

Low-Level Radioactive Waste Compacts:

ONE YEAR AND COUNTING

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Low-level radioactive waste (LLRW) has been a part of nuclear medicine from the very beginning. In recent years, it has become an acute problem—because larger volumes are now being generated and because of the imminent nonavailability of disposal sites.

In the mid-1970s, there were six disposal sites scattered throughout the United States. By 1979, three of these (Sheffield, IL; Maxey Flats, KY; and West Valley, NY) were closed. By 1980, the remaining sites (Barnwell, SC; Hanford, WA; and Beatty, NV) came under pressure from their state governments to curtail activities.

In response to the apparent shortage of disposal sites, Congress passed Public Law 96-573. This law defined LLRW, declared the three available sites off-limits as of January 1, 1986, made every state responsible for its own LLRW as of that date, and encouraged the formation of interstate compacts to deal with LLRW on a cooperative, regional basis. Key to understanding the compact system is that: a) two or more states are required to form a compact; b) each state participating in a compact must enact the same compact language; c) a “host state” must develop a site for the exclusive use of compact members; d) all members must use the site; and e) Congress must grant approval to the compact (1).

Predictably, regions with existing



A shipment of radioactive waste arrives on a truck at the Beatty, NV waste site. (© UPI/Bettmann Archive)

sites were most accommodating to the states hosting those sites. Those compacts are currently before Congress. In areas without facilities, the process has moved more slowly. Of the seven original areas, four are in congressional committee, two are close to ready, and one is in shambles. The last includes Pennsylvania, New York, New Jersey, and the New England states, where over 30% of the nation's LLRW is generated.

Originally, the Council of Northeastern Governors (CONEG) drafted a document that included 11 states: Pennsylvania, New York, New Jersey, Maryland, Delaware, and the New England states. It was quickly ratified by Maryland, Delaware, New Jersey, and Connecticut, which allowed for submission of the compact to Congress. The biggest genera-

tors—Massachusetts, New York, and Pennsylvania—who were seen as potential hosts, demurred. The proposed compact gave eligible sites a deadline of June 30, 1984 to join.

In the meantime, considerable activity was occurring. In Pennsylvania, the Pennsylvania Radwaste Working Group (PRWG), a group of users composed of medicine, research, industry, and power, formed to provide a forum for education of the legislature and the public about the benefits of radioactive isotopes. The PRWG published a fact book. Similar groups formed in New England, Maryland, New Jersey, and New York. Penn State University published an analysis of the technical and socio-economic factors that would influence site selection, and also started the Public In-

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TABLE 1
Medical Radionuclide Use in Pennsylvania, 1981

Application	Procedures	Departments
Nuclear medicine imaging ^a	650,062	190
Radioimmunoassay ^b	3,381,086	241
Source radiation therapy ^a	72,217 patients	85

Sources: ^aStatistics, Pennsylvania Department of Health, 1981.

^bStatistics, Pennsylvania Bureau of Laboratories, 1981.

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volvement in Education in Radiation (PIER) Program as a community educational vehicle. The medical community became involved as well when it became apparent how heavily it depended on radioactive material (Table 1). In fact, in 1981, 23% of Pennsylvania's LLRW was generated by medical/research institutions (3).

Public perception

Considerable controversy developed. New York had West Valley and Love Canal, while New Jersey had its share of toxic waste disposal problems. Pennsylvania had Three Mile Island (TMI). It has been easy for the public to intermingle these issues. Antinuclear activists have played upon this misunderstanding, but have also raised some legitimate issues that must be addressed.

In the first place, the past and present sites have not always functioned perfectly. In a number of places, there has been subsidence, implacement of improper radionuclides, poor packaging, water penetration, intrusion, and off-site migration. Although the magnitude of these problems was small in every case, they represent site failure. Negative perception of words such as "dump site," "trash," "radioactive," along with apprehension about nuclear power plants among the press and public, further complicate the issue. Finally, 1984 was an election year: a poor time to address controversial matters.

Pennsylvania has had some additional setbacks. In November 1983,

the eight-part series "Forevermore" (4) was published by *The Philadelphia Inquirer*. The series was a 68-page litany of problems associated with radwaste disposal, offering no hope or suggestions for resolution of the issues, tarring everyone and everything associated with any attempt to deal responsibly with them. More recently, a LLRW broker attempted to purchase an abandoned copper wire recovery plant in north-eastern Pennsylvania. His intention was to concentrate and hold radioactive wastes for decay and then shipment to other sites. Because of inadequate preparation, he provoked an intense negative local reaction. This resulted in the introduction of three bills

in the Pennsylvania legislature which would effectively ban radioactive waste storage in Pennsylvania for 2 years as well as provide local areas with veto power over the state.

New York and New Jersey have had their share of problems that are perhaps even more an issue for nuclear medicine. Because of the presence of the medical reactor in Tuxedo Park, New York and two radiopharmaceutical houses in New Jersey, their problems with waste disposal will quickly translate into problems for the nuclear medicine community at large.

The public perception of LLRW in New Jersey is more negative than in most states. One group is working very hard to increase the exportation of waste and block its importation and transportation. Both the medical community and the news media seem to be very supportive of the group's position, making a responsible solution more difficult.

A recent issue generating controversy in New Jersey involves some homes in the northern area of the state which were built using soil contami-

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Low-level radioactive waste is defined by exclusion, an unsatisfactory approach which has caused considerable misunderstanding. By way of review, radioactive waste is any waste that is contaminated by any amount of a radionuclide. It is usually broken down into:

- a) **High-level radioactive waste (HLRW)**—wastes which are very radioactive and have very long half-lives. Defense wastes and used reactor cores are examples.
- b) **Transuranic wastes (TRU)**—those which have significant amounts of plutonium, americium, or other heavy nuclei.
- c) **Uranium mill tailings.**
- d) **Low-level radioactive waste (LLRW).**

LLRW includes radioactive wastes like those from hospitals, research, industry, and the housekeeping functions of nuclear reactors. Generically, LLRW is shorter lived and emits less radiation than HLRW, but it can be very radioactive and must be handled in a responsible manner. The Nuclear Regulatory Commission has subclassified low-level into three categories, A, B, and C, depending on half-lives and radiation levels (2). Class A has less radioactivity, lower concentration, and shorter-lived nuclides than B or C. Class A disposal requirements are less stringent.

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nated by an old radium watch dial factory as backfill. Although simple venting of radon gas from the basements of these homes would seem to be all that is necessary—and there is a certain natural abundance of radon gas in almost any dwelling using cinder block foundations—the authorities are proposing to dig the dirt from under these homes and to store it as LLRW in an armory in a neighboring community. This will increase the volume of New Jersey's wastes by about 5,000 cubic yards.

The situation in New York more closely parallels the situation in Pennsylvania. Early on, the New York State Low-Level Working Group (NYSLLWG) formed. It includes representatives from various generators, similar to PRWG. This group prepared an excellent summary of op-

TABLE 2
LLRW Generation by State, 1982

State	Volume (M ³)	(Rank)	Activity (Ci)	(Rank)
PA*	7,658	(1)	23,988	(6)
NY*	5,606	(3)	70,190	(2)
NJ*	3,627	(11)	1,566	(21)
MD	1,342	(18)	212	—
OH	779	(24)	4,999	(12)
DE	30	—	2	—
WV	29	—	(0.13)	—

Source: USEPA Statistics, 1984.

*These states would be required to develop a disposal facility under the terms of the "Appalachian Compact."

chusetts—had less control, more jeopardy, and the probable added political burden of having to host the site. This caused concern in Harrisburg, Albany, and Boston. The concerns of Pennsylvania and New York were basically the cost, host-state succession, liability, and control.

the smaller generators, Pennsylvania would host the site. New York, Maryland, Delaware, and Ohio have expressed passing interest; New Jersey has not. A review of the amount and activity of waste generated by eligible states (Table 2) clarifies which states need to develop sites and why Pennsylvania chose West Virginia as its partner.

“The Northeast Compact probably had no chance of success. In essence, the smaller generating states . . . engineered a document which gave them a good deal of control”

tions and reasons for making a choice. Just as Pennsylvania had TMI to deal with, New York had the experience of West Valley to overcome. Facing reluctant elected officials, the NYSLLWG spurned the Northeast Compact for exactly the same reasons as Pennsylvania did.

The Northeast Compact probably had no chance of success. In essence, the smaller generating states, which were in a majority, engineered a document which gave them a good deal of control and placed them in very little jeopardy. The bigger generators—Pennsylvania, New York, and Massa-

Recognizing the problem, New Hampshire and Massachusetts both reworked the document to make it more attractive to those three states, but their efforts were unsuccessful.

When the June 30, 1984 deadline arrived, Pennsylvania announced its plan. Its salient points were to form the "Appalachian Compact" with West Virginia, to offer membership to states contiguous to Pennsylvania (if those with 25% of Pennsylvania's wastes agreed to host a simultaneous site), and for member states to assume a jeopardy in proportion to the amount of their waste. For itself and

New Jersey's option

This leaves New Jersey with limited options. It can remain in the Northeast Compact, join Pennsylvania in the "Appalachian Compact," form a compact with another state, or attempt to form a one-state compact and risk becoming a regional disposal site. All of these options call for New Jersey to develop its own site. The political machinery is working to establish "siting" legislation. New Jersey, unlike New York and Pennsylvania, has laws in existence for siting toxic waste disposal sites. The bureaucracy has dealt with some of the issues that will come up with LLRW. New Jersey is adamant about keeping the Northeast Compact alive. Should Delaware or Maryland defect to the "Appalachian Compact," the state's options may change.

The Northeast Compact is probably dead in New York. Like Pennsylvania and New Jersey, New York cannot avoid hosting a site. Its options are not much different from the other two

TABLE 3
Some Criteria for Site Selection

Technical	Socioeconomic
Soil	Population density
Substrata	Transportation
Topography	Agricultural use
Ground water	Distance from cities
Surface water	Unemployment
	Distance from generators
	Community willingness

Source: Low-Level Radioactive Waste Disposal Siting: A Social and Technical Plan for Pennsylvania. Witzig, WF, Dornsife WP, Clemente FH, Eds. Institute for Research on Land and Water Resources. Pennsylvania State University, August 1983.

states, except that it has West Valley. There is some sentiment to reopen portions of West Valley for Class A wastes generated by hospitals and research, ignoring Class B and Class C wastes if the state can get into another compact that allows for disposal of these wastes.

Vigorous lobbying and a mass mailing campaign have led legislators in Albany to the realization that New York will soon have a serious problem. Some responsible (but unpopular) decisions will have to be made.

New York has expressed interest in the "Appalachian Compact" if the wording is favorable. The state is quite prepared to use West Valley for creation of its own compact or a multiple-state compact. There is a possibility that a site altogether different from West Valley will be developed.

Creating a site facility

Forming a compact will be easier than creating the site facility. Assuming no delays, it will take approximately 4 years to develop a functioning site. The area is determined by a macro screen in terms of geology, hydrology, population density, and other factors. After selection of the best site, a developer-operator is contracted, the necessary legislation passed, and the site licensed. The critical step is finding the actual site. Table 3 lists a few of the technologic and socioeconomic considerations

that bear on site selection. There are also a number of technical options available (Table 4) which generally involve either above-ground/grade storage or engineered below-ground storage. In any case, simple burial is not a consideration. Strong local re-

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sistance is expected in any region selected to host a site.

There are significant economic advantages to hosting a site (Table 5). Many new jobs will be created. Rent paid on the wastes stored will generate revenue. Transportation corridors will be well-kept. There are other inducements, such as guaranteeing property values and securing backup water sources, that can be offered to a community. A few communities have recognized the economic impact of such a facility and expressed interest in hosting a site.

After January 1, 1986

What will happen on January 1, 1986 if these matters are not resolved? One site is considering the

possibility of accepting limited amounts of LLRW from those states showing "good faith" in resolving their own problems. New Jersey, having ratified the Northeast Compact, may qualify, but Pennsylvania and New York probably will not. By the deadline, they may qualify. That facility may accept some wastes at high prices. Pennsylvania's utilities have taken to building temporary storage facilities with an expected life of 4-5 years at a cost of \$19-23 million. These facilities will be paid for by rate increases.

There are two specious arguments that have gained currency and need to be rebutted. First, "We'll develop a site for medicine and research only." These facilities cost millions of dollars per year to run. In Pennsylvania (5), 190 hospitals have licenses, but

TABLE 4
Technical Options for Site Selection

1. Engineered shallow land burial.
2. Above-grade/above-ground engineered facility.
3. Caissons.
4. Combination of 1, 2, or 3.
5. Simple burial is politically nonviable.

TABLE 5
Advantages to Hosting a Site

1. 80-100 new jobs.
2. New industry.
3. Rent paid to community.
4. Better roads/bridges.
5. Can guarantee property values.
6. Other benefits negotiable.

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only 32 shipped waste in 1982. Their total volume was 332 cubic meters containing 32.7 Ci that year. With recent upheavals in reimbursement, 32 hospitals cannot support a site. As research money dries up, Pennsylvania's seven medical research facilities

only!" It is true that hospitals, by various mechanisms of volume reduction and on-site decay, can reduce their LLRW to very small volumes. Shipments from the 32 Pennsylvania hospitals consist mainly of RIA vials which can legally be put into sanitary sewerage or incinerated. The physi-

into inflated radionuclide costs, which relates to DRGs.

The most pressing argument for the responsible handling of low-level radioactive waste is public safety. Each state must handle this issue in the most scientifically and technologically sound fashion. The well-being of the public is at stake, both from the standpoint of exposure and from the jeopardy of losing such critical medical services as nuclear medicine, some radiation therapy, and radio-immunoassays. It is 1 year to the deadline.

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producing 8.1 Ci in 146 cubic meters per year cannot help very much. This option ignores the radiopharmaceutical houses on which medicine depends for its radionuclides, and does not deal with 95% of the wastes, which are generated by nuclear reactors.

The second argument: “Hospitals produce so little waste that they don't need a disposal site; it's for utilities

cists who insist on commercial disposal do so not because they have to, but because they feel they should. As costs rise and availability of sites decreases, this volume will drop. This argument ignores a major part of the problem. Nuclear medicine has to be concerned about its suppliers as well as medical and scientific research. Disposal problems experienced by radiopharmacies will rapidly translate

References

1. United States Public Law 96-573 (Radioactive Waste Policy Act of 1980)
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4. Bartlett DL, Steele JB. Forevermore: nuclear waste in America. *The Philadelphia Inquirer*; November 13-20, 1983
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WHITE HOUSE BRIEFING ON HEALTH CARE COST CONTAINMENT

During the RSNA meeting in Washington, DC last November, approximately 150 members of The Society of Nuclear Medicine, the American College of Nuclear Physicians (ACNP), and the Corporate Committee for the Advancement of Nuclear Medicine attended a White House briefing on health care and national security issues. This briefing, followed by a reception in the Indian Treaty Room, was coordinated by the ACNP to acknowledge the Corporate Committee's contribution to the formation of the ACNP's

Professional and Public Information Program.

Dr. William Roper, Special Assistant to the President, Office of Policy Development, reported that the health policy will be shaped in terms of the \$200 billion deficit. The high cost of physician payment, teaching, capital equipment, and high technology must be dealt with in the near future.

Of the country's 6,000 hospitals that are feeling the bite of the cost-containment issue, Donald W. Moran, Executive Associate Director, Office of Management and Budget, predict-

ed that Congress will be compelled to deal with the DRGs as requests for exemption pile up.

Dr. Tyrus Cobb, Deputy Director for European and Soviet Affairs for the National Security Council, concluded the briefing with a discussion on foreign policy, with particular emphasis on Soviet-American affairs.

A press conference on the initiatives of nuclear medicine physicians and corporate executives in cost containment and cost effectiveness preceded the White House briefing. ■