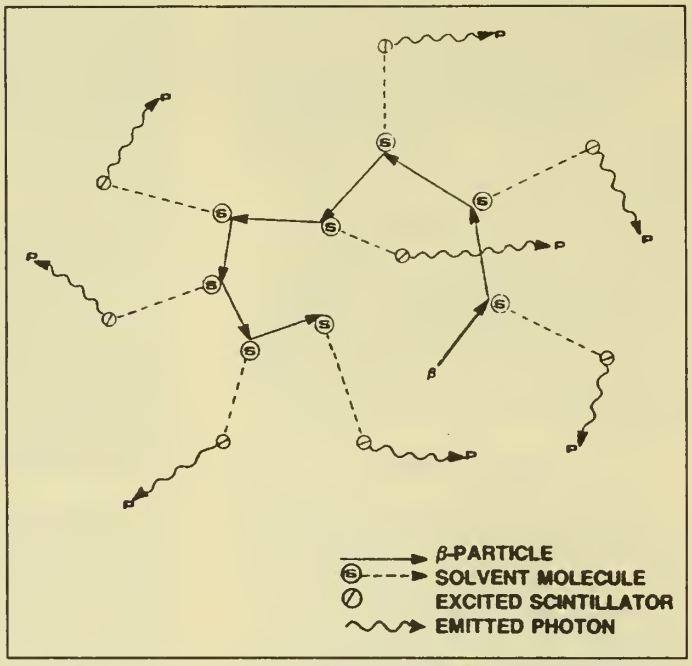
A Closer Look

Scintillation Analyzers

[Now and then, this spot will be devoted to a closer look at a particular use of radioactive materials.]

In the medical and life science research so common to the Boston area, one way to check whether or not a chemical reaction went as expected is to use a computerized liquid scintillation analyzer.

These supersensitive machines vary in size and looks, but all are designed to detect extremely small amounts -- parts per billion -- of a radionuclide. Prior to an experiment, a measured amount of a radionuclide known to attach itself to a certain molecule can be used to "label" a compound that the researcher wants to trace through a reaction or process. Later, a sample can be mixed into a solution called a scintillation "cocktail" -- a solvent such as toluene plus a scintillator solute. Excited by radiation, the atoms in the solute chemical emit energy in the form of light photons as they "calm down."



In this illustration, a single beta particle could collide with eight solvent molecules, which in turn would excite scintillator solute molecules that later emit photons. (Courtesy of Packard Instrument Co.)

Amplifying the light and converting it to electrical signals, the analyzer prints out the precise amount of radioactivity in the sample, providing important data on the fate of the labelled compound.

Scintillation analyzers also are used to confirm that no radioactive material has been spilled in the workplace -- as a backup to other safety measures designed to prevent or detect unnecessary exposure to workers. Paper pads used for "wipe tests" of a lab's work surfaces can be placed in small vials that are run through the analyzer.

Outside the lab, portable scintillation counters can be used in water to model currents and dilution rates. For example, sewage from a treatment plant in California was labelled with a radioactive tracer and followed with counters as it dispersed in Santa Monica Bay.

More than 50 laboratories in Massachusetts generate used scintillation fluids as waste. Some of this is "mixed waste," containing radionuclides as well as hazardous chemicals (or exhibiting their characteristics). If the only radionuclides in these fluids are tritium or carbon-14 in concentrations below 0.05 microcuries per gram, the generator may be licensed to incinerate them. The same standard applies to tritium or carbon-14 wastes that are not mixed with hazardous solvents, but these may be released to a sewer system or taken to a regular landfill, depending on other variables. Other used scintillation fluids are stored for future treatment, disposal, or radioactive decay.

SUSPEND *(Continued from page 1)*

Despite urging by some individuals, the Board did not alter its finding that there is a need for additional disposal facility capacity to meet present LLRW disposal needs or needs anticipated to arise within 10 years. That "determination of need" is contained in the state's *LLRW Management Plan* and in Board regulations.

The Board also will continue its other responsibilities under state law, including:

- Discussions and negotiations with other states for long-term, out-of-state disposal solutions. (Pursuit of an agreement with another state or compact has always been the Board's preferred solution, although it initiated its slow, deliberative siting process to identify a suitable disposal facility site in Massachusetts if an out-of-state arrangement is unattainable.)
- Monitoring LLRW generation, treatment, source and waste volume minimization, storage, transportation, and disposal through the collection and publication of data on these subjects from Massachusetts radioactive materials users.
- Providing educational outreach on subjects relating to LLRW management.
- Gathering data on LLRW management issues.
- Completing a Teacher's Resource Packet on radiation and radioactive waste for high school science teachers.
- Preparing various reports and updating the Commonwealth's *LLRW Management Plan.*
- Providing technical assistance to LLRW generators and the public.
- Serving as a catalyst to enable exchanges of information and "mentoring" programs on source and waste volume minimization to occur among LLRW generators.
- Reviewing health effects literature on the issue of low-dose radiation exposure, and providing materials to the public.

Workshops Encourage Comments on Draft P&P

Three February workshops conducted by representatives of Foster Wheeler Environmental Corporation, the Management Board's contractor, provided town officials and other citizens with the opportunity to discuss and ask questions about the *Draft Statewide Mapping and Screening Protocol and Procedures,* issued in January.

Criteria Define Unsuitability

Criteria spelled out in state Department of Environmental Protection (DEP) regulations require Statewide Mapping and Screening to exclude from further consideration land that is obviously unsuitable for a low-level radioactive waste (LLRW) disposal site.

The Protocol and Procedures would determine which portions of the state would be excluded and how they would be mapped. Foster Wheeler wrote the draft with the help of two subcontractor firms that specialize in computerized mapping techniques. Once finalized, the document will be held in readiness until the Management Board decides to continue the Mapping and Screening portion of site selection.

Participants Voice Concerns

A number of comments were provided at the workshops. Since the DEP regulations require that 34 exclusion criteria be applied during a complete site selection process, many of the comments questioned why the draft proposed applying only 10 of the criteria at this first stage.

In response, Foster Wheeler noted that only mappable data which have been electronically converted (''digitized'') for use in an acceptable computerized ''Geographic Information System'' (GIS), and are available at statewide map scales, would be applied at this stage. Most of the usable GIS data reside in a state-owned GIS, known as MassGIS. Other available digitized data would have to meet quality standards comparable to those of MassGIS.

However, Everett Washer, Foster Wheeler's project manager, noted that digitized data are not available, or are not available at appropriate map scales, to address all of the DEP exclusion criteria at this stage. He emphasized that *all* exclusion criteria would be reapplied during later site selection stages.

Some workshop participants pointed out that certain municipalities and regional planning agencies have their own digitized data, and suggested they be used for the maps. Foster Wheeler said it would consider these other sources.

Some Data Not Accurate Enough

A number of commenters questioned why other data that are available in digital form from MassGIS and other agencies were not proposed for use at this stage. Washer explained that some of these data should not be used because of the inherent limitations in accuracy of some data at statewide map scales, or due to the validity of the source data used to create the digitized maps. For example, most of the available digitized 100-year flood plain data and topographic slope maps are not based upon very accurate or consistent data.

Limitations in map accuracy at statewide map scales brought about some discussion on actual locations of excluded area boundaries. The width of a boundary line at this scale is equivalent to about 100 feet on the ground. In addition, a boundary line may be off by as much as 250 feet in either direction. DEP regulations allow the Board to revise the border of an excluded area, later in the siting process, on the basis of more accurate, site-specific data.

Next Steps

The workshops, and a public comment period that closed March 15, produced almost 200 comments on the draft Protocol and Procedures. Comments will be fully evaluated by the Board, and the draft document revised, where appropriate, by the end of June.

Everett Washer uses an overhead projector to illustrate his presentation at the workshop in Waltham on February 15.

Foster Who?

Foster Wheeler Environmental Corporation, the Management Board's contractor for some preliminary siting-related tasks, is a New-Jersey-based consulting firm with a long history of providing services in the area of radioactive materials management.

Foster Wheeler's Boston office has a staff of more than 80 professionals, including geologists, hydrogeologists, chemists, meteorologists, ecologists, planners, and engineers.

Project Manager Experienced

Everett Washer, the senior project manager assigned to the Board's project, has 23 years of experience in site selection, evaluation, analysis, design, and licensing for nuclear and fossil-fuel power plants, radioactive waste disposal facilities, and other major projects. His education includes graduate study in geotechnical engineering and geophysics after earning a B.S. in geology and geophysics in 1966 from M.I.T. He is a registered professional engineer.

Washer helped develop siting criteria for the Maine LLRW Authority. He worked to obtain public comment on that process, which identified 10 candidate sites. Later, he managed environmental studies to assess the potential suitability of these 10 sites plus nine volunteered sites. Maine's siting process was halted after the state negotiated a compact agreement with Texas.

Other States, Further Along, Still Cautious

The Slow Road to a New Disposal Facility

Site selection for a low-level radioactive waste (LLRW) disposal facility can generate controversy anywhere, but choosing a good site is only half the story. A quick update on activities in three other states shows that, while slow progress continues to be made, it is hard to predict when and where the first of the new generation of disposal facilities will open for business.

California

Three years ago California became the first state to license a new LLRW disposal facility. Development of a facility at the chosen site (Ward Valley in the Mojave Desert) hinges on a transfer of federal land from the U.S. Interior Department to the state.

A 1993 report suggested that radionuclides (such as tritium) might migrate from the proposed shallow-land-burial facility to the Colorado River 22 miles away. A panel of experts from the National Academy of Sciences (NAS) concluded such migration was highly unlikely, but nevertheless recommended continued monitoring and assessment of the site, which could take place during facility development and operation.

California agreed to the NAS recommendations. However, Interior Secretary Bruce Babbitt announced that he would transfer the land only if he got binding commitments from California to limit the total volume and radioactivity of waste disposed of at Ward Valley to the amounts specified in the state license (5.2 million curies or 5.5 million cubic feet) and to place a limit on the amount of plutonium allowed in the facility, in addition to implementing the NAS safeguards.

Gov. Wilson Angry

Resistance by California Governor Pete Wilson to what he sees as federal interference in a state project has resulted in a bitter standoff with Babbitt, who recently announced another year of testing and study before he will address the land transfer.

At press time, Governor Wilson and other proponents of the Ward Valley facility had asked Congress to approve legislation transferring the land.

Failing such a Congressional shortcut, Governor Wilson suggests "legislation which relieves California and other states of the responsibility assigned to them in the LLRW Policy Act."

North Carolina

The North Carolina Low-Level Radioactive Waste Management Authority has deferred major work on facility development while it seeks further funding from the Southeast Compact Commission. The Southeast Compact is comprised of seven southern states.

Representatives of the Authority and Chem-Nuclear, Inc. (its prime contractor) have been meeting regularly to answer concerns of the state's Division of Radiation Protection, which is reviewing the license application submitted more than two years ago. They are negotiating on the tasks needed to provide data to supplement the application.

The first evaluation point in a new licensing work plan was expected to focus on whether soil at the chosen site in Wake County has the capacity to accept water that may infiltrate through the proposed engineered system. At press time the plan was being revised, and the cost estimates had not been completed.

Texas

The Texas Natural Resource Conservation Commission's technical review of the license application for that state's planned disposal facility is nearly complete, according to a recent update from the Texas LLRW Disposal Authority.

The state is designing a new interchange on Interstate 10 in order to provide access to the Hudspeth County site. The county has already received funds for local public projects, and will receive an additional $692,045 this year.

The Texas-Maine-Vermont interstate compact is awaiting Congressional ratification.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

Gubernatorial Appointees:
Barry Connell
Charles B. Killian
Bonnie L'Etoile
John A. Mayer, Jr.
Joseph P. Ring
vacant seat (public administration)
vacant seat (environmental protection)

Cabinet Secretaries:
Trudy Coxe (Environmental Affairs)
Gerald Whitburn (Health & Human Services)

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 5 , Number 3, Summer, 1996

New Ruling Reported by Board Counsel

Question of Municipal Liability Settled

Are local communities that participate in the Massachusetts low-level radioactive waste (LLRW) siting process liable for damages under the federal ''Superfund'' law by virtue of their statutory responsibilities to choose a facility operator? Or to choose the technology they want to be used at an LLRW facility?

Do these actions, which are some of the many tasks assigned to municipal governments by state law, M.G.L. Chapter 111H, as part of the process to site an LLRW facility, make the municipality an ''arranger'' for waste treatment or disposal, as described under federal law?

Although the Low-Level Radioactive Waste Management Board has maintained that the state and local governments are not liable, a recent U.S. Supreme Court Decision has provided a much clearer answer.

CERCLA, the federal Superfund law, provides, in part that "any person who...owned or operated any facility at which...hazardous substances were disposed of, [and] any person who...arranged for disposal or treatment...of hazardous substances...at any facility...from which there is a release, or a threatened release...of a hazardous substance shall be liable for... any...necessary costs of response incurred by any...person consistent with the national contingency plan...."

CERCLA has been of particular concern to states and compact commissions, at least since the U.S. Supreme Court's 1989 decision in *Pennsylvania v. Union Gas Co.*, in which the Court stated: "The language of CERCLA...clearly evinces an intent to hold States liable in damages in federal court."

Conflict with LLRWPAA?

The reason this ruling has been problematic for the states is that the federal LLRW Policy Amendments Act clearly charges each state with responsibility for providing for the disposal of LLRW generated within its borders. If a state meets its obligation under section 2021c, however, there has been a concern that it was exposing itself to liability as an ''arranger'' under the Superfund law.

Recently, however, the U.S. Supreme Court reversed the *Union Gas* decision, in *Seminole Indians v. Florida*, in which it stated that "Union Gas was wrongly decided and...it should be, and now is, overruled" and "Congress does not have authority under the Constitution to make [a] state suable in federal court."

The effect of this ruling is that states cannot be held liable under the Superfund statute, except to the extent they have agreed to be sued. In Massachusetts, the operative provision for state liability is Chapter 111H, §9(b), which states that locally appointed Community Supervisory Committees and the Management Board and other involved state agencies "shall be subject to liability for harms to persons, land or property resulting from the management of low-level radioactive waste only in accordance with the provisions" of the Massachusetts Torts Claims Act.

In turn, the Tort Claims Act, M.G.L. Chapter 258, §2 states:

"Public employers shall be liable for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any public employee while acting within the scope of his office or employment...."

The Act then proceeds to list, in section 10, a number of specific types of claims for which liability may not be imposed, including:

(see QUESTION, page 4)

Minimization Working Group Formed

The Management Board is establishing a Minimization Working Group of interested organizations, other state agencies, and Board members to discuss ways to reduce or eliminate, where appropriate, the radioactive sources that can generate LLRW, and to minimize or eliminate LLRW volumes and activity after the waste is produced. Board member Barry Connell will chair the group.

Under consideration are such ''Min Group'' themes as exchanging information on a variety of minimization subjects (such as substituting short-lived radionuclides for long-lived ones where appropriate); serving as a technology exchange clearinghouse; preparing a report on the status of source and waste volume minimization efforts in Massachusetts; and using several years of Board survey data to develop a trend analysis and ''baseline'' of each radioactive materials user's LLRW volume, activity, and mixed waste.

At its September 11 Board meeting, the Management Board will discuss a formal mission statement and a list of potentially interested agencies and organizations that will be invited to participate in the Minimization Working Group.

Publication No. 17830 - 4 -6600 - 8/96
Approved by: Philmore Anderson III, State Purchasing Agent

For the New Fiscal Year 1997

Highlights of Management Board Activities

As a result of the Massachusetts Low-Level Radioactive Waste Management Board's decision last March to cease certain of its scheduled siting activities, the new fiscal year, which began July 1 and ends June 30, 1997 (FY97), is allowing the Board to focus on some of its non-siting tasks required by state and federal law, while it continues a modest level of site planning.

The Board's number one non-siting-related priority is to continue discussions and negotiations with other states and regional groupings of states, called compacts, to establish long-term out-of-state disposal solutions.

That is not to say that the Board has stopped all efforts to identify a site within Massachusetts for LLRW disposal, but it has suspended its active in-state siting operations while it monitors recent developments in other states, such as access to the LLRW disposal facility in Barnwell, South Carolina to Massachusetts (and other non-southern states) and the expansion of Envirocare of Utah's license allowing that company to accept most Class A waste. The Board recognizes its responsibility to provide disposal capacity -- even within the state if other options fail.

In conjunction with monitoring recent developments in other states which have expanded opportunities for out-of-state disposal, the Management Board monitors the activities within Massachusetts that generate LLRW. Each year, it surveys all companies, universities, and other entities that are licensed to use radioactive materials. The data collected is analyzed and published in an yearly Survey Report which tells the practices of Massachusetts generators concerning on-site storage, treatment, waste packaging, transportation and disposal of LLRW.

The annual data are also being evaluated in the preparation of a Source Term Report. Such a report will provide details on the waste characteristics present in all Massachusetts-generated LLRW needing disposal in a licensed disposal facility for the facility's operating life -- perhaps 30 or 40 years. This information provides a detailed "illustration" of the characteristics of Massachusetts LLRW -- a picture that other states and compact regions want to see as they consider accepting Massachusetts' waste in their disposal facilities.

Watch for Agenda Listings

Here is a snapshot of some of the major activities of the Management Board scheduled for FY97. Many of these activities appear on the agendas for discussion at Management Board meetings; other tasks are conducted by the Board's staff. For more information, contact the Board's office.

August

·Management Board considers proposals to modify its assessment regulations.

·Management Board submits Compact Report to the Legislature.

·Staff prepares FY98 Management Board budget for presentation to the Budget and Planning Committee in September.

·Staff continues work on the Source Term Report, Draft Siting Plan, and the Volunteer Sites Program.

September

·Budget and Planning Committee meets to discuss the executive director's budget recommendations for FY98.

·Meetings are held (Boston, Worcester) for interested individuals and groups to comment on changes in the Board's regulations pursuant to Executive Order 384 (see story, page 4).

·Management Board discusses staff recommendations for the mission statement, meeting schedule, and membership of the new Minimization Working Group (see story, page 1).

·Public Participation Advisory Committee meets.

·Management Board publishes its 1996 Annual Report.

October

·Management Board finalizes its FY98 budget.

·Management Board holds public hearing on any changes in its assessment regulations, and votes to conduct the FY97 assessment on all radioactive materials users.

·Management Board discusses staff recommendations for 1997 legislation.

·Management Board discusses Volunteer Sites Program issues.

·1995 Survey Report is published.

November

·1996 Classification Survey form is mailed to all Massachusetts radioactive materials users.

·Bills for the FY97 assessments on all radioactive materials users are mailed.

·Minimization Working Group holds an organizational meeting (tentative).

December

·Management Board discusses the collection of scientific literature on radiation health studies relating to very low-dose radiation exposure.

·Management Board holds its semi-annual meeting with radioactive materials users (or in January, 1997).

·Management Board holds public hearing on any changes in its Management Plan or Operator Selection regulations resulting from the Executive Order 384 review (see story, page 4).

·Staff continues work on Source Term Report and Draft Siting Plan.

January, 1997

·Staff updates members of the Massachusetts Congressional delegation and the state Legislature on LLRW management activities.

·Management Board conducts a public briefing/open house in eastern Massachusetts on LLRW management issues, including the status of access to disposal sites in other states.

·Management Board submits Compact Report to the Legislature.

February

·Management Board begins discussions to review the "conditional" siting criteria and to establish Board policies on their application.

(see ACTIVITIES, page 3)

Attorney Ray Miyares, Management Board General Counsel, discusses liability issues.

ACTIVITIES (Continued from page 2)

·Management Board reviews the Public Comments Report.

March

·The Minimization Working Group meets (tentative).

·Management Board/staff monitor literature on radiation health studies.

April

·Management Board completes its discussions of issues involving "conditional" siting criteria, and begins discussions of policies on the application of "preference" siting criteria.

·The Public Participation Advisory Committee meets.

May

·Staff develops materials to promote the Teachers Resource Packet consistent with the Board's discussions.

·Board issues Spring issue of its newsletter, LLRW UPFRONT.

June

·Management Board continues discussions with other states and regional compacts for long-term, out-of-state disposal arrangements.

·Management Board finalizes its Volunteer Sites Program, volunteer siting regulations, and Draft Siting Plan.

·Management Board discusses collection of scientific literature on radiation health studies.

·Management Board/staff conduct a public briefing/open house in western Massachusetts on LLRW management issues.

LLRW Generators and Liability

J. Raymond Miyares, General Counsel to the Management Board, recently discussed liability issues with a group of Massachusetts companies and institutions that use radioactive materials.

Mr. Miyares described two principal ways that the law can affect risk management decision-making by private parties: (1) the imposition of safety statutes and regulations; and (2) the application of rules of liability for harms associated with particular types of activity. Each of these methods can influence risk management by deterring certain types of risky behaviors or by providing compensation for harms that result from these activities (or both).

The burdens of regulation are well known, he noted. Regulation imposes costs on certain types of activities, and generally distributes the benefits of improved safety and health and environmental protection on persons other than those who bear the costs. In economic terms, this is potentially inefficient. Moreover, regulations often create uncertainty about what is precisely required or, perhaps even more troubling, can result in irrational or unsuitable mandates that are inappropriate for the risk management problem at hand.

Health and safety regulations also may have inherent limits as promoters of proper risk management. Even well crafted regulations are only as effective as their enforcement. And regulations divert the attention of those they affect away from accident avoidance to minimal compliance, he said.

"Strict Liability"

For all of these reasons, Mr. Miyares concluded, we have to rely on liability rules to supplement or even replace health, safety and environmental regulations in many contracts. In the case of low-level radioactive waste, the operative liability rule is known as "strict liability."

Every first-year law student learns that negligence has four elements, each of which must be proven before liability is imposed. They are: (1) a standard of care applicable to the particular factual circumstances of the case; (2) a breach of that standard; (3) a causal link between that breach and the alleged harm; and (4) a cognizable injury. In contrast, the rule of strict liability does not involve a standard of care, and requires no showing that due care has been breached. As long as the injury is causally linked to the class of activities subject to the rule, liability is imposed.

Massachusetts Provision

In Massachusetts, the applicable rule of strict liability pertaining to LLRW is set forth in M.G.L. Chapter 111H, §9(b), which states:

"Any person who carries on any activity involving the management of low-level radioactive waste shall be subject to strict liability for harm to persons, land or property resulting from such activity when caused by any release of, or exposure to, such waste or associated toxic materials...."

This provision imposes liability on any person who carries on an LLRW management activity, whenever there is a release of or exposure to LLRW or associated toxic materials. It specifies that strict liability is imposed for "harm to persons, land or property" as long as a causal link ("resulting from") to the release or exposure is demonstrated.

In contrast to the Massachusetts provision is a Pennsylvania law which states: "It shall be presumed...that the operator of a regional facility is liable...for all damages and radioactive contamination within three miles of the boundary of the regional facility without proof of fault, negligence or causation."

This provision "presume[s]" that liability will be imposed, not on all persons engaged in LLRW management, but only on the operator of a regional LLRW facility "without proof of fault, negligence or causation" for all damages or radioactive contamination within three miles of the facility. While it permits a defendant to escape liability if it can prove that a particular harm was caused by a release or exposure unrelated to the facility, such proof may be difficult to establish, so that the facility operator is, in effect, the guarantor of the safety of the three-mile radius area. The language of the Pennsylvania statute seems also to allow an affirmative defense of due care, so that its effectiveness in establishing strict liability is open to question.

Other statutes that may impose strict liability for radioactive releases in certain circumstances include the federal Price-Anderson Act, and state and federal Superfund laws. The effect of these statutes and case law is to make liability more likely when harms result from radioactive releases, and thereby to establish a strong incentive to manage LLRW risks properly.

Meetings Scheduled for Regulations Review

The Management Board is reviewing all of its regulations as required by Executive Order 384, a new order issued by Governor William Weld to reduce the regulatory burden that state government can pose.

''EO 384'' requires every agency to review its regulations and, on or before Dec. 31, 1996, must sunset them by rescission, or revise or simplify them. The review must ensure that (a) there is a specific need for the governmental intervention embodied in the regulations; (b) the costs of the regulations do not exceed the benefits effected by them; (c) less restrictive and intrusive alternatives have been considered; (d) the agency has established a process and a schedule to measure the effectiveness of the regulation; and (e) the regulation is time-limited or provides for regular review.

The review also must ensure that every regulation is clear, concise, and written in plain and readily understandable language.

The Management Board is interested in receiving comments from the public on whether the regulations in 345 CMR 1.00 (LLRW Management Plan), 345 CMR 3.00 (Operator Selection), and 345 CMR 4.00 (LLRW Management Fund) are appropriate as written, should be modified, or should be rescinded. Two meetings are scheduled for interested persons to discuss their recommendations:

·September 13, 1996: 100 Cambridge Street, Boston, Room 905, 9 a.m.

·September 20, 1996: Worcester Public Library, Banx Room, Worcester, 2:30 - 5:30 p.m.

Written comments are encouraged, and will be accepted through September 20, 1996. Comments should be sent to the attention of ''LLRW Management Board Regulations'' at the address on this newsletter (or fax to 617 727-6084). In addition, public hearings will be held on October 16, 1996 for 345 CMR 4.00 and on December 4, 1996 for 345 CMR 1.00 and 3.00. Please contact the Board's office if interested in commenting on the specific proposals that will be the subjects of these hearings.

QUESTION (Continued from page 1)

· any claim based upon an act or omission of a public employee when such employee is exercising due care in the execution of any statute or any regulation of a public employer, or any municipal ordinance or by-law, whether or not such statute, regulation, ordinance or by-law is valid;

· any claim based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a public employer or public employee, acting within the scope of his office or employment, whether or not the discretion involved is abused;

· any claim based upon the issuance, denial, suspension or revocation or failure or refusal to issue, deny, suspend or revoke any permit, license, certificate, approval, order or similar authorization;

· any claim based upon the failure to inspect, or an inadequate or negligent inspection, to determine whether the property complies with or violates any law, regulation, ordinance or code, or contains a hazard to health or safety, except as otherwise provided in clause (1) of subparagraph (j).

· any claim based on an act or failure to act to prevent or diminish the harmful consequences of a condition or situation, including the violent or tortious conduct of a third person, which is not originally caused by the public employer or any other person acting on behalf of the public employer.

The effect of the *Seminole Indians* decision, therefore, is to limit state and municipal liability for LLRW only to negligent or other wrongful acts or omissions not included within the scope of any of the statutory exceptions.

In virtually all circumstances, therefore, the Commonwealth and local government participants in the processes established by Chapter 111H will be immune from liability for any harms that arise.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Gubernatorial Appointees:
Barry Connell
Charles B. Killian
Bonnie L'Etoile
John A. Mayer, Jr.
Joseph P. Ring
vacant seat (public administration)
vacant seat (environmental protection)

Cabinet Secretaries:
Trudy Coxe (Environmental Affairs)
Joseph Gallant (Health & Human Services)

Printed on Recycled Paper ♻

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 5 - Number 4 - Fall, 1996

Kickoff for Minimization Working Group

The inaugural meeting of the Management Board's new Minimization Working Group will occur as part of the next semi-annual meeting the Board holds for Massachusetts radioactive materials users.

The purpose of the initial meeting will be to develop a preliminary scope of work to define the activities of the Minimization Working Group (MWG) for the coming year. The MWG will solicit the input of low-level radioactive waste generators and the general public in identifying the issues that will be addressed.

The meeting between Massachusetts radioactive materials users and the Minimization Working Group has been set for Monday, January 13, 1997 in Room 116 of the Higgins Laboratory Building of Worcester Polytechnic Institute, Worcester. After a presentation by the Management Board on its current activities and an update on progress by the Commonwealth to assume regulatory authority from the U.S. Nuclear Regulatory Commission (NRC) over licensing most radioactive materials users (the so-called "Agreement State" program), the Minimization Working Group will begin its first meeting. The MWG will be chaired by Board member Barry Connell, who works in the waste management field. Paul Mayo, Deputy Director for Technical Operations to the Board, will provide staff support.

LLRW generators are among those being invited to join the Minimization Working Group, which will consist of 15 members "with a diversity of perspectives and applicable experience," according to the group's charter. Others include industry organizations such as NELRAD and the Massachusetts Biotechnology Council; environmental organizations such as the Massachusetts Audubon Society, the Environmental League of Massachusetts and the Sierra Club; public interest groups including Massachusetts PIRG and the League of Women Voters, and members of the public. The Management Board intends to invite several representatives from state government, including individuals from the Governor's Advisory Council on Radiation Protection, the Department of Environmental Protection, the Office of Technical Assistance for Toxic Use Reduction, the Toxics Use Reduction Institute, and the Department of Public Health (DPH).

DPH, along with the Management Board, is charged by law to address the minimization of radioactive sources and LLRW. DPH has a regulatory role, while the Management Board's is advisory.

The charter for the Minimization Working Group directs the group to "... act as an advisory body to the Management Board on issues related to fostering the minimization of LLRW and mixed waste, and their elimination were practicable, when considering the total hazard, economic, and other costs and benefits associated with the uses of radioactive materials."

The charter encourages the group to accomplish these objectives through a variety of mechanisms, including fostering communication and the exchange of minimization information among radioactive materials users, waste brokers, waste processors, state agencies, and the public; discussing issues relevant to waste minimization, including incentives and impediments to minimization; and examining new or existing uses of radioactive materials and making suggestions on minimizing waste through process design or redesign.

In addition, the MWG charter directs the group to provide formal reports to the Management Board on the status of source and waste volume minimization efforts in Massachusetts and the potential for additional source and waste volume reduction.

The MWG is charged to meet at least twice annually.

Upcoming Board Meetings

Dec. 4, 1996 -- Regular Management Board meeting, Boston, 9 a.m. - noon.

Jan. 13, 1997 -- Semi-annual Board sponsored meeting with radioactive materials users (and first meeting of Minimization Working Group), Worcester Polytechnic Institute, Higgins Laboratory Building, Room 116, Worcester, 8:45 a.m. - 1 p.m.

Jan. 29, 1997 -- Management Board Assessment Committee and Assessment Fee Working Group, Boston, 10 a.m.

Feb. 5, 1997 -- Regular Management Board meeting, Boston, 10 a.m. - 1 p.m.

All Boston meetings will be in Room 905 of 100 Cambridge St. (the Saltonstall Building). Call the Board office for confirmation in case of changes.

Highlights of the 1995 Survey Report

Data Shows How Generators Managed Waste D

During 1995, 39 Massachusetts companies and institutions shipped 177,578 cubic feet of low-level radioactive waste (LLRW) containing 26,150 curies of radioactivity to out-of-state disposal facilities in South Carolina, Utah and Washington. This volume was a substantial decrease from 1994 figures.

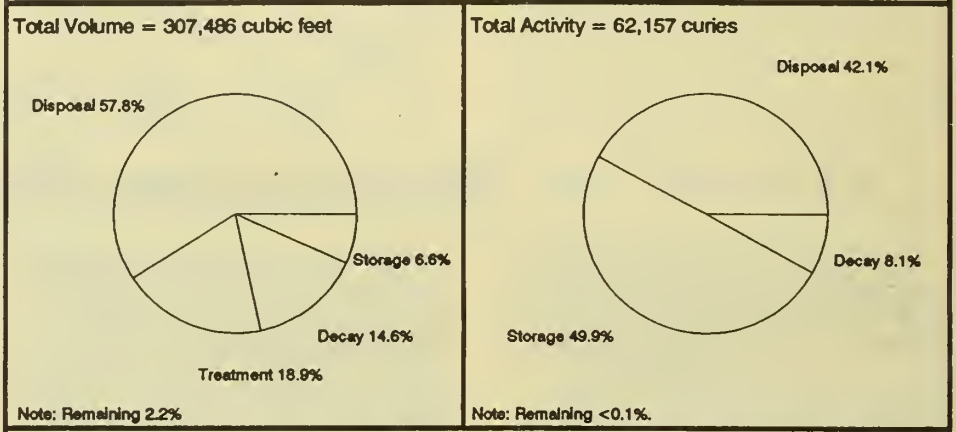
These figures are from the 1995 Massachusetts Low-Level Radioactive Waste Survey Report, a comprehensive description of LLRW generated by Massachusetts businesses and institutions during 1995. The data are collected and analyzed annually from a questionnaire sent by the Management Board to universities, hospitals, biotechnology companies, utilities and other businesses, as well as to federal, state, and local government entities such as transportation authorities, water districts and health departments that use radioactive materials.

This annual survey provides details on the characteristics of LLRW generated, treated, stored, and shipped for disposal out of state. It describes the types, volumes, radioactivity, sources, and other characteristics of LLRW produced in Massachusetts as well as LLRW management practices such as source and volume minimization, on-site storage, treatment, packaging, and transportation.

Survey Projections

The survey also provides interesting historic trends and projects future quantities of LLRW volume and activity requiring disposal in licensed disposal facilities.

1995 LLRW Volume and Activity Reported – by Management Method
(percent)



Note: "Decay" = Storage for Decay. "Storage" = storage of LLRW and mixed waste. "Treatment" = eliminated by treatment. "Remaining" = total of all other management methods.

These data are used by the Management Board in connection with its responsibilities to arrange storage, treatment, and disposal solutions for LLRW produced in the Commonwealth.

The Survey Report classifies LLRW shipped for disposal into two types: ''routine'' and ''non-routine.'' ''Routine'' LLRW results from process operations and is expected to be produced each year for the foreseeable future. ''Non-routine'' LLRW results from the cleanup of old sites where LLRW was buried (in the days that such burial was allowed) and from the decommissioning of companies that are terminating their use of radioactive materials.

The figures on LLRW shipped for disposal during 1995 reflect a significant reduction in waste volume and activity (curies) shipped for disposal over similar figures for 1994. This is because some of the short -term ''non-routine'' LLRW activities that occurred in 1994 ended or produced lower disposal volumes in 1995.

Comparison to 1994 Data

For example, in 1994, 1,082,172 cubic feet of LLRW containing 140,934 curies were shipped for disposal by 77 LLRW generators. The 1994 shipment figures were dominated by two decommissionings and one old-burial-site remediation. The

"Radiation".....Simply

Radiation is a form of energy that passes through space, air, or other matter in a fashion similar to waves or particles. The general term ''radiation'' covers all forms of radiant energy, including light, radio waves, infrared energy, and microwaves. In contrast to these types of radiation, the type of radiant energy associated with radioactive materials is known as ''ionizing'' radiation.

Atoms with the same number of protons but different numbers of neutrons are called ''isotopes.'' A ''radionuclide'' or ''nuclide'' is an unstable isotope of an element (with an unbalanced proton-to-neutron ratio) that is ''radioactive,'' which means it will emit energy in the form of particles and/or waves (radiation) as it changes from an unstable to a more stable form.

Every radionuclide has a defined ''half-life,'' which is the amount of time it takes for one-half of the radioactive material to decay or transform into another element, that may or may not be radioactive. The rate of transformations is measured in units called ''curies,'' and is called the ''activity'' of the radioactive material.

1995

two decommissionings included the U.S. Army's Watertown Arsenal site (which shipped over 900,000 cubic feet of LLRW in 1994) and Yankee Atomic's Rowe nuclear power plant (which shipped only 221 cubic feet but it contained 130,205 curies of activity in 1994). The old-burial-site remediation involved Texas Instruments' property in Attleboro (which shipped 135,821 cubic feet in 1994).

The 1995 data show that the U.S. Army decommissioning project was winding down during 1995. The U.S. Army shipped only 117.5 cubic feet that year. However, the Texas Instruments (TI) site remediation work continued, and that company shipped 157,965 cubic feet for disposal in 1995. This and other smaller "non-routine" activities comprised over 93 percent of the total volume shipped in 1995.

Nearly all of the volume shipped for disposal during 1995 (89 percent) was soils containing small amounts of radioactivity from the Texas Instruments site. Many years ago, the company's predecessor was authorized to bury radioactive materials on site, but more recently TI has been instructed to remove the contaminated soils and ship them to an LLRW disposal facility.

The major portion of the activity in the 1995 LLRW (94 percent) was contained in waste generated by Du Pont Medical Products Company, a manufacturer of radioactive compounds called tracers used in medical research. The Du Pont waste is comprised of tritium, an isotope of hydrogen, which has a half-life of 12.5 years. This waste contained 24,511 curies of the total 26,150 curies in the LLRW shipped for disposal during 1995.

Disposal Sites Used

Massachusetts LLRW generators used three disposal sites in 1995, depending upon the type and activity of their waste. Most of the volume was sent to Clive, Utah, where a disposal facility run by Envirocare of Utah, Inc. accepted building rubble and soils contaminated with very low concentrations of radioactive materials. This waste is called "high volume, low activity" LLRW. Other LLRW, including all the waste that was contaminated by greater concentrations of radioactivity, was shipped for disposal to a Barnwell, South Carolina facility operated by Chem-Nuclear. The third site available to Massachusetts generators, in Hanford, Washington, was authorized to accept only LLRW containing naturally-occurring or accelerator-produced radioactive materials (NARM).

The Management Board surveyed 585 businesses and institutions for the 1995 Survey Report. Of those, 245 (42 percent) said their use of radioactive materials generated LLRW. The remainder reported that they produced no LLRW or did not possess radioactive materials during 1995.

1995 LLRW Volume Shipped for Disposal Summary – by Generator Category
(cubic feet)

	Acad	Comm	Govt	Health	Utility	Total	% of Total
Produced	686.8	172,864.4	125.7	888.7	48,668.0	223,233.5	100.0
Eliminated by On-Site Treatment	475.6	3,718.2	0.0	363.5	0.0	4,557.3	2.0
Eliminated by Off-Site Treatment	81.6	3,916.3	0.0	438.6	36,662.2	41,098.6	18.4
Total Volume Reduction	557.2	7,634.5	0.0	802.1	36,662.2	45,656.0	20.5
Barnwell, South Carolina	129.5	3,592.0	8.2	86.6	9,480.8	13,297.1	6.0
Clive, Utah	0.0	161,550.0	117.5	0.0	2,525.0	164,192.5	73.6
Hanford, Washington	0.0	88.0	0.0	0.0	0.0	88.0	0.0
Shipped for Disposal	129.5	165,230.0	125.7	86.6	12,005.8	177,577.6	79.5

1995 LLRW Activity Shipped for Disposal Summary – by Generator Category
(curies)

	Acad	Comm	Govt	Health	Utility	Total	% of Total
Produced	1.543	25,497.319	2.212	1.978	646.887	26,149.939	100.0
Barnwell, South Carolina	1.543	25,492.810	2.210	1.978	646.887	26,145.427	100.0
Clive, Utah	0.000	2.460	0.002	0.000	0.000	2.463	0.0
Hanford, Washington	0.000	2.050	0.000	0.000	0.000	2.050	0.0
Shipped for Disposal	1.543	25,497.319	2.212	1.978	646.887	26,149.939	100.0

Total LLRW Management

In total, LLRW generators reported that they managed 307,486 cubic feet of LLRW, containing 62,157 curies, during 1995. Of that amount:

- 177,578 cubic feet, containing 26,150 curies, was shipped for disposal, as noted.
- 81,914 cubic feet, containing 36,003 curies, was managed on site.
- 47,995 cubic feet, containing 3.3 curies, were managed off site.

The most common on-site LLRW management activity is a treatment procedure known as "storage for decay" used for LLRW that contains relatively short half-life materials. At the end of the storage period, the waste effectively is no longer radioactive, and after radiation monitoring, it can be disposed of as normal trash. Other on-site and off-site management techniques include sorting and segregation (that is, separating the non-radioactive from the radioactive portion of the waste), compaction, incineration, and decontamination.

Some waste is stored for future disposal. This procedure especially is used for certain mixed waste, which is radioactive material that is contaminated by, or exhibits the characteristics of, toxic chemical hazardous material. Because no disposal options exist for some mixed waste at this time, that waste must be placed in storage pending the development of future treatment or disposal capacity.

Generator Projections

1995 survey responses indicate that the decommissioning and remediation projects, which contributed significant volumes to

(see Survey, page 4)

Around the Country

Will Texas Have More Than One LLRW Disposal Facility?

The Texas LLRW Authority is in the preliminary stages of developing a low-level radioactive waste (LLRW) disposal facility at its site in Sierra Blanca. The facility license application is pending, and three public hearings recently were completed to identify issues and to allow the public to comment before evidentiary hearings on the license petition begin next year.

In addition, the Authority's "exploratory trench project" is underway. The project includes excavation of a demonstration trench that will allow engineers to evaluate various aspects of trench construction and the shallow geology at the Sierra Blanca site.

But, in the meantime, two other proposed LLRW facilities have been suggested in Texas. Both plan to accept for disposal only LLRW from the federal government, not commercial LLRW from businesses and institutions.

Waste Control Specialists

One proposal comes from a Texas company called Waste Control Specialists (WCS) which owns a 16,000-acre tract of land, mostly in Andrews County, Texas, on the other side of the state from Sierra Blanca. WCS operates a 1,300-acre landfill for toxic, chemical hazardous waste (not LLRW), and has a state permit to process hazardous waste.

WCS has proposed to make part of its site available to the U.S. Department of Energy (DOE) for the disposal of federal LLRW. Because WCS believes that no state permits are necessary if it arranges for DOE to assume "control" of its LLRW disposal activities, the company has not applied to the Texas Natural Resources Conservation Commission for a license to operate its proposed facility.

Envirocare of Texas

The second proposed LLRW disposal facility for federal waste was made by Envirocare of Texas, a subsidiary of Envirocare of Utah, Inc. that runs a large LLRW and mixed waste disposal operation in Clive, Utah. Envirocare of Texas purchased 880 acres of land -- also in Andrews County -- and in September submitted a license application to the Texas Natural Resources Conservation Commission.

Envirocare acknowledged in a press statement that some question exists whether or not Texas law allows a private company to own and operate an LLRW and mixed waste disposal facility. (Some legal experts suggest that Texas law authorizes only the Texas LLRW Authority to develop such a site.) However, the company said it was initiating discussions with the Texas Legislature to clarify the law.

While LLRW facility-watchers around the country pondered whether either of the two "federal" disposal sites ever may become available for commercial LLRW disposal, the Texas Natural Resources Conservation Commission in October declined to process Envirocare of Texas' license application. Its reason: Texas statute prohibits the licensing of a private company to dispose of LLRW.

Survey *(Continued from page 3)*

the LLRW shipped for disposal in 1995 (and in 1992 through 1994) will decline dramatically by 1998. Generators predict that approximately 250,000 cubic feet comprising 2,000 curies of "non-routine" LLRW will be shipped for disposal during 1996, 35,000 cubic feet containing 4,000 curies will be shipped during 1997, and only 1,000 cubic feet containing 10 curies will be shipped during 1998.

In addition to the "non-routine" waste projections, the total volume of "routine" LLRW shipments is expected to remain around 13,000 to 15,000 cubic feet for the next three years.

Copies of the Survey Report can be obtained by contacting the Management Board.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 6- Number 1 - Winter, 1997

Minimization Group to Review TURA, RAM Reduction Models

A comparison of the successes of the Toxics Use Reduction Act (TURA) minimization program for hazardous chemicals and the Low-Level Radioactive Waste (LLRW) Management Act minimization program for radioactive materials and LLRW was one topic selected by the newly-formed LLRW Minimization Working Group (MWG) for action this year.

The Management Board's MWG met recently in conjunction with the Board's semi-annual radioactive material (RAM) users meeting. All participants at the RAM users meeting were invited to participate in the deliberations of the MWG.

As reported in the Fall 1996 edition of "LLRW UP-FRONT," the MWG will act as an advisory body to provide the Board with information and recommendations to foster the minimization of LLRW and mixed waste, and to reduce or eliminate radioactive sources, where practicable.

After considerable discussion, the MWG agreed to develop and provide presentations on the following issues:

1. Compare TURA to RAM and LLRW minimization models and successes.

2. Explore the concept of organizing a collective of small generators and the feasibility of obtaining process review services and other minimization services from a commercial consultant or processor.

3. Provide a "tutorial" on RAM uses and RAM and LLRW minimization programs and on the TURA program and its achievements, for those on the MWG and other potential participants not well versed in these.

Subcommittees of the MWG were formed to accomplish these tasks, and it is expected that the MWG will meet to address them in the summer or fall.

The MWG consists of fifteen members who represent diverse perspectives on waste management issues. MWG members as of the date of the first meeting, along with their affiliations and the interests they represent, are listed in the table on page 2. Members present at this first meeting of the MWG were Wanda Milik, Frank Masse, Robert Hallisey, Salifu Dakubu, Charles Killian, Matthew Wilson, Lisa Coronado, and Barry Connell. Jim Tocci was represented by Nancy Fratoni of Smith College; George Anderson represented Lou Todisco; Dr. Michael Ellenbecker represented Dr. Kenneth Geiser; and Richard Reibstein represented John Raschko.

The principal order of business for the kickoff meeting was to establish MWG tasks for future discussion. A number of participants expressed a strong opinion that the MWG focus primarily on minimizing the use of radioactive materials as a means of minimizing LLRW as opposed to the processing of waste after it has been produced, and that TURA provides a model that may provide useful features and experience for an LLRW minimization program. Others were quick to point out that LLRW generators have made huge strides in recent years in effecting LLRW minimization.

Several examples of progress in LLRW minimization were provided. It was noted that some large companies and organizations were able to implement major minimization initiatives using state-of the-art techniques and significant in-house research, while others pointed out that these substantial programs are not usually practical for small organizations. One representative of a small college observed that one of the attractive things that the TURA pro-

(See MWG, page 2)

Minimization Working Group Chairman (and Management Board member) Barry Connell (left) leads the MWG discussion of its mission for the year. Other MWG members pictured include (l. to r.) Matt Wilson, Lisa Coronado, and Nancy Fratoni.

Publication No. 17864 - 4 - 6600 - 2/97 - .07 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

MWG Meets

MWG (Continued from page 1)

gram does is to put together information for small users. She believes that a similar program would be appropriate for RAM users. Another observed that even though information is made available to small organizations, minimization improvements may not get implemented if they don't pay. However, it was believed that it might be cost effective for commercial processors to offer services to groups of small generators if a group of these companies with common needs were identified and organized.

Minimization Strategies

The MWG also reviewed the list of possible minimization strategies provided in its Charter. These include:

1. Fostering communication and the exchange of minimization information among RAM users, waste brokers, waste processors, state agencies, and the public.
2. Discussing and illuminating the issues relevant to waste minimization, including the incentives to minimize and impediments to minimization.
3. Illuminating the costs and benefits associated with minimization, considering the comparative risks, costs, and benefits of the use of radioactive materials and the use of non-radioactive substitutes.
4. Examining new or existing uses of radioactive materials and making suggestions on minimizing waste from process design or redesign.
5. Providing information on the positive and negative features of substituting short-lived for long-lived radionuclides or non-radioactive for radioactive materials.
6. Encouraging appropriate treatment.
7. Providing technical information regarding which treatment technologies and practices may not be appropriate for later waste disposal.
8. Providing technical information regarding treatment technologies and practices that may be most beneficial to individual types of generators.
9. Providing guidelines defining what specific radionuclides are suitable for decay in storage.
10. Evaluating waste minimization potential for individual Massachusetts generators based on data provided by the Board's staff from the annual LLRW generator survey.
11. Reviewing DPH minimization and generator guidance and providing input to DPH on these and related issues.
12. Addressing any other related subjects at the request of the Management Board.

The date and other details of the MWG's next meeting will be published in the Spring 1997 issue of "LLRW UP-FRONT."

Source Minimization? Volume Minimization?

Both "source minimization" and "volume minimization" are important goals of the Massachusetts low-level radioactive waste (LLRW) management law. These terms are defined in the law as follows:

"Source minimization: minimizing the volume of radioactivity of LLRW prior to its generation by such methods as: (1) avoiding unnecessary contamination of items during the use of radioactive materials; (2) carefully segregating radioactive waste from non-radioactive trash; or (3) substituting non-radioactive isotopes or radioactive isotopes with shorter half-lives where practicable." [Chapter 111H, section 1]

"Volume minimization: treatment of LLRW after its generation in order to minimize the physical dimensions of the waste and the space required for disposal." [Chapter 111H, section 1]

While the Management Board has indicated that source minimization, and source elimination where practical, are preferred approaches, the Board also recognizes the limitations of source minimization/elimination, and encourages volume minimization, as well. In addition, any volume minimization, source minimization, or source elimination should be evaluated with respect to the total hazard (radiological and non-radiological) associated with such minimization efforts. Minimization strategies may be appropriate only if the total hazard is reduced.

Perspectives Represented / MWG Member

General Public:
Open
Public Interest Groups:
Cindy Luppi - Clean Water Action
Environmental Organizations:
Wanda Milik - MA Association of Conservation Commissions
Waste Generator / Industry Groups:
Frank Masse (MIT) - NELRAD
Health Physics Professionals:
Jim Tocci (UMass-Amherst) - Health Physics Society
Massachusetts Department of Public Health:
Bob Hallisey [S. Dakubu, Alternate]
Massachusetts Department of Environmental Protection:
Open
LLRW Generators:
Lou Todisco - Du Pont
Governor's Advisory Council on Radiation Protection:
Charles Killian
Toxic Use Reduction Institute:
Dr. Kenneth Geiser
[Dr. M. Ellenbecker, Alternate]
EOEA, Office for Technical Assistance for Toxics Use Reduction:
John Raschko
Up to three other participants plus the Chairperson:
Matthew Wilson - Toxics Action Center
Rex Woodleigh - MA General Hospital
Lisa Coronado - MA Biotech Council
Barry Connell - chairman (Management Board)

MWG Staff:
Paul Mayo - (617) 727-6018

A Commentary

How the Courts View Slow Progress in LLRW Facility Siting

The Management Board has decided not to appeal a ruling in its lawsuit against the U.S. Department of Energy (DOE) over the distribution of surcharge funds.

The action sought payment of all surcharge fees that had been collected by DOE from Massachusetts generators of low-level radioactive waste (LLRW) between 1990 and 1992 for the use of LLRW disposal facilities in Nevada, South Carolina, and Washington. The disputed funds totaled nearly $500,000.

Similar suits challenging DOE's decision to distribute half the surcharge rebate funds to LLRW generators, rather than to states and regional compacts, were filed by the Central Midwest, the Appalachian, and the Midwest Compact Commissions. U.S. District courts in these jurisdictions all ruled in favor of DOE except in the case of the Appalachian Compact. Upon appeal, the U.S. Court of Appeals also recently sided with DOE's distribution method in that compact region, as well.

The following observations, written by the Management Board's General Counsel, comment on the Board's decision to cease certain in-state siting activities, and how that decision and other decisions elsewhere in the country have been viewed by the courts in the surcharge rebates case.

by J. Raymond Miyares
Management Board General Counsel

On March 27, 1996, the LLRW Management Board voted to cease certain of its activities aimed at siting a facility for the Commonwealth's LLRW. Most users of radioactive materials who expressed a view supported the Board's action, as a justified "breather," to give the Commonwealth time to assess the long-range impact of the reopening of the Barnwell, South Carolina facility to Massachusetts generators and of other out-of-state developments, before incurring significant additional expenses associated with facility siting. Some anti-nuclear activists criticized the Board's action as not going far enough in putting a "stake through the heart" of facility siting.

But in the courts, the Board's vote was viewed quite differently. In the Commonwealth's lawsuit against the federal Department of Energy, in which Massachusetts was claiming nearly $500,000 in surcharge rebate funds that the Department was refusing to release, U.S. District Court Judge Patti Saris characterized the Board's action as just the sort of "not-in-my-back-yard approach to LLRW disposal" that the federal LLRW Policy Act was "designed to ...combat." *Commonwealth v. O'Leary*, 925 F.Supp. 857, 864, n.5 (1996). Judge Saris entered judgment denying the Commonwealth's claim, stating that Massachusetts' contract with the Southeast LLRW Compact Commission to allow disposal of Massachusetts LLRW at Barnwell for an 18-month period did not qualify the Commonwealth for the full surcharge rebate amounts, since Congress contemplated that only "permanent solutions" would qualify states for a full rebate.

The U.S. Supreme Court has observed that the LLRW Policy Act was designed to get states to "comply with their statutory obligation to provide for the disposal of waste generated within their borders." *New York v. United States*, 505 U.S. 144, 152 (1992). While the Act does not prohibit states from pausing and letting events take their course, in the hope that an adequate disposal capacity will be made available, it is clear that the Courts take a dim view of such an approach.

Thus, for example, in *Appalachian States LLRW Commission v. O'Leary*, 93 F.3d 103, 105 (3rd Cir. 1996), the Third Circuit Court of Appeals rejected a claim for surcharge rebate funds similar to the Commonwealth's, stating that the goal of the Act is "the construction of new disposal sites." The Court then added (93 F.3d at 110):

"It is ludicrous to think that Congress envisioned short-term contracts with the already existing Barnwell facility as the preferred solution to the national LLRW problem."

The Court would presumably have found it even more ludicrous for states to rely on continued access to Barnwell without even the benefit of any type of contract. Rather, the Court stated, "[s]tates have the duty to provide for disposal of all waste indefinitely...." 93 F.3d at 112. A petition for reconsideration in the case is still pending. See also *Midwest Interstate LLRW Commission v. O'Leary*, 926 F.Supp. 134, 137 (D.Minn. 1966) (rejecting the argument that states' obligations are satisfied by actual access to Barnwell even if "there is no longer a need for a contract with South Carolina" to provide such access.).

Massachusetts is unlikely to return to court soon seeking a judicial ruling that it has satisfied its obligations under the LLRW Policy Act. The Management Board's vote indicates that, for now, it believes that the best course for Massachusetts is to improve its site selection planning and finalize its volunteer siting process, rather than to rush ahead with mapping and screening activities. But the courts have certainly made it clear that the Commonwealth's obligations under the law are not satisfied by merely leaving the LLRW disposal marketplace to sort things out on its own.

Board Streamlines LLRW Regulations

As part of Governor William F. Weld's initiative to reduce unnecessary regulations and their burden on Massachusetts citizens and businesses, the Management Board reviewed and streamlined its state regulations.

The Board's regulations to implement the Low-Level Radioactive Waste Management Plan (345 CMR 1.00), to select an operator for any in-state LLRW management facility (345 CMR 3.00), and to assess fees on all Massachusetts radioactive materials users (345 CMR 4.00) accounted for only three of the 1,600 groupings of regulations and 47 pages of the 20,000-page Code of Massachusetts Regulations (CMR). However, the Board's reviews resulted in changes that improved clarity, enhanced readability, eliminated duplication, and reduced the total number of pages by 20%.

The review also identified a needed change in the Board's Management Plan regulations. Section 1.06 of those rules, entitled "Management Plan Consistency Review," was found to be more burdensome than required by state law. That law grandfathers any person lawfully licensed by the U.S. Nuclear Regulatory Commission (NRC) to accept low-level radioactive waste (LLRW) for storage, treatment, or disposal, once the authority over the licensees is transferred from the NRC to the Massachusetts Department of Public Health as part of the Agreement State program. (This transfer of regulatory control is expected to occur around April or May of this year.)

The requirement in the state statute compels any such licensee first to receive a determination from the Management Board that any amendment of the license "terms and conditions" is "consistent with the LLRW Management Plan." However, the Board's regulation broadened this requirement beyond the statutory requirement so as to apply to every NRC licensee, not just those that are licensed to accept LLRW for storage, treatment, or disposal.

The Management Board's review of its regulations was prompted by Governor Weld's Executive Order 384, which required all state agencies to examine their regulations and rescind or simplify them by December 31, 1996.

Management Board Publications Available

Several publications relating to LLRW management are or soon will be available to the public, free of charge. If you would like a copy, please contact the Management Board office (see address below) or call us at (617) 727-6018.

____**1996 Annual Report to the Commonwealth.** This yearly report highlights the Management Board's major activities and accomplishments during the period between July 1, 1995 and June 30, 1996. It also contains minutes of Board and committee meetings, as required by state law.

____**1995 Massachusetts LLRW Survey Report.** This report, based on data collected from the 1995 Classification Survey, characterizes the types, quantities, and radioactivity of all LLRW in Massachusetts that was generated, stored, treated, and disposal of during 1995.

____**Progress Report to the Legislature on Negotiations for a Regional LLRW Compact.** This report describes the varied discussions underway between officials of the Commonwealth and other states and regional compacts as Massachusetts endeavors to identify long-term solutions for LLRW disposal.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 6- Number 2 - Spring, 1997

It's Official--

Massachusetts Becomes 30th 'Agreement State'

Ten years after the Legislature passed a law enabling Massachusetts to enter into an agreement with the U.S. Nuclear Regulatory Commission (NRC) the Commonwealth officially became an "Agreement State" on March 21, 1997. The Commonwealth has adopted regulations necessary to assume regulatory authority (licensing, inspection, enforcement, etc.) over certain radioactive materials and to license any centralized storage, treatment, or disposal facility built in Massachusetts for low-level radioactive waste (LLRW).

Massachusetts achieved Agreement State approval while retaining provisions of state law -- like the ban on landfilling LLRW and an aggressive minimization program -- that are not part of the federal regulatory system.

The "Agreement State" program is so named because of the section of the federal Atomic Energy Act that provides a mechanism for states to assume regulatory authority over the users of radioactive materials -- authority otherwise residing with the NRC. Agreement States regulate all users of radioactive materials except for federal facilities (such as Veterans' Hospitals and other federal operations in Massachusetts), nuclear power plants (Yankee Atomic's closed plant in Rowe and Boston Edison's station in Plymouth), and university nuclear-powered research reactors (one each at MIT, University of MA-Lowell, and Worcester Polytechnic Institute), which remain under NRC's control.

The Massachusetts Department of Public Health's (DPH's) Radiation Control Program has been designated as the Agreement State agency, and has added staff necessary to implement that responsibility consistent with NRC requirements. It has received training and will continue to receive technical support from NRC.

Becoming an Agreement State has been a lengthy process. Below is a brief summary of the actions involved:

1987: The Legislature enacted a law allowing the Governor to enter into an agreement with the NRC and enabling the state to adopt regulations needed to assume regulatory authority under the Agreement State program.

1992: Governor Weld gave initial certification that the State's radiation control program is "adequate to protect public health and safety."

1994: The Massachusetts Public Health Council approved regulations to govern the radioactive materials regulated under the Agreement State program.

1994: The Massachusetts DPH Radiation Control Program began hiring the necessary personnel and developing procedures, forms, database programs and fees to implement a

(See Agreement State, page 4)

What's Regulated via Agreement State?

The NRC regulates some radioactive materials, but not others. The "Agreement State" approval allows Massachusetts to regulate the following NRC-regulated materials:

Special Nuclear Material: plutonium, uranium enriched in the isotopes 233 or 235, or any material artificially enriched in any of these substances. These materials are restricted to quantities not sufficient to form a critical mass, that is, a self sustaining chain reaction.

Source Material: uranium or thorium or any combination of those elements in any physical or chemical form, or any radioactive material (except special nuclear material) that contains 0.05% or more of uranium, thorium, or their combination.

Byproduct material: any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material. [One type of byproduct material that Massachusetts did not request authority to regulate is uranium mill tailings, which are scraps or residues that remain from the chemical processing, or "milling" of ore to remove the uranium. Because no uranium mills or mill tailing production facilities exist in Massachusetts, this subcategory of byproduct material does not need to be regulated in the Commonwealth.]

With its new authority under the Agreement State program, DPH will regulate all sources of radiation. The agency already has the authority to regulate other radioactive materials (and waste) that are not within the regulatory authority of the NRC (or the scope of the Agreement). They are:

Naturally-occurring or Accelerator-produced Radioactive Material (NARM): may be either low volume, high activity accelerator-produced materials, radium needles used in medicine, and drinking water filters from radium-contaminated areas or lower activity radium-contaminated soil at locations where radium was used for manufacturing luminous dials and paint or where natural deposits of radium exist; or it may be material in which radium or other naturally-occurring materials have been concentrated.

Naturally-Occurring Radioactive Material (NORM): radioactive material or waste that has a natural source. It is a subcategory of NARM.

Publication No. 17893 - 4 - 6600 - 5/97 - .08 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

The "Human Compactor" - A Thing of the Past

Over the past 40 years low-level radioactive waste (LLRW) volume reduction treatment methods have evolved from simple "do-it-yourself" techniques into sophisticated technologies. The "human compactor" of the 1950s, jumping up and down on lab coats and paper waste in 55 gallon drums, has given way to "super compaction," "steam reforming," and the "quantum-catalytic extraction process," to name a few of the new processes.

This evolution, from the simple to the complex, has been driven by changing LLRW disposal requirements and the economics of LLRW disposal over the last four decades.

The "Early Years" (1950s to 1980)

In terms of radioactive waste management, the period from the 1950s to 1980s can be characterized as the early years. Disposal prices were in the single dollar per cubic foot range. Because disposal prices were low, there was no economic reason for generators to use volume reduction treatment on their waste.

During the 1950s and 1960s, simple volume reduction technologies such as compaction and baling were used along with novel techniques like the "human compactor" to reduce the waste volume for efficient shipment.

By the 1970s, the disposal of liquid waste and the use of flimsy containers led to problems at the six LLRW disposal sites. Three disposal sites closed, and new disposal requirements were developed.

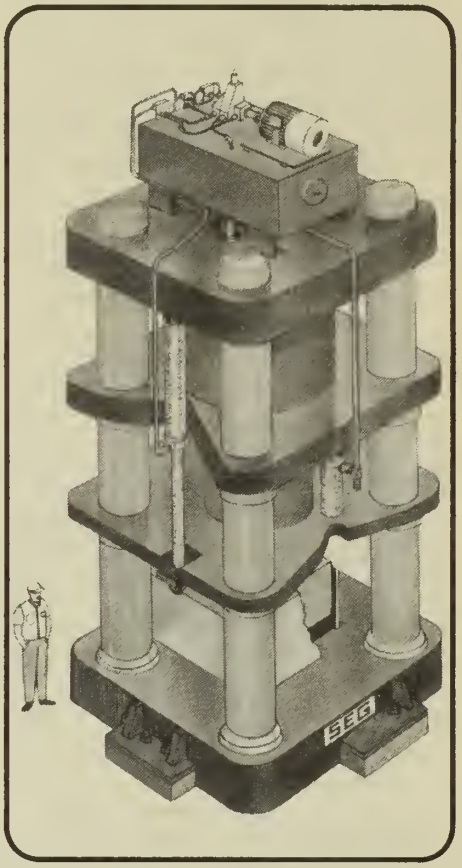
The changes in disposal criteria caused an advance in treatment technology. For example, radioactive waste engineers, hoping to be hired for the nuclear utilities, began to explore incineration and ash solidification as an alternative for meeting the new disposal criteria. Unfortunately they found that high capital costs, combined with the difficult permitting process, made convincing a utility to invest in an incinerator a hard sell when disposal prices were low.

Little did the engineers know that the entire radioactive waste management world would change as disposal prices skyrocketed during the 1980s and 1990s.

The "Volume Reduction Era" (1980 to 1996)

The period between 1980 and 1996 can be characterized as "a time of relentless pursuit of volume reduction." During this period, LLRW disposal prices (traditionally weighted more towards volume than radioactivity) increased at the Barnwell, South Carolina, disposal facility from less than $10 dollars per cubic foot to over $300 dollars per cubic foot.

To a lesser extent the increase was due to normal inflation and the collection of additional monies by disposal site operators for environmental contingencies. However, the largest increases were due to the imposition



The SEG "UltraCompactor"-the world's largest compactor. (Courtesy of Scientific Ecology Group.)

of federal surcharges and state taxes by South Carolina. Most of the federal surcharges were distributed to the states. South Carolina state taxes currently fund higher education.

The explosion of disposal fees led to a new concept in LLRW management: the large scale processing of LLRW at centralized facilities. Aggressive processing companies, recognizing the needs of the LLRW disposal market, developed new treatment and processing technologies.

The first step in the evolution of treatment technology was enhancement of existing techniques. The simple single drum compactors (little more than industrial versions of the home compactor) gave way to enhanced and enlarged designs, dubbed "supercompactors," able to compress waste and waste drums to a greater extent than before. Of course the "ultra-compactor" was soon to follow.

Next came new treatment technologies including steam reforming and the quantum catalytic extraction process (Q-CEP). Steam reforming is a process that changes waste into a form similar to incinerator ash, but without combustion. High temperature steam is used to reform (reduce) the waste into small particles.

Q-CEP is a process developed in Massachusetts by a Waltham-based company. The process uses a molten metal bath as a catalyst and solvent to break down wastes to their basic elements. The elements are reconfigured into useful gases, ceramics, and metals. A smaller residual radioactive waste is the output.

The enhancement of existing treatment processes and the development of innovative, new ones have worked together to reduce the volume of LLRW disposed of at facilities in South Carolina, Washington, and Nevada from over 3,772,686 cubic feet in 1980 to less than 700,000 cubic feet in 1995.

"Changing Times" (1996 and Beyond)

Beginning in 1996, the volume reduction era ended when the Barnwell, South Carolina facility (the only "full service" facility available to Massachusetts LLRW generators), changed its fee schedule from a volume-based system to a weight-based system.

The implications of the weight-based disposal fee system are just beginning to be known. For some types of waste, volume reduction, especially by compaction, is no longer economically attractive.

Preliminary analysis of the 1996 Low-Level Radioactive Waste Survey data by the Management Board indicates that some generators are no longer volume-reducing their waste.

What direction the evolution of LLRW treatment technologies will take is uncertain. Undoubtedly human ingenuity will combine with the desire to dispose of LLRW in the most cost- effective manner to produce new technologies that take advantage of weight-based disposal fees.

Want to Serve on the Public Participation Advisory Committee?

The Management Board's Public Participation Advisory Committee has one opening. Interested in joining?

The advisory committee, established by the Board to provide advice and assistance to the Public Participation Coordinator, has two major functions:

(1) To advise the Public Participation Coordinator on procedures and methodologies that will facilitate an open, fair, and effective process of public participation in the Management Board's activities.

(2) To advise and assist the Public Participation Coordinator in establishing, conducting, and publicizing public information and education programs on the use of radioactive materials in Massachusetts; the nature and characteristics of low-level radioactive waste (LLRW); current and newly-developing technologies for LLRW storage, treatment and disposal; and the hazards associated with LLRW and its improper management.

The Public Participation Advisory Committee charter stipulates that membership must be geographically balanced, represent the "range of public opinion" on LLRW or its management, and include up to 15 Massachusetts residents with insight, skill, or knowledge who are committed to a public, participatory process.

Current Members

The current Public Participation Advisory Committee includes Lyn Billman-Golemme of Westborough (land use planning consultant), Philip Connors of Princeton (professor of physics and engineering), Lois Durso of South Hadley (high school science teacher), Stanley Fielding of Wilmington (groundwater hydrologist and conservationist), David Form of Somerville (high school science teacher), Mary Lampert of Duxbury (citizen activist), James Muckerheide of Needham (nuclear engineer), Kent Portney of Newton (professor of political science and environmental policy), David Rush of Boston (professor of community health and pediatrics), Leonard Smith of Boston (radiation safety official and health physicist), David Steindler of Sheffield (businessman and solid waste district chairman), James Tocci of Amherst (radiation safety official and health physicist), and Larry Weathers of Arlington (high school science teacher). Phil Connors is the current chairman; Jim Tocci serves as vice chair.

PPAC Recommendations

The Public Participation Advisory Committee frequently makes recommendations to the Public Participation Coordinator and to the Management Board. At a recent meeting, Committee members recommended that:

(1) The Board should conduct public informational meetings, especially now that it has ceased its active in-state siting activities.

(2) The Board's "Teachers' Resource Packet" of learning activities for high school science is a good idea, but should have been prepared by an "independent" entity through a grant from the Board, rather than by science teachers and curriculum developers hired by the Board.

(3) The Board's planned "Speakers Bureau" should include a "training" component involving the development of topical outlines or modules prepared with the assistance of various professional societies (planners, transportation experts, etc.) to be used by members of those associations.

(4) The Board should include in its planned Internet web site the titles and abstracts of scientific articles routinely compiled in its review of possible health effects of low-dose radiation.

(5) The Board's staff should distribute to interested organizations "concept" papers on the development and application of "preference" and "conditional" site selection criteria (one of the "site-planning tasks that the Board is currently undertaking); hold discussion meetings; request public comment; and send revisions back to the commentators so that they can see how changes were made and provide additional input.

(6) The Board should establish a general "LLRW" e-mail address, and include it on Board stationary.

With the exception of (2) above, all of these recommendations are being implemented.

Public Participation Advisory Committee members are appointed for two-year terms. Their expenses (travel to meetings, phone calls) are reimbursable by the Management Board. Meetings generally are held twice a year.

Are You Interested?

Interested in sharing your views on public participation with a fascinating group of people at not-too-many meetings? Then this group is for you! Contact the Board's Acting Public Participation Coordinator, Carol Amick, for more information, or send a note with your resume to the Board's office.

PPAC members (l. to r.) Lyn Billman-Golemme, David Rush, Mary Lampert and Stan Fielding join in the discussion at a May 2 PPAC meeting.

Massachusetts Attains Agreement State Status

Agreement State (Continued from page 1)

comprehensive radioactive materials licensing, inspection, and enforcement program. NRC began its independent evaluation to determine whether the state's program was adequate.

1996: Governor Weld submitted a final certification that Massachusetts has a program to control radiation hazards that is adequate to protect public health and safety and that the state desires to assume responsibility as an Agreement State.

1996: Having made a determination that the state program is "adequate" and "compatible," NRC published this finding in the Federal Register and requested public comment through January, 1997.

1997: An Agreement was signed on March 7 between NRC and Massachusetts, and became effective on March 21, 1997.

Licensure of LLRW Facility

Besides regulating certain radioactive materials (see box, front page), Agreement State authority enables the Commonwealth to serve as the licensing, inspection, and enforcement entity for any LLRW facility that may be sited, built, and operated in Massachusetts under the auspices of the Low-Level Radioactive Waste Management Board. This part of the Agreement is not essential at the present time, since the Management Board has put "on hold" its active in-state siting of an LLRW disposal facility, while it monitors activities in other states and continues to work for a long-term out-of-state disposal solution.

The Commonwealth also received authority to evaluate the safety of sealed sources and devices containing materials covered by the Agreement for distribution in interstate commerce. After the March, 1997 effective date of the Agreement, licenses issued to Massachusetts radioactive materials users by the NRC continue in effect under the state's new regulatory authority until they expire or are replaced or amended by licenses issued by DPH's Radiation Control Program.

Agreement State Program Benefits

A major "plus" for Agreement State authorization is that it allows DPH to implement regulations adopted in 1993 to require minimization of LLRW volumes and radioactive sources that lead to LLRW generation. Those regulations, 105 CMR 120.890, were adopted by DPH because of a forceful mandate of state law that companies and institutions generating LLRW must develop and follow minimization statements and plans to enhance their LLRW minimization efforts.

The Agreement State program allows the state, rather than the NRC, to control the licensing and monitoring of LLRW disposal facilities -- one reason for the Management Board's support. The Board always has believed that any LLRW storage, treatment, or disposal facility that may have to be developed within the Commonwealth would be regulated more appropriately by a state licensing and inspection agency representing the interests and concerns of Massachusetts citizens, rather than a federal licensing agency.

Another positive outcome of the Agreement State program is the lower licensing fees that will be charged by DPH to radioactive materials users (and LLRW generators) that before were licensed and assessed fees by the NRC. NRC licensing fees levied on Massachusetts companies, hospitals, and universities have totalled over $2.5 million each year. In contrast, annual fees charged by the state's Radiation Control Program are expected to total approximately $800,000.

The NRC's independent review of Massachusetts' radiation control program acknowledged some provisions of the DPH program that are not identical to the NRC program. These included Massachusetts' prohibition on disposing of LLRW via "shallow land burial" and a schedule for inspections that mandates some inspections to occur more frequently than the schedule used by NRC.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 6- Number 3 - Summer, 1997

Effect on Massachusetts?

Siting Slow-Down in Other States and Compacts

The Low-Level Radioactive Waste Management Board will re-open its discussion of low-level radioactive waste (LLRW) disposal activities in other states and compact regions when it meets on September 17 in Boston.

The Board's discussion of this topic reflects its decision in March, 1996, to slow its siting activities by ceasing those siting tasks that would lead to identifying "areas," "locations," or "potential sites" for a Massachusetts LLRW disposal facility, but continuing to engage in "site planning" endeavors. When the 1996 decision was made, the Board declared its intention to monitor LLRW disposal and siting activities in other states and to review its siting slowdown plan routinely.

State and Compact Status

As the Management Board contemplates the LLRW disposal situation around the nation, it will review the following actions in other states:

Ohio: This state's LLRW facility siting program was halted in June by the Midwest Interstate LLRW Commission, which voted to terminate development of a disposal facility for the Midwest Compact region (Indiana, Iowa, Minnesota, Missouri, Ohio and Wisconsin) and to relieve Ohio of its designation as host state.

The Midwest Compact Commission's decision to stop siting resulted from its assessment that declining waste disposal volumes in the region, continued access to existing LLRW disposal facilities in South Carolina and Utah, and the "high cost of new disposal facilities," forced it to reconsider the need to proceed with an Ohio disposal facility before committing significant funds to the Ohio siting process.

Illinois: Facility siting also was delayed in Illinois, the host state for the Central Midwest Interstate Compact (Illinois, Kentucky). Legislation signed into law in June postpones the facility opening date from the year 2003 to 2012. The law also provides county and municipal governments with veto power over a potential site volunteered by a private landowner.

The decision to postpone siting resulted from an analysis by Illinois officials that its declining LLRW generation would result in disposal costs in excess of $900 per cubic foot, or three times the current cost of disposal at the Barnwell, South Carolina facility. The state reasoned that, by waiting until some of the Central Midwest Compact utility plants begin decommissioning, increased disposal volumes generated around the year 2012 would make disposal costs more reasonable.

Siting Costs

North Carolina: Funding concerns have plagued the North Carolina LLRW siting project, where a regional disposal facility is being developed for the Southeast Compact (Alabama, Florida, Georgia, Mississippi, North Carolina, Tennessee and Virginia).

Nearly $103 million has been expended to date on the North Carolina site in a rural area of Wake County. A portion of those funds was spent to further characterize the site after North Carolina regulatory agencies identified a series of questions about the license application submitted by Chem-Nuclear Systems, Inc., the contractor chosen to license, build, operate, and close the disposal facility.

Concerned about rising siting costs, the Southeast Compact Commission has been monitoring action by both the North Carolina Siting Authority and the North Carolina Division of Radiation Protection on the "Licensing Work Plan" -- a series of seven "decision points" designed to yield the information needed for North Carolina regulators to approve or deny the license application. In early June, reacting to a letter from the Division of Radiation Protection criticizing the Siting Authority's efforts, the Compact Commission's Monitoring Committee urged North Carolina to scale back spending on the facility until the Commission received "assurances" that both the Siting Authority and the state regulators have agreed on the Licensing Work Plan (or its revision), and "neither party believes that it would be imprudent to proceed with characterization."

By June's end, the Monitoring Committee had restored its limited funding for the facility project, and recommended that the full Compact Commission meet to consider additional funding needs.

California: In 1993, the California Department of Health Services issued a license for an LLRW disposal site in Ward Valley, California, chosen as the disposal location for the Southwestern Compact of states (Arizona, California, North and South Dakota). The license was conditioned upon the state acquiring the facility site, which is owned currently by the Bureau of Land Management of the U.S. Department of Interior.

Since early 1993, a series of disputes over the transfer of the site from the federal government to the state have stalled California's actions to construct and operate the facility. These included the issu-

(See Slow-Down, page 4)

Publication No. 17899 - 6 - 6600 - 8/97 - .10 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

Public Forum in Amherst--

Nationally Known Experts Present Their Views

Is it possible that a "little radiation may be good for you?" This controversial notion was advanced by some panelists during a May 20, 1997 public forum sponsored by the Low-Level Radioactive Waste Management Board. However, the discussions also covered a variety of other viewpoints on the potential health effects of low-level ionizing radiation. (Ionizing radiation is the type of radiation emitted from radioactive materials, including radioactive waste, and from devices such as x-ray machines.) There was no agreement among the panelists on any one theory.

The panel was composed of public health advocates and experts in the fields of radiation and hazardous materials sciences, risk, and low-level radioactive waste (LLRW) management. The formal presentations and discussions illuminated existing and emerging theories and interpretations of the data on biological effects of low-level exposures, and the possible implications for changes in the regulation of radioactive materials and other potentially hazardous materials. New research and ongoing reviews of health effects studies have stimulated considerable debate and discussion regarding the potential hazards associated with exposure to low levels of ionizing radiation and other potentially hazardous and toxic substances. According to some, the data suggest that current regulations controlling the release of, and exposure to, potentially hazardous substances may be unnecessarily restrictive.

In addition, the panel was open to question and debate from the audience. Many participants joined the dialogue on this controversial and fascinating issue and added to a lively and interesting evening.

Panel Members

Panelists participating included:
Myron Polycove, M.D., Professor Emeritus of Laboratory Medicine and Radiology, University of California San Francisco, and NRC Visiting Medical Fellow. Dr. Polycove has gained significant notoriety for his assertions concerning the likelihood that the health effects of low-dose radiation may be substantially overestimated, which in turn cause unnecessary expenditures for the regulation of nuclear activities. He has been involved in biomedical research and related issues since 1951.

· Dianne Quigley, Executive Director, Childhood Cancer Research Institute, Concord, MA. Ms. Quigley has devoted many years to evaluating the possible health effects associated with ionizing radiation and speaking on this issue. Her efforts regarding public health issues associated with radiation are widely known.

· James Muckerheide, Director, Center for Nuclear Technology and Society, Worcester Polytechnic Institute. Mr. Muckerheide has been at the forefront of those urging a reassessment and possible reform of radiation protection standards. He has assembled data from a wide body of research studies that he asserts supports the position that low-dose radiation does not pose significant, if any, risk to human health.

Dr. Edward Calabrese, Ph.D, was moderator and keynote speaker for the forum.

· Christopher Nelson, Environmental Engineer, U.S. Environmental Protection Agency (EPA). Mr. Nelson works at EPA's Radiation Protection Division where he has been involved in numerous projects associated with radiation risk, including the Three Mile Island accident, uranium mill tailings, and radon exposure.

Judith Johnsrud, Ph.D, Director, Environmental Coalition on Nuclear Power. For many years, Dr. Johnsrud has challenged the efficacy of nuclear power and has assessed risks and other issues associated with the use of nuclear materials and radioactive waste management.

The moderator and keynote speaker was Edward Calabrese, Ph.D., Northeast Regional Environmental Public Health Center, University of Massachusetts, Amherst. As Chairman of the Advisory Committee on the Biological Effects of Low-Level Exposure (BELLE), he has assembled a substantial database on health effects studies of hazardous and chemical substances and the nature of their impacts to human health at low doses.

Dr. Calabrese summarized the information that the BELLE group has assembled, relating it to issues surrounding risk from ionizing radiation. He noted that the major problem in dealing with health effects issues, chemical or radiation, is what goes on in the low-dose area. He stated that data are usually incomplete in the low-dose range, but that judgments must nevertheless be made regarding health effects in this realm. Frequently data must be extrapolated over orders of magnitude, and often from animal data, to estimate risks in the low-dose region. Although epidemiology can help in studying the effects on human populations, epidemiology is a complicated science that generally does not allow the application of strict controls, as do animal studies. For this and other reasons, epidemiological studies in the low-dose arena are not readily verifiable.

However, he stated that extensive data from studies of chemical toxicity and the chemical responsiveness within biological systems appear to show evidence of chemical hormesis. (Hormesis is generally understood to mean positive or beneficial effects associated with low-level exposures to hazardous substances.) Hormesis seems to exist and is seen with respect to many different chemicals.

Disputes LNT Theory

Dr. Polycove explained that current radiation protection standards are based on the Linear No Threshold (LNT) hypothesis which asserts that the cancer risk associated with radiation exposure is proportional to radiation dose at any level and right down to zero dose: that is, damage to DNA from a single radiation particle or event could result in cancer. Dr. Polycove finds this theory inconsistent with the evidence from molecular biology research. Those data indicate that every single human gene is likely to

on the Health Effects of Radiation

have undergone mutation on about ten billion occasions in any individual from mostly normal, metabolic causes. Each of us experiences about ten trillion cell mutations every day. If each damage event could lead to cancer, then Dr. Polycove finds it remarkable that cancer occurs relatively infrequently and that we have not been overrun by mutant cells. Therefore, he concludes that if a single mutation in some particular gene were enough to convert a typical healthy cell into a cancer cell, we would not be viable organisms.

He stated that our bio-system evidently is protected by a complex process that includes DNA repair mechanisms, programmed cell death (apoptosis), cell cycle control (checks to see if cells are "normal" before allowing cell division), necrosis (another form of cell death), and immune system response to abnormal cells. With respect to radiation exposures in the range of background levels (about 100 millirem per year, not including radon), normal metabolic production of free radicals produces about 10,000 times more mutations than our exposure to this background radiation.

Dr. Polycove asked whether it is reasonable that some of our radiation protection standards require protection down to 1/4 of background levels or less. He asserted that the "insignificant number of mutations produced by low-dose radiation does not increase the risk of cancer," but on the contrary, "low-dose, low-dose rate radiation stimulates and increases this DNA damage control system." This, he claims, is the basis for the hormetic effects of low-dose radiation.

Citing studies that appear to support this hypothesis, Dr. Polycove believes that the regulatory structure based on the LNT hypothesis results in the unnecessary expenditure of $50 to $100 billion a year.

"Hormesis" Theory

Jim Muckerheide presented information on studies that show the beneficial effects of low-dose radiation, but that have been largely ignored by the regulation-setting establishment. These studies, including those on animals, cells, simple organisms, and humans, all reveal a positive response to low-dose radiation exposures. Human studies that Mr. Muckerheide believes support hormetic responses include those on the Japanese bomb survivors, shipyard workers, medical practitioners, radium dial painters and other radium exposed populations, and populations exposed to naturally occurring, high radiation background doses.

Christopher Nelson shared a different perspective on the radiation health effects issue. He outlined EPA's approach for estimating radiogenic cancer risk from low-level exposures, which he indicated is based on risk models developed for the International Commission on Radiation Protection (ICRP) and based largely on the data from Japanese atomic bomb survivors. EPA uses an LNT that extrapolates available data from high doses to the low-dose region.

With regard to a threshold or the hormesis issue, Mr. Nelson stated that it is not surprising that any excess cancers are difficult to detect at low-doses, since only a relative few are predicted to occur and these are masked by the many cancers that occur from other risk factors. He defined the low-dose range as something comparable to background levels, or about 100 millirem per year, indicating that this level of exposure will result in about every cell nucleus getting hit on the average of once per year. Considering all sources to which an average individual would be exposed, it is estimated that one could be exposed to about 20 rem (1 rem equals 1000 millirem) in a lifetime. Such an exposure, using the EPA linear model, is estimated to result in a 1% risk and result in about 4% of all cancer deaths.

Mr. Nelson said numerous studies support the LNT model. In the zero to five rem range of data from the Japanese survivor study, a clear response can be demonstrated within that region, although the data are statistically weak. However, it is believed by the authors of a recent study of the data that the effect is convincing: the fact that an LNT model fits the data cannot be rejected. Mr. Nelson cited other data that also supports the EPA's LNT model, including a Canadian breast cancer study and a childhood cancer study based on in-utero exposures.

Mr. Nelson thinks that some of the other views of low-dose radiation health effects are naive, particularly that background radiation must be harmless because we have always had to live with it. Furthermore, he maintains that although humans have an enormously complex protective and repair mechanism for dealing with biological damage, this mechanism is not perfect, because some people do die of cancer. He said that damage that radiation causes is very strong and localized, so that in some situations it appears that it may be more difficult to repair.

Community Risk Experience

Dianne Quigley focused her presentation on community experience with the health risks of radiation exposure. She noted that most often the radiation risk issue is framed solely on technical analysis of the data from various studies. She believes that the direct experiences of populations living with nuclear contamination on a daily basis never seems to register much meaning to scientific and regulatory experts. Ms. Quigley recommended several mechanisms for integrating communities into programs that potentially impact their health.

Among the effects that Ms. Quigley believes should be considered are the "insidious social impacts" of nuclear facilities, including how divisive they can be. Related factors include the undue economic

(see Nationally-Known Experts, page 6)

Discussing different theories on the health effects of low-dose radiation exposure are (l. to r.) James Muckerheide, Dianne Quigley, Myron Polycove, Christopher Nelson, and Judith Johnsrud.

Management Board Monitors Siting Slow-Down in Other States

(Continued from page 1)

ance in January, 1993 of a "Record of Decision" to transfer the land, which was followed by a decision by in the incoming Interior Secretary under President Clinton not to follow through with that Record of Decision and the land transfer.

Other disputes involving environmental impact reviews and evaluation of the site by the National Academy of Sciences culminated in a lawsuit filed by California against the Department of Interior in January, 1997. California wants the federal court to compel transfer of the land based upon the favorable 1993 Record of Decision. It also seeks to block the preparation by Interior of a second supplemental environmental impact statement. US Ecology, California's facility contractor, also filed suit in the Federal Court of Claims against Interior for breach of implied and express contract.

In addition, California announced its intention to conduct tests at the Ward Valley site consistent with recommendations made by the National Academy of Sciences. Other disputes between California and Interior have ensued concerning whether the testing should be conducted jointly by the state and Interior, and whether the U.S. Department of Energy should provide technical assistance to California.

While the squabbling continues, the Ward Valley site land transfer remains "on hold." At the request of several congressmen, the Government Accounting Office initiated an investigation of alleged mishandling of the land transfer by Interior.

California hopes that a court ruling on the land transfer will be issued in 1998, and that disposal operations can begin in 1999. If the date is further delayed, generators in the Southwestern Compact region will be forced to continue storing their LLRW on site, or using the Utah and South Carolina facilities temporarily.

More Lawsuits

Nebraska: Five law suits to date have been initiated by the host state, Nebraska, and one by the Central Interstate LLRW Commission (Arkansas, Kansas, Louisiana, Nebraska, and Oklahoma).

The seventh and latest suit, filed in April by the Central Commission's facility developer and operator, US Ecology, challenges Nebraska's decision that filling a "small depression" on the site and creating a new wetland outside the site boundary constitutes the "commencement of construction" and is prohibited until after a facility license is issued. Nebraska argues that state law allows the Department of Environmental Quality to prohibit any construction pertaining to any activity for which an environmental impact analysis is required, and that "commencement of construction" means "any clearing of land, excavation, or other substantial action that may affect the environment of the facility." Noting that a permit authorizing the work was issued by the U.S. Army Corps of Engineers, US Ecology argues that the mitigation work is not a significant site activity, does not constitute starting construction, and does not require an environmental impact analysis.

Texas Progress

Texas: A new LLRW disposal facility in Texas is proceeding through the state's review process. A license application was submitted to the Texas Natural Resource Conservation Commission in 1992. Between 1992 and 1996, the Texas Siting Authority addressed over 70 major topical issues posed by the Commission, which resulted in 20 revisions to the license application.

In April, 1996, the Commission completed its review process and issued its environmental and safety analysis along with draft license conditions. However, opponents to the site in Hudspeth County, Texas, requested a "contested case" hearing. Adjudicatory hearings are scheduled to begin in January, 1998.

Connecticut: Several states continue to encourage "volunteer" sites. Connecticut's volunteer program only allows consideration of sites that have been approved by a community in a town-wide referendum. A town choosing this approach will receive an additional $2 million in compensation over and above the $2 million dollars per year it will obtain when the facility opens for operation.

Three Connecticut towns indicated interest in exploring the voluntary program, but the state's Siting Authority encouraged them to postpone their discussions because of the uncertainty that was developing nationally, due to the reopening of the Barnwell disposal facility for a limited period of time and the expansion of access at the Envirocare of Utah facility. That situation continues today.

Pennsylvania: Another state using a voluntary approach is Pennsylvania, host state to the Appalachian States Compact (Delaware, Maryland, and Pennsylvania). Pennsylvania conducted initial exclusionary screening which eliminated about 78% of the state from consideration in its volunteer siting process, called the Community Partnering Plan. Volunteers are being encouraged through 1998.

Effect of Barnwell Re-Opening

What impact has the temporary reopening of the Barnwell, South Carolina disposal facility had on states' activities to provide for LLRW disposal? What effect has the sharp reduction in LLRW generation nationwide had on the development of so many new disposal sites? Massachusetts slowed its siting program in 1996 because of the availability of Envirocare in Utah and Barnwell in South Carolina, even though access to Barnwell is not guaranteed. Illinois just took the same action, due to the sharp decline in LLRW generation in the Central Midwest Compact region. The Midwest Compact took stronger, and perhaps permanent action, in terminating the Ohio siting activity and cancelling Ohio's designation as host state.

Massachusetts Dilemma

What lies ahead for Massachusetts LLRW generators? Can Massachusetts count on South Carolina's Barnwell site for the long-term? South Carolina says "no" to that suggestion.

Can Massachusetts rely on further expansion of the Envirocare of Utah facility as a long-term solution? The Management Board is concerned that an investigation by the offices of the U.S. Attorney General and the FBI into a secret financial relationship between Envirocare's president and Utah's former top nuclear regulator could have negative consequences on Envirocare's operation.

With so many other states and compact regions dropping or delaying their plans for disposal facilities, are Massachusetts' options dwindling?

Minimization Group Compares Waste Reduction Programs

Presentations and discussion of the features and similarities of the Toxics Use Reduction Act (TURA) minimization program for hazardous chemicals and the Department of Public Health minimization program for radioactive materials and radioactive waste (LLRW) were featured at a June 4, 1997 meeting of the Low-Level Radioactive Waste Management Board Minimization Working Group. Although there are differences in the two programs, the discussion highlighted many similarities.

TURA Program Features

Dr. Mike Ellenbecker of the Toxics Use Reduction Institute at UMass Lowell and Dr. John Raschko of the Office of Technology Assessment within the Executive Office of Environmental Affairs explained that TURA places emphasis on reduction in the production and use of toxic and hazardous materials in industry. However, TURA also has established a goal to reduce the amount of toxic wastes generated in Massachusetts by 50% by 1997. Toxic materials use reduction is the preferred method to accomplish this reduction in waste and meet other environmental laws as well. TURA also seeks to promote the competitiveness of Massachusetts businesses, while advancing innovation in toxic use reduction and management.

Dr. Raschko listed six methods that are employed to accomplish the desired reductions: (1) input substitution; (2) product reformulation; (3) production unit redesign or modification; (4) production unit modernization; (5) improved operation and maintenance of the production unit; and (6) recycling, reuse, or extended use of the toxic material.

TURA covers only specific substances; requires TURA reporting for toxic chemical usage above certain thresholds (25,000 pounds of total hazardous materials usage or 10,000 pounds of a single hazardous material) for firms with 10 or more employees and within certain industrial code categories (most TURA filers fall within the manufacturing category); assesses a fee to users; and requires plans to evaluate toxics use reduction potential and possible strategies.

TURA plans require statements of management commitment, characterization of manufacturing or production processes, and evaluation of alternatives to current methods. Although this detailed planning process is required of all TURA filers, implementation of developed alternatives is not mandatory. Each company's TURA plan is retained at the company, but a summary is filed with the Department of Environmental Protection.

The Office of Technology Assessment (OTA) helps implement the TURA program. OTA assists companies in accomplishing toxics use reduction and complying with requirements relevant to chemical use. The OTA program is non-regulatory, is confidential, and services are provided to industry free of charge. OTA operates many other related programs and activities, and TURI operates a laboratory in Lowell that companies can use to test non-toxic substitutes for organic cleaning solvents.

DPH Minimization Program

Robert Hallisey said the Department of Public Health (DPH) Radiation Control Program has as its primary goal the minimization of exposure of workers and the public to various sources of radiation, including radioactive materials and radioactive waste. In furtherance of these radiation protection goals and as a result of its responsibilities under Chapter 111H, the Commonwealth's Low-Level Radioactive Waste Management Act, DPH also has adopted waste minimization regulations that ensure that source and waste volume minimization are integral parts of each licensee's radiation control and waste management program.

Mr. Hallisey feels that the DPH program meets the intent of TURA. The program requires both source and waste volume minimization, while striving to be consistent with the promotion of responsible research and innovation.

Mr. Hallisey noted that DPH's licensing and regulatory authority is a key element in its implementation of a waste and source minimization program. A license application is approved only if the radioactive material licensed is used for the purpose represented and in such a manner to minimize danger to public health, safety, and property. Several requirements in the licensing regulations restrict the use and application of radioactive materials and require justification for the amount and type used, he explained.

Each DPH licensee must adopt a minimization statement on source and waste volume minimization. The statement must indicate the measures taken to minimize any waste that may result from their operations. It should contain the rationale for the use of radioactive material, the quantities proposed, and the choice of nuclide. It should also consider the fate of any anticipated radioactive waste that would be generated.

Similar to the TURA program, there is a threshold (100 cubic feet of LLRW requiring disposal) above which a licensee must actually develop and submit a minimization plan to DPH. Plans, and the licensee's commitment to source and volume minimization, must be updated annually, and plans and commitments become inspection items for each licensee. Compliance is obtained by enforcing license terms, including the total inventory of radioactive materials held, and by regular inspections. Similar to TURA plans, DPH requires plan filers to perform an operational assessment based on EPA's methodology for assessing waste minimization options.

If DPH licensees were required to meet TURA program requirements, 27 out of 503 radioactive materials licensees currently would qualify for inclusion under TURA by virtue of TURA industrial code classification requirements. Only three of these produce more than 100 cubic feet of LLRW per year (the 10,000 and 25,000 pound thresholds would be meaningless and would not apply), requiring them to produce a DPH minimization plan. However, under the DPH program requirements, whose applicability are not defined by industrial code classification, several additional organizations actually are required to provide minimization plans to DPH.

Achievements Under Both Programs

Dr. Ellenbecker and Mr. Hallisey presented information on the success in reducing waste quantities achieved by the TURA program and the radioactive materials users program. Dr. Ellenbecker reported that between 1990 and 1995, there has been a 20% reduction in toxic chemical material use, a 30% reduction in toxic chemical byproducts produced, and a 67% decrease in toxic materials released to the environment. Hallisey noted that over the past 15 years there has been a 90% reduction in LLRW volumes shipped for disposal from Massachusetts.

Nationally Known Experts Differ on Potential Health Effects

(Continued from page 2)

influence such facilities have on community decision-makers, complacency of institutions responsible for protecting public health, and funding to support local groups who want to participate and monitor.

She also indicated that there is another side to the story of research on the effects of radiation. She cited numerous studies that point to possible health effects at low doses, including those on prenatal x-rays, populations exposed to atomic bomb test fallout, the Sellafield, England paternal exposure studies, childrens' risks from Chernobyl, Oak Ridge worker studies, purported effects around the Pickering and Pilgrim nuclear power plants, and recent findings on Three Mile Island by Dr. Steve Wing. She said these studies and others that indicate effects from low-level exposures form a large body of evidence that causes communities to have grave concerns about repeated exposures to releases of radiation from nuclear facilities.

Dr. Johnsrud expressed concern with a movement in the nuclear industry to return to the "discredited concept" of a threshold for radiation health effects.

On the issue of hormesis, she advised that it would be best to follow the great body of evidence that suggests protective measures against radiation are appropriate. If any relaxation of those standards is to be adopted, the burden of proof must be met by hormesis proponents, she said.

Dr. Johnsrud believes that in order to protect the public it must be assumed that all exposures, including naturally occurring ones, carry a risk of somatic or genetic injury, and she cited BEIR V as finding no evidence to contradict the LNT hypothesis. She also believes that the regulatory community has not adequately considered multiple, additive, cumulative, and synergistic effects of radiation acting in concert with other radioactive sources and contaminants in the environment.

Effects Other Than Cancer

Dr. Johnsrud also cautioned that looking only at cancer effects may be inappropriate, since there may be more subtle effects on our reproductive capability that have even greater impacts. She maintained that a given amount of a contaminant released to the environment will result in the same total health impact on the total population, whether that release is focused or widespread: "dilution only dilutes detection." She believes that ionizing radiation is disbursed unevenly among the many atoms of the millions of body cells, and that much molecular damage is done by radiation before any symptoms can be recognized.

Dr. Johnsrud is also concerned that the many allowed and unplanned releases of radioactivity into the environment will increase background levels, ultimately with adverse consequences for human well-being and ecosystems everywhere.

During the questions and comments portion of the forum, audience participants questioned some of the data presented on hormesis, indicating that contradictory data exist, such as that provided by Dr. John Goffman. Some disputed the applicability of studies on animals and other organisms to humans, and asserted that the move to demonstrate hormesis was just another ploy for allowing waste sites to be built and for decommissioned sites to be released without adequate cleanup.

In response to an audience question regarding the possibility of greater rather than lesser effects at low doses, Dr. Johnsrud cited new evidence from Russia that indicated that chronic internal exposures may damage the immune system.

Residents of Deerfield Valley in Western Massachusetts described health effects observed by the citizens of that area which they blammed on the Yankee Rowe nuclear plant, and feel aren't being seriously considered by public health agencies.

Some observers felt that radiation studies are funded by vested interests and may not be objective. Dr. Calabrese responded that this is not the case for the studies he has reviewed. Some felt, and Ms. Quigley agreed, that funding should be provided to study community concerns and observed human health problems.

A transcript and video of the entire forum are available from the Management Board.

Upcoming Board Meetings

Sept. 10 – Tentative Budget and Planning Committee meeting.

Sept. 17 – Regular Management Board meeting.

Nov. 12 – Tentative Management Board meeting.

Dec. 10 – Regular Board meeting.

All meetings will be held in 100 Cambridge Street, Room 905, Boston (the Saltonstall Building), at 9:30 a.m. Call the Board office for confirmation in case of changes.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 6 - Number 4 - Fall, 1997

Cleanup Underway of Starmet Holding Basin

Fifteen years after the planning began to either recycle or dispose of the radioactive materials accumulated in a "holding basin" behind its West Concord facility, Starmet Corp. (formerly Nuclear Metals, Inc.) has begun the task of removing 94,500 cubic feet of radioactive sludge containing about 350,000 pounds of depleted uranium and 700,000 pounds of copper. Another 40,500 cubic feet of contaminated sub-basin soil is likely to be removed as well.

Depleted uranium, a byproduct from enriching nuclear reactor fuel, is used as radioactive shielding and in the manufacture of ammunition. The holding basin was designed as a solids settling basin, and for 28 years accumulated plant process wastes principally from Starmet's production of armor-piercing bullets for the federal government.

While the company succeeded in developing a working recycling venture, the costs ultimately were prohibitive (three times the disposal estimate). The disposal effort now underway has no small price tag – $6.5 million dollars. That cost, which is being paid by the U.S. Army, funded the construction of a giant, temporary steel-and-fabric enclosure, the removal of the waste, its packaging into cubic yard boxes (27 cubic feet = 1 cubic yard), its transport (by truck and rail), and its disposal in a licensed Utah facility.

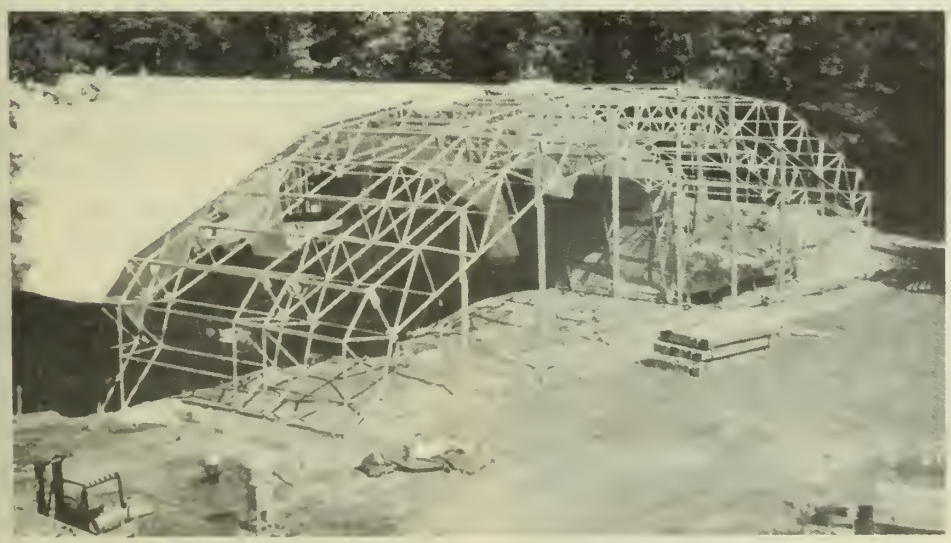
The enclosure, which is 200 feet long, 110 feet wide, and 35 feet tall, was completed in September. The galvanized steel supporting trusses are covered both inside and out with a heavy plastic liner. A HEPA filtered ventilation system is being used to maintain negative air pressure inside, to minimize the possibility of any radioactive contaminants becoming airborne and escaping outside during the excavation process. Use of a full enclosure was chosen by Starmet to provide an added measure of protection against release of dust and other airborne particulates likely to be generated during excavation. The enclosure also allows excavation to continue in inclement weather.

Monitoring Stations

In addition, monitoring stations surrounding the perimeter monitor air, dust, and groundwater, and a drainage trench directs any rainwater runoff into a recharge pond elsewhere on the company's property. Eight other monitoring stations, installed by the Town of Concord as a second pair of eyes to check air emission levels, are in place around the Starmet property and as far away as 4.5 miles.

According to Starmet Vice President Frank Vumbaco, approximately 300 truckloads of waste will be shipped to Worcester and put on railroad gondola cars for the long trip to the Envirocare of Utah disposal site in Clive, Utah. The heavy-duty, plastic-lined cubic yard corrugated boxes in which the excavated waste is packaged are being used only to transport the waste; once at Envirocare, they are opened and their contents placed into disposal cells.

When full, each cubic yard box weighs about one ton. One truck can hold about 20 boxes, and three to four trucks will fill one rail car, explained Vumbaco. He said the company expects that the bulk of the waste will be shipped by the end of December. However, the goal is to remove and ship the waste "as safely as possible." If the excavation and packaging operation has to be slowed for safety reasons, it will be done, he added.



In mid-September, work was almost complete to install the plastic liner on the enclosure erected around the excavation area at Starmet in West Concord. (Photo courtesy Starmet Corp.)

Several Agencies Watch Cleanup

The work at Starmet has involved several state agencies, the Town of Concord, and local citizens groups. Because of contamination by volatile organic compounds, the Massachusetts Department of Environmental Protection (DEP) classified the site in 1985 as a "priority site" for cleanup under the State's Superfund law, which requires DEP approval of all decommissioning activities. In 1990, a petition submitted to DEP requested that the Starmet holding basin be designated as a "Public Involvement Plan site." That petition was approved, and the group known as Citizens Research and Environmental

(See Holding Basin, page 2)

Publication No. 18004-4-6500-11 97- 08 -C R.
Approved by Philmore Anderson III, State Purchasing Agent

Guest Commentary-

Radioactive Materials Provide Environmental Safety Data

By Paul Fackler, Ph.D.
Research Director
Springborn Laboratories, Inc.

All new chemicals intended to be sold in the United States require some form of environmental assessment testing before permission is granted to distribute the products, or claims are made regarding biodegradability and/or environmental safety. These tests are imposed by one of three U.S. government agencies, the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), or the Federal Trade Commission (FTC), for a variety of applications.

The environmental safety of pharmaceuticals and animal health drugs is regulated by FDA. Chemicals and pesticides undergo review by EPA before a license is given to produce and sell these products. This is nothing new, in that a great deal of effort has been put into studying the environmental effects of pesticides covering the past 20 or 30 years. For consumer products, the FTC insists that "environmentally friendly" and "biodegradable" claims put on commodities sold in the U.S. be backed up with reliable scientific studies ensuring the claims are true.

Springborn Laboratories performs a variety of laboratory tests using radioactivity as a tool to develop environmental safety data for chemical, consumer product, and drug companies. This is often done using low-level radioactive materials. Test chemicals which are radioactively labeled, can be used as a tracer for determining how they behave in the environment, i.e., do they biodegrade, if so, what biodegradation products do they form; are the degradation products toxic, etc..

Other tests using radioactively "tagged" test chemicals investigate how safe (or toxic) products are to environmentally important groups of organisms. These include fish, shellfish, insects, worms, bacteria, and plants.

Radioactive labeling, in the form of replacing one carbon atom in a molecule with Carbon-14, is done by our suppliers and permits testing of these chemicals at extremely low concentrations. The detection limits are so low, in fact, that the test chemicals can be studied at concentrations below one part per trillion. This is equivalent of measuring one grain of salt dissolved in a swimming pool. Without the use of Carbon-14 labeled test chemicals, testing would have to be conducted at much higher concentrations (perhaps biasing the outcome of the study), or would have to be conducted without actually measuring the test chemicals itself. Both of these options are less reliable than using radioactive tracers in the tests.

As analytical equipment becomes more sophisticated, and detection limits become lower, it is possible that at some point in time the use of radioactive tracers will not be necessary. Today, however, their use is imperative in determining the environmental safety (or risk) of new chemicals and products.

Cleanup at Starmet Holding Basin

(continued from page 1)

Watch (CREW) became active in Public Involvement Plan meetings. CREW has received two technical assistance grants to aid it in reviewing decommissioning data.

Starmet also has had to fulfill all the decommissioning requirements of the U.S. Nuclear Regulatory Commission which had licensed the company to use radioactive materials. Since March 21, 1997, however, licensing and regulation of radioactive materials users in the Commonwealth (except nuclear reactors and federal entities) was assumed by the Massachusetts Department of Public Health (DPH), which now regulates the Starmet decommissioning effort along with DEP.

The Town of Concord also decided that it wanted to be involved in monitoring the Starmet cleanup. A Concord Town Meeting voted funds last year for the second set of air monitoring stations, and a committee of citizens and town officials reports the results monthly to the Concord Board of Health.

Michael Moore, Concord's Public Health Administrator, said Concord is

(See Holding Basin, page 4)

Inside the enclosure, radioactive waste is dug out of the holding basin and placed into cubic yard boxes for shipment to a licensed LLRW disposal site in Utah. (Photo courtesy Starmet Corp.)

Key Events in Holding Basin History

- Originally constructed in 1958
- Peak production discharge, 1974-1985
- Alternate waste process design, 1983-1985
- Discharges to basin ceased, 1985
- Basin capped with Hypalon fabric cover, 1986
- 10 tons of basin waste extracted for characterization, 1991
- Tests performed on waste (site acceptance criteria) by Envirocare, 1992 and 1996
- Enclosure completed and excavation begins, 1997

Major Challenges Face West Valley Decommissioning

Near a small rural village in western New York State, an important and complex project of the nuclear age has been slowly evolving for more than a decade. The project involves a first-of-a-kind program for the solidification of commercial high-level radioactive waste (HLRW) and is taking place at the Western New York Nuclear Service Center, a 3,340 acre site located 30 miles southeast of Buffalo which was originally intended to be a "nuclear park" hosting numerous nuclear industry activities. All facilities at the site, including the solidification equipment and structures, also must be "decommissioned," or decontaminated to the extent practical and placed in a condition where there is no reasonable future threat to public health and the environment. The challenge exists not only in demonstrating the viability of HLRW solidification processes but also in implementing effective long-term solutions to a myriad of potential environmental problems at the site.

The West Valley site has been mentioned as a possible location for low-level radioactive waste (LLRW) centralized storage or disposal. Authorization for such activity has not been approved by the New York Legislature, however.

The New York State Energy Research and Development Authority holds title to and manages the Center. The Center contains a spent nuclear fuel reprocessing facility operated under an Atomic Energy Commission license by Nuclear Fuel Services from 1966 to 1972. The Center also contains two radioactive waste disposal areas: (1) a 15 acre New York State licensed disposal area that the licensee operated as a commercial LLRW facility from 1963 to 1975, and (2) a 5 acre U.S. Nuclear Regulatory Commission (NRC)-licensed disposal area that received radioactive wastes from the reprocessing plant and associated facilities from 1966 through 1986.

A view of the LLRW disposal area showing the trench covers, including plastic membranes, used at West Valley to minimize water intrusion into LLRW disposal trenches.

Processing HLRW

Approximately 640 metric tons of spent fuel were reprocessed at West Valley. In 1972, the plant shut down for modifications. However, citing economic reasons, Nuclear Fuel Services withdrew from the reprocessing business and returned control of the plant and related facilities to the site owner, New York State. During its operating life, the reprocessing plant produced about 600,000 gallons of HLRW which were stored underground, primarily in one HLRW tank.

In 1980, Congress enacted the West Valley Demonstration Project Act. The Act required the U.S. Department of Energy (DOE) to accomplish the safe solidification of liquid HLRW at the site and the transportation of this solidified waste to a geologic repository for permanent disposal. DOE assumed exclusive possession of the 200-acre portion of the Center, which includes the former reprocessing facility, the NRC-licensed disposal area, the HLRW tanks, waste lagoons, and above ground storage areas. New York State retained responsibility for the balance of the Center, including the state-licensed LLRW disposal area.

Waste Vitrification

After an extensive period of testing with nonradioactive waste, a type of waste solidification called "vitrification" began solidifying HLRW in July 1996. Vitrification involves mixing glass-forming chemicals with the waste and heating the mixture to about 1,150 °C in a special melter. The resulting liquid glass and waste mixture is poured into stainless steel canisters (10 feet high by 2 feet in diameter) where it cools to form solid, durable glass logs. The stainless steel canisters, containing the "vitrified" glass logs, are welded closed for storage.

HLRW waste processing was preceded by treatment of the waste in the HLRW tanks. The process resulted in a large volume of "decontaminated" liquid that classified as LLRW and that could be solidified with cement. Several thousand drums of this solidified LLRW are currently being stored in an above ground facility on site.

The remaining, more concentrated HLRW sludge, is being vitrified. By mid-October, 1997, the solidification program was more than half complete; 157 solidified HLRW canisters have been produced by the West Valley Demonstration Project and are being stored on-site.

Low-Level Radioactive Waste Issues

One of New York State's primary management tasks at West Valley is maintenance and future disposition of the commercial, state-licensed LLRW disposal site. This LLRW disposal area is one of the six original commercial LLRW disposal sites to operate in the United States. Between 1963 and 1975, 14 disposal trenches were constructed in the dense and almost impermeable clay soil native to this area. Because of this relatively impermeable clay, and rainwater intrusion into the capped trenches, a phenomenon known as the "bathtub" effect caused some of the trenches to accumulate water.

The LLRW disposal site was shut down in 1975 when contaminated water that accumulated in the trenches rose to a level where it seeped through the caps of two trenches. Some on-site contamination resulted, but no off-site radiation exposures resulted.

Various water management techniques and improved cap features have been imple-

(See West Valley, page 4)

West Valley Decommissioning Includes LLRW Disposal Site

(continued from page 3)

mented at the LLRW disposal area since that time. Currently, New York State is using techniques to manage water before it comes into contact with the waste in the trenches. An 860 foot long, 30 foot deep, 3 foot wide underground barrier wall consisting of clay mixtures has been installed along one side of the disposal area to divert groundwater flow away from the trenches. In addition, plastic-type covers, known as geomembranes, have been installed over the entire surface of several trenches to prevent rainwater and snowmelt from seeping through the clay trench caps.

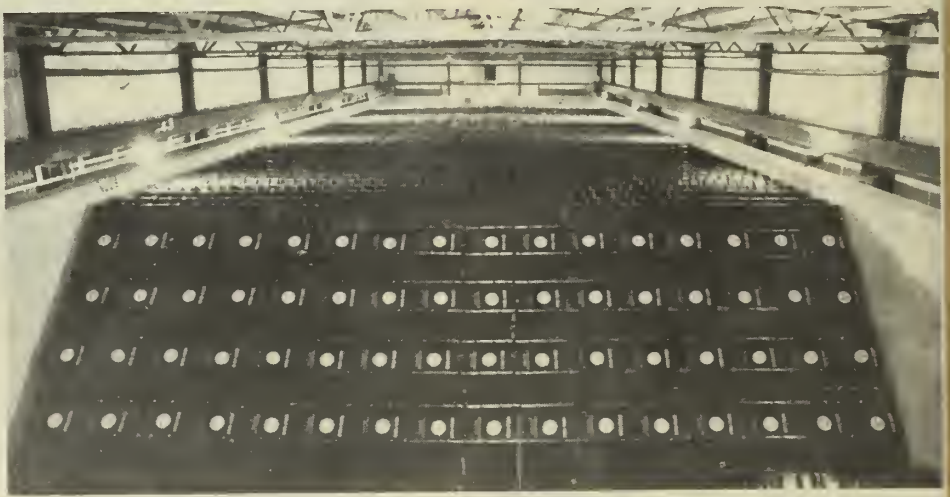
One trench has been covered with an innovative method of water infiltration control known as "bioengineering management." This cover consists of juniper evergreens planted in the clay cap between rows of fiberglass panels. The fiberglass panels restrict approximately 90 percent of rainfall from reaching the caps, and the junipers absorb remaining moisture to create a very dry environment within the cap.

Site Decommissioning

In order to decommission both the DOE- and the New York State-controlled areas of the site, DOE and New York State jointly developed a draft environmental impact statement (DEIS). No decision has been reached on the decommissioning methods that will be employed at the site.

Many years and much more work remains to complete removal of HLRW and decommissioning activities at West Valley. The DEIS identified five possible alternative decommissioning approaches, although a preferred alternative was not recommended in the DEIS. Most of the alternatives involve more than 25 years to complete, and most result in indefinite monitoring and active maintenance programs after that.

DOE and New York State are currently addressing comments to the DEIS, and they are working with local citizens, including a "Citizens Task Force," to help arrive at an acceptable decommissioning approach.



More than 19,000 drums of solidified radioactive waste are stored in this West Valley building.

Cleanup at Starmet Holding Basin

(continued from page 2)

pleased by the cleanup, to date. "We're not getting the phone calls or the attendance at public meetings that we used to get concerning this site," he noted.

Pam Rockwell, Chairman of the monitoring committee established by Town Meeting vote, said she is "happy with the cleanup so far," and noted that the air monitoring has revealed "no discernible effect on air emissions during the excavation." Vumbaco added, "With weekly meetings between the company, its contractor and town officials, word is getting around that the job is going well and we are performing the remediation according to our approved plans.

After excavation is completed, appropriate radiological and chemical surveys will be performed. Once approval from DEP and DPH is received, the area will be backfilled with clean gravel and graded to resemble the site before the holding basin was used. All of this should happen by next spring.

The remaining elements of Nuclear Metals' site decommissioning, including the remediation of groundwater contamination and other site mitigation activities, will be conducted after the basin cleanup.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 7- Number 1 - Winter, 1998

An Uncertain Future?

Plan to Keep Barnwell Open for 25 Years Falters

A proposal by the operator of the low-level radioactive waste (LLRW) disposal facility in Barnwell, South Carolina, that sought to keep the site open for 25 more years and raise tax monies linked to the amount of LLRW shipped there for disposal has been postponed.

Chem-Nuclear Systems L.L.C., the private company that operates the Barnwell disposal facility, notified the Low-Level Radioactive Waste Management Board on Jan. 12 that it would not proceed with its initiative so that LLRW generators could have additional time to react to its proposed plan requiring payments in advance. The first contractual deadline under the plan had been set for Jan. 16, and the first payment would have been due, Jan. 30.

The Barnwell disposal site has had an uncertain future ever since South Carolina Governor David Beasley announced his support to re-open the facility to generators across the nation, but only for 7 to 10 years. Barnwell opened its doors to LLRW generators from Massachusetts and elsewhere in July, 1995; it had been closed for a year to all generators except those from states in the Southeast Compact region (an organization of southern states which had included South Carolina).

Extra Disposal Charge

Access to this disposal facility did not come cheap. The South Carolina law allowing out-of-region LLRW generators back into the site required them to pay a $235 surcharge for every cubic foot of waste disposed of at the facility. South Carolina officials earmarked the surcharge receipts for a variety of educational programs, including college scholarships. They predicted that the surcharge would bring about $140 million per year into the state's treasury.

Only about 50% of that amount has been received to date, however, because waste volumes being shipped to this facility have declined.

Details of the Proposed Charges:

The Chem-Nuclear initiative would have required LLRW generators to make the following commitments up front to reserve 25 years of disposal space:

On January 30, 1998: Pay a $3.60 per cubic foot "commitment fee." This fee was to be nonrefundable, no matter what happened to the required implementing legislation in the South Carolina Legislature.

On October 30, 1998: Pay a $202 per cubic foot "Disposal Allotment Charge" and also pay $2.46 per cubic foot to reimburse Chem-Nuclear for its estimated fixed operating costs.

On April 1 of each year after 1998: Reimburse Chem-Nuclear for its estimated fixed operating costs at a rate increased annually by the percentage increase in the Consumer Price Index (CPI).

At time of disposal: Upon delivery of waste, pay a Disposal Service Charge based on the amount and type of LLRW delivered to the facility ($30 per cubic foot for Class A Unstable to $700 per cubic foot for irradiated hardware) plus a curie charge of $0.30 per millicurie, with an annual CPI increase for both fees.

Seeing this problem, the South Carolina Legislature passed another law -- last year -- requiring Chem-Nuclear to make up any yearly deficiency in the statutorily-required minimums for the higher education scholarship portion of the surcharge revenues ($22 million last year; $23 million this year, and $24 million each year after that).

Chem-Nuclear estimates that the tax shortfall for the fiscal year ending in June, 1998, will be $9 million. To collect enough to pay the taxes, the company proposed that LLRW generators could "reserve" disposal space by pre-paying 25 years worth of surcharges. This money -- expected to total $1 billion or more -- was to be placed into a trust fund, with the principal kept for South Carolina to collect at the end of the 25-year facility operating period, and the interest used to finance the annual education program costs.

The success of the Chem-Nuclear plan depended upon commitments from individual generators and states or compacts to reserve, by Jan. 16, 1998, a minimum of 5 million cubic feet of disposal space, and the approval by the South Carolina Legislature and Governor Beasley of legislation to establish the trust funds and keep Barnwell open for 25 years.

The corresponding legislation was to be filed in January, 1998, and approved no later than July, 1998. It was not known what action, if any, the South Carolina Legislature would take on this proposal.

Management Board Review

Because Chem-Nuclear was willing to enter into agreements with state and regional compacts (i.e., groups of states affiliated through legislation approved by each state and by Congress) -- in addition to individual LLRW generators -- the Management Board undertook a comprehensive analysis of the Chem-Nuclear proposal both to advise Massachusetts LLRW generators that may decide to commit to it, and to consider whether the state's interest in safeguarding disposal facility access required the Commonwealth

(See *An Uncertain Future?*, Page 3)

Publication No. 18042-4-6600-2/98-.10-C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

1996 Volumes of LLRW to Disposal Sites

The Low-Level Radioactive Waste Management Board's annual Radioactive Waste Classification Survey of 1996 data, which was collected and analyzed during 1997, reveals that low-level radioactive waste (LLRW) generators shipped 39% more LLRW for disposal than they shipped in 1995.

During 1996, 225 generators reported to the Management Board that they generated 365,952 cubic feet of LLRW comprising 42,792 curies of activity. Various methods of waste management, including incineration for disposal, storage for decay, and volume reduction eliminated 33% of the generated waste, leaving 246,701 cubic feet containing 16,481 curies to be shipped for disposal (see Figure 1 for percentage breakdown by management method).

This disposed volume increased from 177,578 cubic feet in 1995 but disposed activity declined from the 26,150 curies disposed in 1995.

As in the last several years, one-time decommissioning and decontamination (D&D) activities resulted in a large volume of LLRW shipped for disposal. However, that large D&D volume is not expected to recur in the next few years.

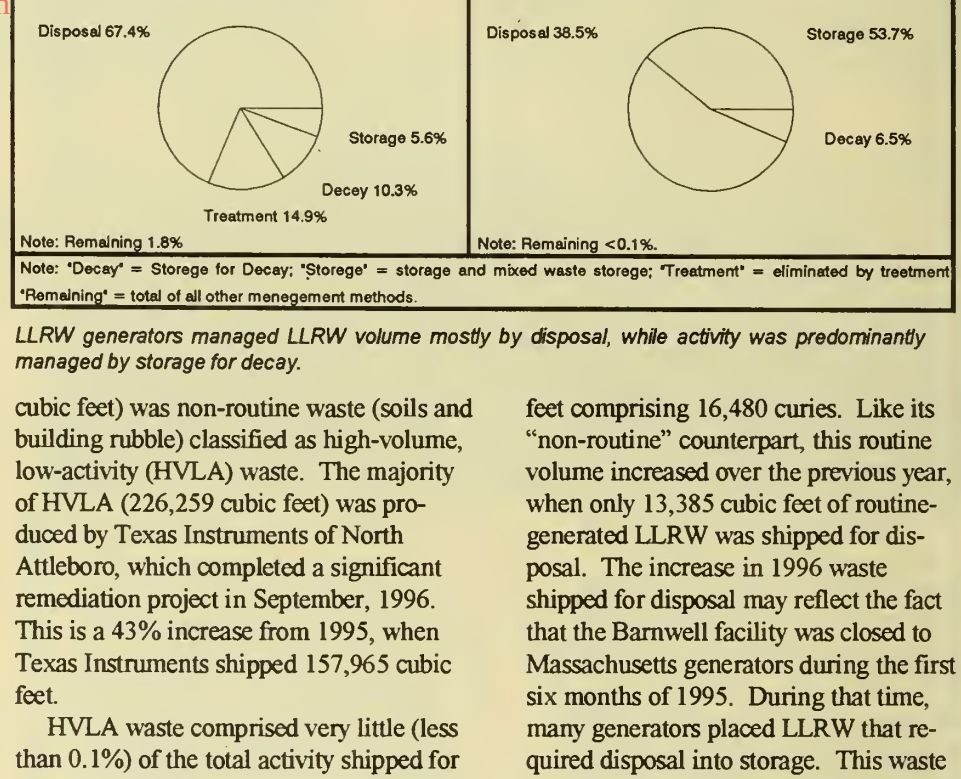
Waste shipped for disposal results from either "routine" or "non-routine" activities. "Routine" refers to LLRW produced from process operations that is expected to be generated annually for the foreseeable future. "Non-routine" refers to LLRW from decommissioning or site remediation projects which can take several years to complete, and significantly affect the volume of LLRW shipped for disposal.

Nearly 92% of the total volume shipped for disposal in 1996 (226,553 cubic feet) was non-routine waste (soils and building rubble) classified as high-volume, low-activity (HVLA) waste. The majority of HVLA (226,259 cubic feet) was produced by Texas Instruments of North Attleboro, which completed a significant remediation project in September, 1996. This is a 43% increase from 1995, when Texas Instruments shipped 157,965 cubic feet.

HVLA waste comprised very little (less than 0.1%) of the total activity shipped for disposal in 1996. Routine waste dominated the activity shipped for disposal. A majority of the activity shipped for disposal (84.7%) came from NEN Life Science Products in Boston (formerly Du Pont Medical Products), which manufactures radioactive tracers for use in medical research. Almost 100% of the activity shipped by NEN (13,960 curies) came from tritium, an isotope of hydrogen which has a half-life of 12.5 years (see Figure 2 for chief shippers).

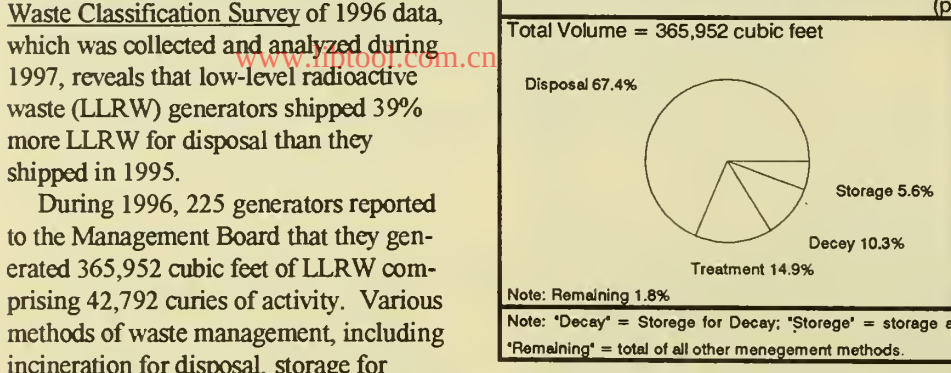
Once the non-routine waste is accounted for, the remaining routine LLRW shipped for disposal in 1996 totaled 20,148 cubic feet comprising 16,480 curies. Like its "non-routine" counterpart, this routine volume increased over the previous year, when only 13,385 cubic feet of routine-generated LLRW was shipped for disposal. The increase in 1996 waste shipped for disposal may reflect the fact that the Barnwell facility was closed to Massachusetts generators during the first six months of 1995. During that time, many generators placed LLRW that required disposal into storage. This waste may have been part of the waste shipped along with volumes generated in 1996.

Figure 1
1996 LLRW Volume and Activity Reported – by Management Method
(percent)



LLRW generators managed LLRW volume mostly by disposal, while activity was predominantly managed by storage for decay.

Figure 2
1996 LLRW Volume and Activity Shipped for Disposal – by Chief Shippers
(percent)



YAEC's decommissioning waste did not contribute significantly to volume shipped; BECO shipped high activity irradiated reactor components; Starmet shipped low-activity waste to Envirocare.

Projections

As part of each year's survey, the Management Board asks LLRW generators to project what they will generate for three years into the future. The Board calculates total projections based on normal on- and off-site volume reduction practices and on LLRW that has been placed into storage for future disposal, if an expected shipment date has been provided by the generator.

Projections indicate that Starmet Corp. (formerly Nuclear Metals, Inc.) in Concord, which began a remediation project in 1997 to clean up a holding basin on its property containing depleted uranium and copper (see LLRW UP-FRONT Volume 6, Number 4 – Fall 1997), will ship 160,000 cubic feet containing 65 curies. In addition, American Annuity Group, Inc. (which is completing the decommissioning of the Sprague Company facility in North Adams), expects to ship 3,400 cubic feet comprising 0.03 curies of HVLA.

ue to One-Time Decommissioning Projects

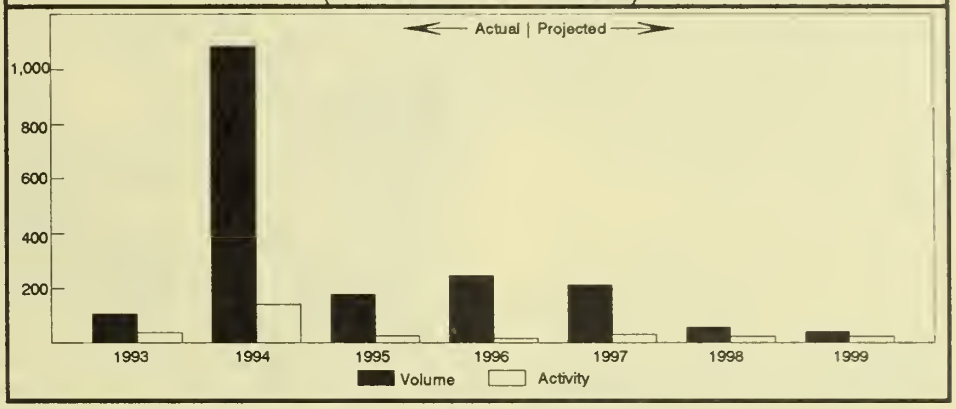
Projections by generators also indicate that non-routine sources of LLRW will decline to zero by 1999, and that routine waste shipped for disposal will average 10,000 cubic feet with activity ranging between 15,000 to 23,000 curies over 1997, 1998, and 1999.

Because projections are based on factors known at the time they are made, and business activities can change dramatically, the Management Board understands that shifts can occur between projections and the actual volumes and activity of waste requiring disposal in the future. For example, in 1995 Massachusetts generators predicted that they would ship 13,313 cubic feet of routine LLRW (containing 31,073 curies) and 250,000 cubic feet (containing 2,000 curies) of non-routine LLRW for disposal in 1996. Actual shipment numbers were higher for routine waste volume (20,148 cubic feet), but lower for radioactivity (16,481 curies) and also lower for non-routine waste (226,553 cubic feet) and activity (1 curie).

The Management Board's annual survey is conducted to determine the characteristics of LLRW generated, stored, or shipped for out-of-state disposal. The annual questionnaire is sent to hospitals, universities, biotechnology firms, utilities, and other businesses that use radioactive material, as well as local, state, and federal government entities such as transportation agencies, water districts, and health boards. The data provided by licensees are used in connection with the Management Board's activities to arrange storage, treatment, and disposal solutions for LLRW generated in Massachusetts.

During 1996, Massachusetts generators had access to the three disposal facilities in the country that accept LLRW. Envirocare of Utah primarily accepted LLRW from decommissioning and remediation projects in the form of soil and building rubble containing very low concentrations of radioactive materials. The Hanford, Washington facility accepted only naturally-occurring or accelerator-produced radioactive material (NARM) from Massachusetts. The Barnwell, South Carolina facility accepted Class A, B, and C LLRW, but no waste mixed with (or exhibiting characteristics of) toxic chemical "hazardous" waste.

Figure 3
Historical and Projected LLRW Volume and Activity Shipped for Disposal
(cubic feet and curies–thousands)



Projections in this figure are based on data supplied by LLRW generators.

An Uncertain Future?----------

(Continued from Page 1)

to take some action on behalf of generators.

As a result of its review, the Board identified numerous concerns with the language of the Chem-Nuclear contractual agreements. Rather than agreeing to support or oppose the plan, the Board decided to press Chem-Nuclear for a delay in implementing its proposal so that further reviews (by both the Board and LLRW generators) could occur.

On Jan. 12, 1998 -- just five days before commitment letters were due -- Chem-Nuclear announced that it would postpone action on its initiative to give all interested parties -- LLRW generators, states, regional compacts, and the South Carolina Legislature -- additional time to study the plan and related legislation.

Impact on Barnwell's Future

It is uncertain what effect Chem-Nuclear's failure to gain the necessary commitments to fund South Carolina's higher education scholarship program will have on the company's Barnwell operations. Chem-Nuclear must receive a total of 343,400 cubic feet of waste during the year ending June 30, 1998 to collect enough state surcharge monies to fund South Carolina's scholarship program, but as of January, was short 239,000 cubic feet.

In addition, the company estimates that volumes shipped to Barnwell in 1998 and 1999 will drop to approximately 200,000 cubic feet per year, resulting in a scholarship tax shortfall in excess of $12 million each year that Chem-Nuclear would be obligated to pay.

It is possible that Chem-Nuclear will raise its disposal fees to try to collect the funds necessary to pay South Carolina. The company is working with a coalition of utilities to develop such a plan.

The prospect also remains that some LLRW generators will refuse to pay higher disposal costs, and store their LLRW on their own premises until the Barnwell issues are resolved. (Companies can legally store waste for up to five years.)

If less volume of LLRW is shipped to Barnwell for disposal as a result, the declining volumes could force Chem-Nuclear to cut its losses by closing the site.

A lot of attention will paid to Chem-Nuclear in the months to come.

Transportation Issues at Public Forum

Have questions or concerns about the transportation of radioactive materials?

Your questions will be addressed at the next-in-a-series of Public Forums sponsored by the Low-Level Radioactive Waste Management Board. The forum is scheduled for April 7, 1998 at Holyoke Community College in Holyoke, MA. The sessions are set for 12:00 noon and 5:30 p.m.

(See *Transportation Issues*, Page 4)

Spring RAM User Meeting on D&D

The next radioactive materials user meeting sponsored by the LLRW Management Board is scheduled for March 18, 1998 at 12:30 p.m. at the Ashburton Cafe Conference Room in the McCormack State Office Building, 1 Ashburton Place, Boston.

The meeting should interest licensees since it will include presentations on actual decontamination and decommissioning (D&D) experience with several facilities in Massachusetts. Presentations are tentatively scheduled to be made by representatives from NEN Life Sciences Products, Inc. (formerly Du Pont Medical Products), a manufacturer and supplier of radiopharmaceutical and life science research products; Texas Instruments, which has recently decommissioned a formerly used, on-site LLRW disposal facility at its Attleboro facility; Massachusetts Institute of Technology, which has decontaminated and decommissioned research laboratories and other facilities; and Yankee Atomic Electric Company, which is in the process of decommissioning its nuclear power plant at Rowe, MA.

In addition, DPH Radiation Control Program personnel will be available to describe D&D regulatory requirements and in-state regulatory experience.

Management Board personnel will present an update on the availability of the Barnwell, South Carolina disposal site and any new pricing proposal by Chem-Nuclear.

This shipment of LLRW, packaged in a cylindrical cask and tied down on a flatbed for truck transport, was typical of shipments from Yankee Atomic Electric Company's Rowe nuclear power plant to an LLRW disposal facility in Barnwell, South Carolina. A public forum on LLRW and high-level radioactive waste transportation will be held on April 7.

Transportation Issues at Public Forum

(Continued from Page 3)

Various issues related to the transportation of radioactive materials, low-level radioactive waste, and high-level radioactive waste will be addressed by experts in these fields, as well as by concerned citizens. Topics will include the regulatory framework for transporting these materials, packaging and shipping practices, potential for health impacts and environmental damage from transportation incidents, and the history of radioactive waste transportation accidents.

Emergency Response Actions

Massachusetts Department of Public Health officials will describe emergency response programs that are activated in the event of a transportation accident.

The forum has been designed to provide substantial opportunity to address the public's perspectives and concerns with radioactive waste transportation. Public concerns will be requested and noted at the beginning of both sessions so that speakers can address them.

A case study on transporting decommissioning waste from the Yankee Rowe power plant will be presented by a representative of the Yankee Atomic Electric Company, and Debbie Katz, of Citizen's Awareness Network, will provide comments and concerns with this particular facility's transportation processes, as well as other transportation issues.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 7- Number 2 - Spring, 1998

Citizens Discuss LLRW Transportation Issues

Can radioactive waste be transported safely? This was the topic of discussion during an April 7, 1998 public forum sponsored by the Low-Level Radioactive Waste Management Board. Presentations and discussions covered regulations and practices for transporting radioactive materials, potential health and safety issues, actual experience with transporting radioactive waste, and community concerns.

State and federal government officials and representatives of Yankee Atomic Electric Company and Citizens Awareness Network responded to a list of concerns elicited from the audience. They included questions about the differences between low-level radioactive waste (LLRW) and high-level radioactive waste (HLRW) regulations; the role of local government in emergency response situations; radiation exposure; and truck accidents.

Speaking on behalf of the National Low-Level Waste Management Program of the U.S. Department of Energy, William Allred said that radioactive materials are transported every day in connection with their use in medicine, industry, consumer products and services, and energy production. By-products from these processes, in the form of LLRW and HLRW, are transported for treatment, storage, or disposal.

Kenneth Heider, Yankee Atomic Electric Co.

By the number of shipments of radioactive materials, 61% go to medical institutions, 19% to manufacturing facilities, 8% to industrial facilities, 4% to nuclear power plants, and 1% to research facilities. Only 7% go to waste storage and disposal sites. Radioactive materials are shipped primarily by motor carrier (56%) and rail (38%).

"Regulations were developed because accidents happen," Mr. Allred said, noting that the U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission are the lead federal agencies on radioactive waste transportation. Regulations for radioactive materials and waste are the same, he added.

Title 49, Part 172 (49 CFR 172) lists and classifies materials which DOT has designated as hazardous for purposes of transportation (including radioactive materials and LLRW) and prescribes the requirements for shipping papers, package marking, labeling, and transport vehicle placarding.

Regulations require three types of packaging ("Strong Tight Containers," "Type A," and "Type B"). Each packaging type is designed so that the number of curies of any specific radionuclide allowed in a given container is limited by the degree of safety built into the container.

Most LLRW shipped in Massachusetts is packaged in Type A containers, which generally take the form of 30- or 55-gallon steel drums with heavy duty closure devices. The Type A package is designed to retain its shielding and containment properties under normal transport conditions, such as being rain-soaked, falling four feet, or compressed.

Type B packages have additional requirements (including a 30-foot drop and exposure to 1,475 degrees for 30 minutes). In addition, Type B packaging must be engineered so that decay heat from higher activity contents is safely dissipated without any significant increase in surface radiation. Less than 1% of Massachusetts LLRW requires Type B packaging.

David Kotker, CAN

Mr. Allred also explained "highway route controlled quantities" -- shipments that exceed the normal curie and waste form limitations for Type B containers -- can only travel on interstate highways with advanced notice.

Every package of radioactive material and waste must be labeled with distinctive warning labels. In addition, the vehicles transporting certain, but not all, shipments must be placarded. All shipments must be inventoried and accompanied by shipping papers kept in the cab of the truck, and accessible to the driver. Driver training is also required.

The Safety Record

Each year, of the 500 billion shipments made in the U.S., 100 million shipments contain hazardous material, and 2 million (2%) of these contain radioactive material and waste. According to the federal government's Radioactive Material Incident Report database, 50 million shipments of radioactive materials occurred between 1971 and 1996. Of these shipments, there were 58 accidents involving LLRW, but only 4 of these (less than 0.0001 percent of the 50 million shipments) resulted in releases of radioactivity. However, those releases did not result in injury or health problems.

(See *LLRW Transportation Issues*, Page 3)

Publication No. 18047 - 2 - 6600 - 5/98 - 12 - C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

What's Happening Around the Country?

While the Low-Level Radioactive Waste Management Board continues to conduct private discussions with various states and regional compacts to arrange long-term out-of-state disposal for Massachusetts' low-level radioactive waste (LLRW) generators, it also monitors activities in other states aimed at providing new LLRW disposal capacity.

Here's a brief update on some of the initiatives in other states and compacts:

Southeast Compact: The Southeast Compact Commission (representing Alabama, Florida, Georgia, Mississippi, North Carolina, Tennessee, and Virginia) recently suspended funding for the development of an LLRW disposal facility in Wake County, North Carolina. Over the years, the Compact Commission had provided $80 million for site development, but ceased to finance the effort due to the absence of an agreement with North Carolina for funding site development activities through licensing, construction, and litigation.

An attempt to give the North Carolina project a financial shot in the arm was made by the Compact Commission and the Southeast Compact Utility Generators Group. Under the proposal, the Commission and volunteer generators would fund the remainder of the licensing costs, generators would back up the construction bonds with revenue guarantees, and the state would provide assurances that a site would be built.

After North Carolina Governor James Hunt expressed reservations about the proposal and deadlines set by the Southeast Compact Commission elapsed without a solution, the Commission halted its financial support.

Work on the Wake County site has ceased. The Southeast Compact Commission is reviewing its options, including litigation, to force North Carolina to fulfill its obligations as host state.

New Jersey: The state suspended its siting process in February, citing the availability of the Barnwell disposal facility and reductions in the volume of LLRW generated in New Jersey.

Before this action, 12 communities had come forward to consider the possibility of volunteering a disposal site. The last volunteer, Carneys Point, first agreed to conduct a feasibility study, and then withdrew itself 18 days later.

New Jersey officials cited the lobbying of interest groups from outside the community as the cause for the township's reversal of its interest in potentially hosting a disposal site. Carneys Point initially was recommended as a site community by the township's Economic Development Commission.

California: Two lawsuits continue to move forward over the issues of breach of contract and the transfer of the Ward Valley, California, disposal facility site. California had issued a license to operate an LLRW disposal facility in Ward Valley conditional upon the state acquiring the federally-owned site, which is controlled by the U.S. Department of Interior (DOI).

In the breach of contract case, a U.S. Court of Federal Claims rejected the federal government's motion to dismiss the suit brought against DOI.

Oral arguments were presented in February, and the two sides in the case are expecting a decision "any day." If the court rules in favor of US Ecology and California, the damages assessed to DOI could total several hundred million.

Oral arguments were scheduled for May 8 on the second suit – involving the refusal of DOI to transfer the Ward Valley land to California once the state satisfied all required conditions for transfer.

Meanwhile, permits were issued to DOI's Bureau of Land Management and California's Department of Health Services to conduct separate studies of rainwater infiltration. The studies have not begun, however, because a group of Native Americans set up an encampment at the site and declared it an independent province. The Native American sit-in, which began with 200-300, has declined to about 30 occupying the Ward Valley site. Federal and state officials attempting to access the site have been frisked and rebuffed.

Texas: While slowdowns have occurred in some other states and compacts, Texas is proceeding on schedule to license its LLRW disposal facility in Sierra Blanca.

In January, 1998, the Texas LLRW Disposal Authority began a series of adjudicatory hearings on the draft facility license. In February, the Authority initiated a second set of hearings, focusing on specific site objections. The review process is expected to be completed in time for a facility license to be issued in October, 1998.

Meanwhile, legislation to establish a regional compact for Texas, Maine, and Vermont passed another hurdle in Congress with the approval of the U.S. Senate on April 1. The legislation would enable the three states to prohibit other states from accessing the Sierra Blanca LLRW disposal site, a feature of the federal law passed in 1980 to encourage regional LLRW disposal solutions.

Since the Senate version differs from the version passed by the U.S. House of Representatives last October, a Conference Committee must resolve the differences.

Nebraska: Nebraska issued two draft documents concerning the proposed regional disposal facility in Boyd County, Nebraska, as the site for the Central Compact (Arkansas, Kansas, Louisiana, Nebraska, and Oklahoma).

The documents are Nebraska's technical response to the license application submitted in 1990 by US Ecology, developer of the Boyd County site.

Nebraska regulators issued a *Draft Safety Evaluation Report* that reviewed US Ecology's application in 152 areas, finding the application acceptable in 123 cases (including site characteristics, design, construction, financial assurance and quality assurance) and unacceptable in 29.

The second draft document, the *Draft Environmental Impact Analysis* determined that the Boyd facility would result in various environmental impacts, but found that "all potential adverse environmental impacts can be mitigated except for sociocultural impacts."

On that issue, the draft report suggested that the magnitude of sociocultural impacts "is expected to decline" during facility operation, "provided no serious radiological accidents occur."

The next steps will involve the preparation of responses to public comments, and revision and issuance of the reports. Then, a tentative licensing decision will be made by two state agency directors.

If a license is proposed to be granted (or denied), a draft license (or reasons for denial) will be issued for public review and comment.

(See *What's Happening?*, Page 3)

The LLRW disposal site at Hanford, Washington has enough capacity to accept all of the nation's commercial LLRW for about 60 years, but is open only to 11 states in the northwest.

LLRW Transportation Issues Discussed

(Continued from Page 1)

The states's Nuclear Incident Advisory Team (NIAT) of 19 professionals provide emergency response capabilities in Massachusetts, according to Robert Watkins of the Massachusetts Department of Public Health. Arriving at an accident, NIAT first determines if radiation is present. If it is, the source, quantity, type of radionuclide, level and extent of contamination, if any, and potential hazards and risks associated with it are ascertained.

NIAT teams are available 24 hours a day, 365 days a year and NIAT relies on the State Police and the Civil Air Patrol. He explained that the local official at the accident site – usually the fire chief – is always in charge.

Mr. Watkins believes the state's plans are adequate for monitoring spent fuel shipments from the Maine Yankee and Vermont Yankee nuclear power plants, when they undergo decommissioning.

Decommissioning Shipments

Kenneth Heider, Plant Manager at Yankee Atomic Power Station in Rowe, said that 80% of the decommissioning is complete with 99.9% of the LLRW removed from the plant. Tens of millions of curies still remain on site within the spent fuel, fuel pool, and associated components, and will be shipped as HLRW to a DOE facility. About 300 shipments of decommissioning waste have occurred to date; another 50 will be made in 1998 to complete this phase of the plant dismantling activities.

Preparing LLRW for shipment from Yankee Rowe involves a number of "packaging" steps (surveying, sorting, inspecting, characterizing the container), several "preparatory" steps (completing shipping papers, notifying state and local officials, inspecting and placarding vehicles, and checking radiation surface levels), and "quality control and oversight."

David Kotker, representing the group Citizens Awareness Network (CAN), said that LLRW and HLRW should not be moved from the sites where it is generated, believing "it is not fair to pollute another community's environment simply to dodge liability." He added that, if problems occur at a disposal site, it is harder to determine what company is responsible. He felt that the best way to insure waste generator liability was to keep the waste "on site." If companies have to store all their waste on site, "hopefully they will generate less waste," he added.

Mr. Kotker also commented that, no matter how safe waste transportation may be, the disposal sites "are not safe," and referred to tritium contamination that occurred years ago at the Barnwell, South Carolina facility, leaks at the now-closed Beatty, Nevada LLRW disposal site, and contamination at the Hanford (Washington) Reservation where both LLRW and HLRW facilities are located.

Both Mr. Watkins and Mr. Heider felt that the public health was better protected if LLRW and HLRW was shipped to centralized disposal sites, rather than be "left all over the state." Mr. Heider added that nuclear power plants are not designed or built with the intent to store waste on site.

Mr. Kotker added that his "real concern" was his "ethical" opposition to the generation of radioactive waste, especially by nuclear utilities.

What's Happening?

(Continued from Page 2)

Washington: Discussions have not progressed to open the Hanford, Washington LLRW disposal facility to other states besides those in the Northwest Compact (Alaska, Hawaii, Idaho, Montana, Oregon, Utah, Washington, and Wyoming) and Rocky Mountain Compact (Colorado, Nevada, New Mexico). The Hanford disposal site has an estimated future capacity of 60 years for all commercial LLRW produced in the country.

Washington Governor Gary Locke recently notified the U.S. Department of Energy (which controls the land and leases the LLRW disposal site to US Ecology) that he opposes "any new role for Hanford in dealing with nuclear materials or waste," and that "any discussion of equity must take into consideration the tremendous burden Washington already shoulders at Hanford."

While these comments were made regarding DOE's proposal to dispose of plutonium at Hanford and to allow DOE-generated LLRW into Hanford from DOE research facilities across the country, sources close to Governor Locke indicate that his message also applies to expansion of the LLRW facility.

Teacher's Resource Packet Available

The Low-Level Radioactive Waste Management Board is completing a "Teachers Resource Packet" (TRP) which will be available for the 1998-99 school year. The TRP contains 20 learning activities to assist high school science, life science, and social studies teachers with curricula related to nuclear radiation and low-level radioactive waste issues. The packet is intended as a supplement to existing textbooks and curriculum materials available to the teacher. It was written by teachers and tested by teachers.

The learning activities conform to the *Massachusetts Science and Technology Curriculum Framework* developed by the state Department of Education.

For more information, or to obtain a copy of the TRP, call the Management Board at (617) 727-6018 or e-mail the Board at LLRW@state.ma.us.

Mailing List Update

The Low-Level Radioactive Waste Management Board is updating its mailing list. To continue receiving Management Board documents, please return this form by June 15, 1998. Your name will be removed from the mailing list if you do not respond.

Please check the items you wish to receive and return the form by FAX to (617) 727-6084, or mail to 100 Cambridge Street, Room 903, Boston, MA 02202, or E-mail us at llrw@state.ma.us.

- ☐ Newsletter
- ☐ Board Meeting Agendas
- ☐ Announcements of Public Forums and Workshops
- ☐ Survey Report
- ☐ Annual Report to the Commonwealth
- ☐ Annual Minimization Working Group Report
- ☐ Other (please specify)

Please Print

Name_____ **Title**_____

Organization_____

Address_____ **City**_____ **State**_____ **Zip**_____

Phone_____ **Fax**_____ **E-mail**_____

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

Printed on Recycled Paper ♻

The Massachusetts Low-Level Radioactive Waste Management Board

LLRW UP-FRONT

The Newsletter of the Massachusetts Low-Level Radioactive Waste Management Board

Volume 8- Number 1 - Winter, 1999

"Round 2" (or "3" or "4"):

One "Won," One "Lost"---(Maybe)

The low-level radioactive waste (LLRW) disposal situation around the country has changed in recent months, with access to one disposal site expanded for Massachusetts generators, but another disposal site clouded with greater uncertainty.

The Commonwealth's LLRW generators "won" greater use of the Envirocare site in Clive, Utah, through the efforts of the Low-Level Radioactive Waste Management Board, among others. However, generators may have "lost" access to the Barnwell, South Carolina disposal site due to politics, economics, and apprehension.

The Management Board's recent lobbying efforts on behalf of small quantity LLRW generators paid off. The State of Utah and the Northwest Interstate Compact Commission recently reversed their policies which prohibited generators with less than 1,000 cubic feet of certain Class A LLRW from using the Envirocare of Utah site in Clive, Utah.

Management Board officials seized the opportunity to press for a change in the restrictive disposal policy at the Clive site when Envirocare's five-year license extension was under review by the State of Utah. The Board submitted written comments urging the elimination of certain draft license language restricting small quantity generators from the Clive site. The Board then actively lobbied the Northwest Compact Commission to amend its policy so that small quantity generators would be eligible to use that site. Federal LLRW management law gives the Northwest Compact authority to exclude LLRW from outside its compact region, and the Compact initially allowed out-of-region disposal at Envirocare only for "large-volume" materials from remediation projects.

Both entities recently made the policy changes promoted by the Board.

Uncertainty at Barnwell

While it's a "win" at Clive, it may be a "loss" at Barnwell, where two recent events have heightened the uncertainty about that site's future. One was the recent election of Governor Jim Hodges. The second was the failure of the site operator, Chem-Nuclear Systems, to gain enough support from LLRW generators to proceed with its long-term plan to keep Barnwell open 25 more years.

South Carolina's new Governor, Jim Hodges, defeated the incumbent Governor David Beasley in November. Beasley had been supportive of keeping Barnwell open, at least for an interim period. He had convinced the South Carolina Legislature in 1995 to re-open the site, which had closed the previous year to all generators outside the Southeast Compact region. Governor Beasley's motive in re-opening Barnwell was to raise funds for education programs in his state. He accomplished that by imposing a $235 per cubic-foot surcharge on all LLRW disposed of at Barnwell.

New Law Makes Chem-Nuclear Pay

But when the anticipated $137 million in annual surcharges did not materialize, South Carolina enacted a new law requiring Chem-Nuclear to pay any shortfall in anticipated revenues for one of the new (and very popular) education programs: higher education scholarships. This law left Chem-Nuclear responsible to pay out of its profits.

Chem-Nuclear developed a plan, the "Barnwell Initiative," that would have guaranteed approximately $1 billion in revenue to South Carolina over 25 years in exchange for keeping Barnwell open that long. But LLRW generators had to commit to the plan contractually before the South Carolina Legislature would be asked to consider a bill to create the billion dollar trust.

For a variety of reasons, including the changing political scene in South Carolina, the economics of making a costly 25-year disposal commitment, and just plain apprehension over many unknown factors that could influence Barnwell's future, Chem-Nuclear's plan was dropped in January for lack of support from enough generators.

Throughout consideration of the "Barnwell Initiative," a major requirement for its success was unknown: what action, if any, the South Carolina Legislature and Governor would have taken on the legislation necessary to effectuate the plan. Since the plan will not be considered by the Legislature, its response will remain unknown.

Governor Jim Hodges, on the other hand, has expressed interest in closing Barnwell to all out-of-state generators, or at least shutting it off to all states outside the Southeast Compact region. Governor Hodges has announced support to rejoin the Southeast Compact, the region of southern states that included South Carolina until former Governor Beasley arranged to withdraw his state back in 1995. Governor Hodges has said that his state would re-enter the Southeast Compact only if he can achieve agreements from other Compact states that the Barnwell site will be a temporary disposal facility.

In the meantime, Barnwell is sure to remain open only at least through June, 1999. This is the date agreed upon by Chem-Nuclear when it convinced some nuclear utilities to help it finance the annual scholarship fund shortfall.

1997 Volume and Activity of LLRW to Disposal

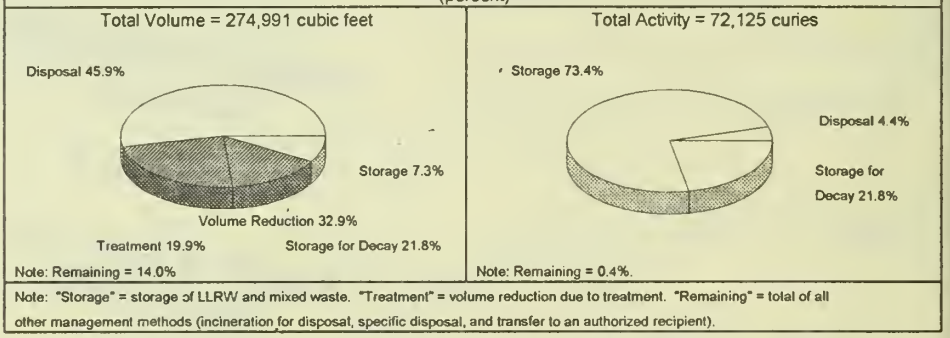
The annual survey of low-level radioactive waste (LLRW) generators in Massachusetts, which was collected and analyzed during 1998, reveals that 1997 was not a typical year for LLRW management activities in the Commonwealth.

Typically, Massachusetts LLRW generators ship for disposal as much waste as they can–both before and after treatment–to reduce waste volume and radioactivity. During 1997, however, a major waste generator (Du Pont Medical Products) that was undergoing a merger stored most of its waste, rather than shipping it for disposal. As a result, 73% of the activity of all waste reported to be generated was held in storage during the year, when most of that activity would have been shipped for disposal.

As in the last several years, one-time decommissioning and decontamination activities by a couple LLRW generators, including removal of LLRW from the closed Yankee Atomic Electric Company power plant in Rowe, continued to be a major factor in the amount and activity of LLRW shipped for disposal. However, decommissioning and decontamination contributed less than previous years, and generators predict that most of this cleanup work will be finished in 1998.

According to the Low-Level Radioactive Waste Management Board's 1997 survey data, generators shipped 48% less LLRW for disposal than they shipped in 1996. During 1997, 230 Massachusetts generators reported to the Management Board that they generated 274,991 cubic feet of LLRW containing 72,125 curies of activity. Various methods of waste management, including storage for decay, incineration for disposal, and volume reduction eliminated 54% of the generated waste, leaving 126,193 cubic feet containing 3,205 curies to be shipped for disposal (see Figure 1 for percentage breakdown by management method). This disposed volume decreased from 246,701 cubic feet in 1996 and activity declined significantly from the 16,481 curies disposed of in 1996.

Figure 1.
1997 LLRW Volume and Activity Reported - by Management Method
(percent)



Note: "Storage" = storage of LLRW and mixed waste. "Treatment" = volume reduction due to treatment. "Remaining" = total of all other management methods (incineration for disposal, specific disposal, and transfer to an authorized recipient).

LLRW generators managed LLRW volume mostly by disposal, while activity was predominantly managed by storage.

Routine and Non-Routine Waste

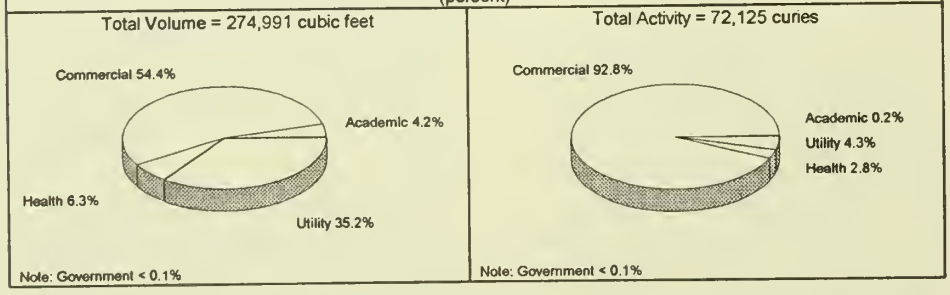
LLRW generated in 1997 resulted from either normal or "routine" operations at companies or institutions that use radioactive materials or from "non-routine" activities, such as the one-time decommissioning and remediation of old burial sites in the Commonwealth which can take several years to complete, and significantly affect the volume of LLRW shipped for disposal. Routine and non-routine LLRW combined represent the total amount of LLRW shipped for disposal by all generators (see Figure 2 for percentage breakdown of total volume and activity shipped for disposal by generator category).

Of the total volume shipped for disposal in 1997, 74% (93,684 cubic feet) consisted of soils and building rubble, classified as high-volume, low-activity (HVLA) waste, from non-routine activities. Activity contained in the HVLA waste contributed 1.4% (45.425 curies) to the total activity shipped for disposal. The majority of HVLA waste (89,973 cubic feet) was produced by Starmet Corporation (formerly Nuclear Metals, Inc.) of Concord, which began a remediation project in 1997 to clean up a holding basin on its property for depleted uranium and copper. While the Starmet cleanup effort contributed almost three-fourths of the total LLRW shipped for disposal, the very low concentrations of radionuclides contained in the HVLA waste amounted to only 45.401 curies (nearly 100% of the total non-routine activity) shipped for disposal by Starmet.

LLRW from routine activities, including the anticipated decommissioning activities at the Yankee Rowe nuclear power plant, contributed 25.8% (32,509 cubic feet) to the total volume and 98.6% (3,159.651 curies) to the total activity shipped for disposal in 1997. Decommissioning activities at Yankee Rowe produced nearly 62% (20,145 cubic feet) of the volume and nearly 97% (3,064.685 curies) of the activity of total routine LLRW shipped for disposal in 1997.

Routine LLRW shipped for disposal increased 38% from 1996 when 20,148 cubic feet of routine-generated waste was shipped. The increase in 1997 waste shipped for disposal can be attributed to the decommissioning activities at Yankee Rowe. Radioactivity in routine LLRW decreased almost 81% from 1996. This decrease was due in large part to the busi-

Figure 2
1997 LLRW Volume and Activity Reported - by Generator Category
(percent)

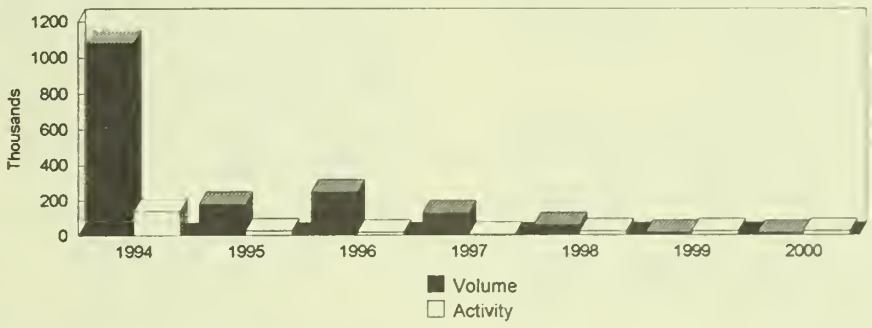


The commercial category of generators shipped for disposal the most LLRW by volume , while the utility category of generators contributednearly all the activity.

s Down; Decommissioning Projects Wrap Up

ness activities at Du Pont Medical Products in Boston. In July 1997, Du Pont Medical Products merged with another company and was renamed NEN Life Science Products. While the merger was underway, the old Du Pont Medical Products shipped less LLRW for disposal, retaining it in storage for future disposal. Subsequently, the new NEN Life Science Products held in storage for future disposal all LLRW generated in the latter half of 1997. As a result, the total radioactivity contained in waste shipped for disposal in 1997 was significantly reduced and the total activity contained in waste managed by on-site storage increased 57% from 22,919 curies in 1996 to 52,929 curies in 1997.

Figure 3
Historical and Projected LLRW Volume and Activity Shipped for Disposal
(cubic feet and curies-thousands)



Projections in this figure are based on data supplied by LLRW generators.

Projections

As part of each year's survey, the Management Board asks LLRW generators to project what they will generate for three years into the future. The Board calculates total projections based on normal on- and off-site volume reduction practices and on LLRW that has been placed into storage for future disposal, if an expected shipment date was provided by the generator (see Figure 3 for historical and projected volume and activity shipped for disposal).

Projections indicate that LLRW from non-routine activities will be nearly double the routine volume of LLRW shipped for disposal in 1998. Starmet Corporation is expected to complete its remediation project in 1998 and expects to ship 40,000 cubic feet of HVLA waste containing 20 curies to Envirocare of Utah. In addition, Texas Instruments in North Attleboro –which fabricated nuclear fuel for the U.S. Navy and produced enriched uranium foils in the 1950's through mid-1980's–completed cleanup of its site in 1997 and expects to make a final shipment of 216 cubic feet of HVLA containing less than 0.001 curies to Envirocare in 1998.

Projections by generators indicate that non-routine sources of LLRW will decline to zero by 1999, and that routine waste shipped for disposal will average nearly 15,000 cubic feet with activity remaining steady at almost 24,000 curies.

However, because projections are based on factors known at the time they are made, and business activities can change dramatically, the Management Board understands that shifts can occur between projections and the actual volumes and activity of waste requiring disposal in the future. For example, in 1996, Massachusetts generators predicted that they would ship 9,798 cubic feet (containing 22,968 curies) of routine LLRW and 93,400 cubic feet (containing 45 curies) of non-routine LLRW for disposal in 1997. Actual shipment numbers were 70% higher for routine waste volume (32,509 cubic feet), but 86% lower for radioactivity (3,160 curies); non-routine waste projections were extremely accurate with 93,468 cubic feet containing 45 curies actually shipped for disposal in 1997.

The Management Board's annual survey is conducted to determine the characteristics of LLRW generated, stored, or shipped for out-of-state disposal. The annual questionnaire is sent to all the licensed users of radioactive materials in the Commonwealth: hospitals, universities, biotechnology firms, utilities, and other businesses; and local, state, and federal government entities such as transportation agencies, water districts, and health boards. The data provided by licensees are used in connection with the Management Board's activities to arrange storage, treatment, and disposal solutions for LLRW generated in Massachusetts.

During 1997, Massachusetts generators had access to the three disposal facilities in the country that accept LLRW. About 65% of the volume of LLRW containing nearly 2% of the activity was shipped to the Envirocare facility in Clive, Utah. Envirocare primarily accepted LLRW from decommissioning and remediation projects in the form of soil and building rubble containing very low concentrations of radioactive materials. The Barnwell, South Carolina facility received only 6% of the volume of LLRW, but 98% of the radioactivity. Barnwell accepted Class A, B, and C LLRW, but no waste mixed with (or exhibiting characteristics of) toxic chemical "hazardous" waste (aptly called "mixed waste"). The Hanford, Washington disposal site received less than 1% of the total volume and activity shipped for disposal. Hanford accepted only Naturally-occurring or Accelerator-produced Radioactive Material (NARM) waste from Massachusetts.

1998 LLRW Classification Survey Changes

In January, the Low-Level Radioactive Waste Management Board sent out a revised 1998 Radioactive Waste Classification Survey to the 460 companies, institution, hospitals, and government agencies licensed to use radioactive materials in the Commonwealth. The 1998 survey questionnaire seeks information about radioactive source and volume minimization activities. The data collected will provide information to the Management Board and the Massachusetts Department of Public Health about actions taken by low-level radioactive waste (LLRW) generators to reduce the radioactivity of source material prior to the generation of LLRW, and to continue to reduce LLRW volumes. Generators have typically been far more successful minimizing their waste volumes than the radioactivity of the sources that result in LLRW.

(See *1998 Survey Changes*, Page 4)

Interest in TRP High Among Teachers

Over 225 science, life science, and social studies teachers from public high schools in Massachusetts have received copies of the Management Board's "Teacher's Resource Packet" (TRP) after notifying the Board of their interest in a copy.

TRPs also have been mailed to several university science teachers around the country, who learned about the teaching packet by word of mouth and Internet sites. Teachers in private Massachusetts high schools will have an opportunity to request a TRP once the Board receives an updated list of private schools from the Massachusetts Department of Education.

The TRP, entitled Radiation and Low-Level Radioactive Waste, contains 20 learning activities to assist teachers with curricula related to nuclear radiation and low-level radioactive waste (LLRW) issues. For example, Learning Activity 3-2, "Estimating Your Annual Radiation Dose," helps students to understand the sources of radiation and to add up the doses that apply to their lifestyles. Students will learn that some radiation sources are controlled by personal decisions, some by societal actions, and some are relatively uncontrolled.

Another learning activity, 3-3, entitled "Sowing the Seeds of Controversy," enables students to track the variations in the germination, rate, formation, and growth of plants grown from seeds exposed to x-rays or gamma rays. This experiment can be used by the teacher as a point of departure for discussing several opposing views concerning the potential health effects of low-level ionizing radiation.

Other learning activities provide experiments and discussions on LLRW regulations, managing LLRW, selecting and building a disposal site, and role-playing at a public hearing.

At a recent joint conference of the Massachusetts Association of Science Teachers and the Massachusetts Association of Science Supervisors, presentations on the TRP were given by two members of the Management Board's Public Participation Advisory Committee, Lois Durso and Jim Muckerheide, and by the Management Board's executive director, Carol Amick. Ms. Durso and Mr. Muckerheide taught the "Sowing the Seeds" unit, using seeds that were irradiated at the University of Massachusetts, Lowell. Ms. Amick gave an overview of TRP material in a presentation on the "implications locally and globally of managing and disposing of LLRW."

The TRP is intended as a supplement to existing textbooks and curriculum materials available to teachers. It was written by teachers and tested by teachers before its release last spring. The learning activities conform to the *Massachusetts Science and Technology Framework* developed by the state Department of Education.

The entire packet will soon be available on the Management Board's web site, www.state.ma.us/llrw. For more information, or to obtain a copy, contact the Management Board at (617) 727-6018 or e-mail the Board at llrw@state.ma.us.

LLRW Website

The Low-Level Radioactive Waste Managment Board's Internet Website contains information on Board meetings (announcements and agendas), Board members and staff. In addition, some Board publications such as newsletters and Annual Reports are available through the site. Since its inception, the site has received 1,577 "hits."

The Board's website address is www.state.ma.us/llrw. Have questions about the Board? Call the office at (617) 727-6018 or send an e-mail to llrw@state.ma.us.

1998 Survey Changes

(continued from Page 3)

Revised instructions and a section entitled "Common Reporting Errors" were added to assist generators with completing the survey form and offer guidelines for correctly categorizing their waste streams. Other changes include a new definition for the high-volume, low-activity (HVLA) waste category, expanded broker and processor lists, and an additional section entitled "Management Plan for Stored Waste," which requests information about waste placed into storage for future disposal.

The 1998 Radioactive Waste Classification Surveys were due on March 1, 1999.

Massachusetts Low-Level Radioactive Waste Management Board
100 Cambridge Street, Room 903
Boston, MA 02202
(617)727-6018

FORWARD AND ADDRESS CORRECTION

BULK RATE
U.S. POSTAGE
PAID
BOSTON, MA
PERMIT NO. 51254

Printed on Recycled Paper ♻