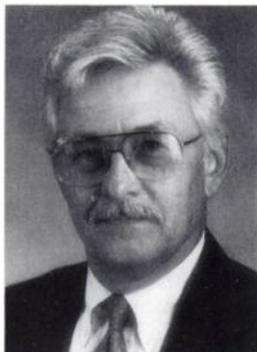


COMMENTARY

WHO'S TO SHOULDER THE BURDEN OF LOW-LEVEL RADIOACTIVE WASTE?

THERE IS A GREAT DEAL OF CONFUSION about who is responsible for dealing with the disposal of low-level radioactive waste. The nuclear power industry doesn't want to own the problem, you and I don't want it, and our government doesn't seem ready to tackle it. So how are we going to avert a crisis? A lot of people, even those responsible for generating waste, have trouble defining the scope of the waste disposal quandary and separating it from a slew of related problems.



William J. Walker, Jr., PhD

Let me tell you a little about my perspective as chief of radiation safety at the National Institutes of Health (NIH). In 1991, NIH shipped 1772 fifty-five gallon drums for off-site disposal. Approximately 750 of these drums were filled with scintillation fluids, 965 contained compacted dry solid waste, 21 held solidified liquids, and 29 contained animal carcasses and other biological waste. Some 1015 of these drums ended up in a burial site. We incinerated 2757 boxes (2.7 cubic feet per box) of dry waste and 975 boxes of medical pathological waste. We released 13,880 gallons of low-level aqueous waste to the sanitary sewer. If the waste released to the sewer were solidified or adsorbed for off-site burial we would create almost 700 more 55 gallon drums per year. This is a large volume of waste, but the activity is extremely low, so we can take advantage of disposal options such as on-site incineration and release to the sewer, which are allowed under current laws. (The majority of activity released from NIH by incineration and sewer disposal is a single isotope, tritium, for which the hazard is very low and the allowable release rates high.)

Severe Challenges

The NIH and the rest of the medical community are facing a number of severe challenges. The most significant of these is the closing in 1993 of low-level waste disposal sites to gen-

This commentary is derived from a talk delivered by William J. Walker, Jr., PhD at the High Country Nuclear Medicine Conference in Vail, Colorado on March 17, 1992. Dr. Walker is chief of the Radiation Safety Branch of the National Institutes of Health, Bethesda, Maryland. The opinions expressed here are solely those of Dr. Walker and do not represent the NIH.

erators in states that are not included in a compact with an operational waste site. After January 1993, generators will be forced to find disposal alternatives such as on-site warehouses or contractor-supplied warehouse space. Generators will no doubt seek new volume reduction strategies such as shipping waste to off-site contractors for supercompaction or incineration before having the compacted waste or ash returned for on-site storage. Biomedical investigators will have to substitute new and perhaps less effective research procedures which do not rely on radioisotopes. Some may be forced to abandon research projects just because there is nowhere or no way to get rid of the wastes. The present thinking, despite official posturing, is that many of the new sites will not open until after the year 2000.

The disposal of mixed wastes poses a dilemma of almost equal significance. Mixed wastes contain radioactivity along with hazardous chemical waste. Because of current regulations, many mixed wastes are in a legal limbo; current regulations prohibit disposal either off-site or on-site. As if that weren't enough of a catch-22, long-term storage of mixed wastes is illegal under the Resource Conservation and Recovery Act. To its credit, the Environmental Protection Agency has recently relaxed time limits for on-site storage.

Soaring Costs

Meanwhile, estimates of increases in the cost of disposing of radioactive waste are mounting while efforts to build disposal sites drag on. The following factors will contribute to soaring costs:

- Hospitals, research institutions, and other waste generators will pay dearly for construction of new on-site waste storage facilities or modification of existing facilities to meet regulatory requirements.
- Per-volume costs to put waste in new disposal sites will be exorbitant. Multiple, low-volume waste disposal facilities will require millions to site and develop, and will cost more to operate than the three large sites now in operation. The cost per volume will become even higher as waste generators are driven out of business and the volume of waste going to disposal sites diminishes. The scene is set for all industrial users of radioisotopes, including scientists and physicians, to absorb significant hikes in disposal costs.
- Generators of mixed-waste face processing and disposal costs that include on-site storage, analytical testing, and treatment. Analytical tests can run up to \$1500 or more per sample. Storage facilities for mixed wastes require special features

such as explosion-proof electrical systems, fire suppression, and environmental controls, all of which are expensive. Few if any methods for rendering wastes non-toxic are available.

Nuclear Medicine Facilities

These problems may seem far removed from the typical nuclear medicine facility. Under present laws, there are few waste disposal problems for hospitals and medical offices, which typically receive unit doses from a radiopharmacy or a technetium-99m generator from a manufacturer. Most radiopharmaceuticals have short half-lives and the waste can be returned to the radiopharmacy or allowed to decay in storage. Wastes from the use of radioimmunoassay (RIA) kits can be heaped with the regular trash. So why the concern over radioactive waste disposal? There may be potential problems of which you are unaware. A bill in the U.S. House of Representatives (H.R. 645) contains forty short lines of text that would ban decay of low-level wastes in storage, ban disposal of radionuclides in sanitary sewers, and remove the waste exemption for RIA kits, among other prohibitive measures. The medical community may be on the verge of having severe and unnecessary restrictions placed on the use of radioactive materials.

If you think that since your nuclear medicine office or department doesn't have a direct need for low-level waste disposal sites that it isn't your problem, think again. Nuclear medicine and the biomedical community need nuclear reactors, radiopharmaceutical manufacturers, sealed-source manufacturers, biotechnology firms, and universities and other research centers. If these organizations are forced to curtail operations or cease production, the entire medical community will come face-to-face with the problem. How easy would it be to operate a nuclear medicine department in the U.S. if all of your radiopharmaceuticals had to be shipped from abroad?

Biotechnology

In the biotechnology industry, competitive pressures compounded by the costs of waste disposal will have a profound impact on biomedical research in the U.S. What happened in Silicon Valley, California is now beginning to happen to the biotech industry. Many biotech firms are small operations with one or two major efforts underway at any given time. These small companies survive from grant to grant and already have felt the financial burden of disposing of radioactive and mixed wastes. These pressures have contributed to the recent sale of a number of biotech firms to large, foreign companies. The same situation exists along the I-270 biotechnology corridor around NIH. It isn't unreasonable to expect that new owners will move recently acquired operations to different states or countries where waste disposal is readily available. Congress approved over \$8 billion for NIH research grants in 1991. A significant number of these dollars may have been used to pay for disposal of radioactive waste. If the U.S. doesn't wake up

soon and solve the waste problem, is the U.S. doomed to dependence on other countries for biomedical research and radiopharmaceuticals?

It isn't easy to separate nuclear medicine from the many other generators of radioactive wastes. Carol Marcus, MD, PhD of the Harbor-UCLA Medical Center, sent me an interesting list of the generators of low-level radioactive waste who shipped from the Southwest Regional Compact of Arizona, California, and North and South Dakota. Out of a total of about 575 waste generators, almost half were hospitals, research labs, or medically related industries such as biotech firms and pharmaceutical makers. Medicine is the largest volume contributor of waste within that compact. In California, biomedical research creates four times the low-level radioactive waste volume created by the California power reactor industry. Many of the other generators on the list are non-reactor industries, including companies we're all familiar with such as Del Monte, GTE, Hewlett Packard, Hughes Aircraft, Revlon, and the San Diego Zoo which contribute to our daily lives. It should be readily apparent that closing waste sites would have a profound effect on all of our lives.

LLRWPA

So what's causing the problem? This is my opinion, not that of the NIH. The government isn't carrying out its own laws. We are thus left with a difficult problem. In 1985, Congress passed a comprehensive law, the Low-Level Radioactive Waste Policy Amendments Act (LLRWPA), which lays out, step-by-step, the actions needed to resolve the impasse. As I see it, many of the states are to blame for foot-dragging and opposing the provisions of LLRWPA. Congress left the generators of waste with the responsibility to pressure the states to ensure that waste sites would be opened. But generators have had little or no influence on state officials, so that pressure is largely a fiction.

In fact, the state of New York has gone so far as to challenge the constitutionality of LLRWPA and the case has reached the Supreme Court (see *Newsline*, May 1992, p. 37N). New York contends that the act exceeds the limits imposed on the Federal Government under the 10th Amendment to the Constitution. If the act were thrown out, the adverse effect on the medical community would be profound. The framework under which states are developing new disposal sites would be destroyed, the current sites would most likely bar waste from out of state. Congress would need years to produce new legislation. The gains we've made, although modest, would be wiped out and the process started from scratch.

I'm fresh out of ideas about how to deal with states that fail to follow the law. Most states have failed to meet the deadlines set in LLRWPA, and it doesn't look like they are inclined to change their speed now. In the mean time, I'll ask one last time, whose problem is it?

William J. Walker, Jr., PhD, CHP