

THE COST OF LLW DISPOSAL - IS IT SOUND ECONOMICS?

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ABSTRACT

Low-level radioactive waste (LLW) management is a growth industry. Since 1980, when the LLW Policy Act was passed, regional and state LLW bureaucracies have grown, and LLW services and consulting businesses have prospered. Most states and federal agencies have LLW programs with increased regulation of LLW management. Costs of all these programs have soared as facilities for LLW disposal are proposed in sixteen, or more, locations in the country. LLW management costs have also increased as licensees implement comprehensive programs for volume reduction and waste form stabilization.

Yet, the total cost of LLW management service is borne by nearly the same universe of payers as in 1980: taxpayers and radioactive materials licensees. Those costs are, in turn, passed on through taxes and consumer costs. Ultimately, everybody pays.

Despite this investment, the LLW situation is adrift. New facilities have not been built, and existing facilities are closing or limiting access. LLW management has not advanced to a respected field of engineering and science. Nor does it include exceptional benefit and opportunity to host communities.

A new focus is needed to allow an economically sound solution to emerge, one where the supply of LLW management and disposal fits the demand for service.

THE COST OF LLW DISPOSAL

What if we build a low-level radioactive waste (LLW) disposal facility, and nobody comes? What if the price of LLW disposal is so high that no one can pay? Just what is the breaking point on the indifference curve of LLW disposal costs? As the issue of LLW is discussed, little is said about real costs, and even less about behavior that may be driven by those costs. Meanwhile, costs of disposal facilities - both individual and collective - continue to climb. Last year at Waste Management '91, U.S. Ecology circulated a compilation of cost data. (1) The LLW Forum did some cost assessment last summer (2), and the DOE 1991 (3) meeting discussed costs. All discussion was individual facility costs only; no one summed the numbers. This paper draws on those information sources and goes further to ponder the economic impacts of the emerging situation that may yield as many as sixteen facilities located throughout the country. Meanwhile, the amount of waste indicates less demand for disposal capacity.

The situation defies the natural order of the market, where demand determines supply and the price of that supply. Robert Dorfman, in *Prices and Markets*, states "In the American economy the most wasteful industries appear to be those where, for one reason or another, the price system does not operate". (4)

WHAT IF?

Over the past twelve years, LLW disposal engineering has been reacting to the questions of "what if?" over technology. Many who continue to work in the LLW area today were present at the DOE (Department of Energy) conference in Boston in 1987 (5) where LLW disposal technology was described and compared. We all heard the well known LLW engineer say, "You want....(more protection); we can give you that," as he added one more line to his conceptual drawing of a facility. When boots are requested, engineering can provide boots - with overshoes. But each addition of engineering and technology costs additional money; and now, after repeat iterations of "what if" over technology, it is indeed time to ask "what if we set the price of LLW disposal too high?"

COST OF FACILITY DEVELOPMENT

It is too soon to have conclusive empirical data on the total cost of this new generation of LLW disposal facilities. With none of the facilities in operation, we have only estimates and projected costs, and those are high and getting higher. At the DOE LLW meeting held in Atlanta last November, a panel concluded that disposal costs at proposed facilities can be expected to exceed \$200 per cubic foot. (6)

That panel presented a new generation of figures: Illinois has already spent \$70 million on disposal facility site selection and characterization and estimate that they will spend another round of that amount -- before facility operation begins. Vermont appears to have chosen mid-cost technology at \$142 million for a mounded concrete vault, compared to \$193 million for even more engineering and \$134 million for a below-ground vault. Simple arithmetic affirms the panel's conclusions that disposal costs of \$150 per cubic foot, would be a bargain! And these are facility-only costs that do not include funds for insurance and institutional control and community benefits; nor do all of them account for cost increases from time and inflation. Nor, do estimates include institutional costs of state and regional management and regulation and enforcement. In addition to disposal facility dollar costs, licensee on-site management and off-site treatment for volume reduction and waste stabilization must be added to derive total LLW management costs. A further missing piece is discussion of the opportunity costs: resources that are sunk in multiple proposals for conventional LLW disposal technology, and thus may not be spent on research or health care advancements, or alternative innovative management and disposal technology.

WHO PAYS THE BILLS?

There are two sources of revenue to finance LLW management and disposal operations and institutions: 1. the users of radioactive materials, themselves, which is not a large number in the national scheme of commerce and industry and service; and/or 2. funding by general taxation. However, no matter who - or what company - writes the checks, people pay the bills, through their electric bills, health care costs, general

business and consumer costs, or taxes. And those costs, their returns and the resulting behavior changes, must be discussed.

A TEST IN ECONOMIC BEHAVIOR

In dealing with the economics of any issue, three critical questions frame discussion:

- Who pays?
- Who benefits?
- What are the incentives?

To pass the test, the same answers apply to the first two questions; the third question is in large part subjective judgment.

Who Pays? In LLW management and disposal, several pay the real costs of disposal. Radioactive materials users pay a large share, passing them on to their customers and grantors; in some cases, state governments, and thus taxpayers, pick up the tab, or part of it. States and communities pay through assumption of responsibility; and in some cases, pay some real costs of facility location, as well.

Who Benefits? Without question, radioactive materials users and their customers - society - benefit from having LLW disposal available, thereby allowing availability of their products and services that use radioactive materials, licensed on condition of safe management - including disposal of the inevitable waste. And, when facility siting is negotiated to advantage, communities and states may realize benefits from assuming responsibility, as citizens of Barnwell County, South Carolina bear witness. (7)

What Are the Incentives? The question of incentives is harder to answer. We have not documented a great deal about how LLW management and disposal costs affect other costs and resulting behavior, environmental protection, technology advancement, or research decisions.

No one is yet asking "At what point does the developer change the project or walk away from it?" or "At what point do those writing the checks ask for an audit to assess just what the LLW dollar buys?" Until now, LLW disposal facility development has operated in a cost-plus environment, with no apparent limit to willingness to pay, assuming that the indifference curve of taste and preference for LLW management has no intersecting lines.

WHAT IF?

What if the price of LLW management and disposal is driven so high that radioactive materials licensees cannot pay?

What if so many facilities are built that there isn't enough waste to finance all of them?

What if on-site storage and source and volume reduction measures are so well developed at a lower price, that storage becomes the preferred management choice, even when new disposal capacity is available?

At what point does the cost of LLW management and disposal cause changes in behavior, forcing decisions on research or availability of diagnostic or treatment procedures? Manufacturers and suppliers of radiopharmaceuticals and radioactive labeled compounds now assume LLW responsibility by delivering ready-to-use products with no waste at the use end, thereby centralizing LLW management at the production end. What if the cost of disposal prevents manufacturers from assuming that responsibility, and they distribute the waste along with the products, decentralizing it and adding volume?

COSTS AFFECT PRACTICE

Radioactive materials users have demonstrated that costs do influence their behavior. Volume reduction has closely followed the cost of disposal, with each surcharge increase resulting in collectively less LLW (8). The Waste Policy Act and Amendments (9), have been interpreted to require construction of LLW disposal facilities. Despite that interpretation, which has the effect of overcoming a market response on the supply side of LLW disposal, an orderly demand-side market pattern has emerged:

- As the price of disposal increased, through real cost charges and surcharges, the volume of LLW decreased, individually and collectively.
- As a result of effort to decrease volume, a new demand for volume reduction and treatment has emerged, resulting in a growth industry of LLW treatment -- volume reduction through compaction and incineration, and waste sorting, stabilization, and storing for decay.

In effort to reduce the costs of LLW disposal, the first order of demand-side behavior change is to allow less waste through a series of management procedures. However, volume reduction is not accomplished without cost. The next order of behavior change takes place farther back in production, examining uses of radioactive materials and asking, "Is this use necessary?" "Are there supportable substitutes to reach the same - or similar - conclusions, or are there substitute research projects that would not require radioisotopes to accomplish?" And then, what is the effect; in order to avoid LLW, do we lose commodities of social value, such as research? (10,11) A major health care center in Massachusetts reports that they have reduced their LLW-for-shipment to nonexistent by substituting fluorescents for radioactive tracers in their laboratories. That may be acceptable for diagnosis purposes, but most research requires greater precision, which is not attainable with known substitutes.

IS IT A FAIR TRADE-OFF?

Economic decisions are measured by trade-offs and the acceptability of the traded values. In the context of LLW discussions, where fairness seems to be the overriding issue, trade-offs are rarely assessed. LLW programs are conducted as though resources are infinite, that choices between providing for LLW disposal and other commodities do not exist.

The question must be asked: Is it fair to trade off cost and quality control testing or research that uses radioisotopes in a variety of critical ways, for state and regional bureaucracies and generous consultant fees? As sixteen states and regions move into siting, employees are added, additional resources are dedicated to the processes, consultants and lawyers are hired, public participation processes are financed, and the total costs of providing the LLW program increases. Those costs must be paid; for now they are being paid by those who use and benefit from radioactive materials. In order to meet those costs, something else in the budget may be reduced or eliminated. The product end is not a cost-plus environment, and equipment, investigators, or research itself may be the trade off.

We seem to be in another game of Chicken, where no one is willing to say "Enough already!" and assert effort to change the situation. Momentum forces LLW programs to stay on the

track of facility development, even though there is nationwide opinion that all the proposed facilities are not necessary -- potentially six times the number of facilities for a third of the LLW volume of 1980. Even those paying the bills seem to be willing to pay whatever to whoever sends the bills, with almost no questions asked. Governors are unwilling to question state and regional agencies - largely because, I submit, the bills continue to be paid by someone else. In Massachusetts, while human services and education programs are being cut back, the LLW Management Board plans for increases in staff and operations and moves on toward, yet, one more facility for waste disposal, and the governor has not publicly questioned those choices.

There must be a breaking point. There must be a time when someone will effectively ask "What are we doing?" "Where are we headed?" "Do we have a goal; what is it?" "Are costs aimed at meeting that goal?"

In the "cost-plus" mentality that prevails, we have watched states and compact regions go far beyond projections and estimates. New York has spent \$43 million since 1986 (12), and now they are starting over. North Carolina has raised pre-construction cost estimates from \$21 million to \$35 to \$74 million. (13) California has gone from a \$7 million total cost estimate to \$54 million. (14)

Yet, all these expenditures are not paying for LLW management or disposal. We have only plans and proposals. No new facilities are in operation, and only California has a complete license to go ahead with construction. In the meantime, the existing facilities are preparing for closure or reduced operations for compact members only. And in the period of time, between current operations and new capacity, state and regional programs will rely on storage at the site of generation to meet LLW disposal demands, adding further to the cost of LLW management.

BENEFITS FROM A LLW DISPOSAL FACILITY

As total costs increase, as the number of facilities increases, and as less waste volume is dispersed across the country, benefits that may accrue to communities, too, are dispersed. What is the lowest number of benefits that a community will accept for having a facility nearby? Dollar returns to communities in several states and regions are tied to the waste itself. (15) In North Carolina the general fund of the state will collect a tax based on volume, and the local community will tax on gross receipts at the facility. Massachusetts, Connecticut and New Jersey municipalities with LLW facilities will collect on gross receipts at the facility. Texas, California and Maine will compensate for impacts on communities, and that is in large part related to the amount of waste and the size of the facility. What if communities demand more benefits? What if the incentive for communities and host states becomes promotion of more waste per licensee in order to have revenue to meet costs and increase benefits?

Where on the indifference curve does someone make a decision to alter the course of events? How much space and how many resources can be assigned to LLW disposal? And who will act first? Will it be facility developers protecting or limiting their investments; local communities in search of measurable benefits; radioactive materials licensees in effort to contain costs of their products and services? Or will a governor assert leadership and call the issue what it is: unsound economics, chaotic and irrational?

A BETTER WAY

There must be a better way! I suggest that there is. Give the market system a chance! Let the demand for disposal determine the right number of facilities and set the right price. I submit that the number of facilities would be far less than sixteen, and that the technology would be more interesting than anything proposed thus far.

The Super Collider is an example of a successful approach to facility siting. Importantly, there was only one proposed. Technical specifications for the collider were attractive. (16) State governments and local communities viewed the facility as an asset that would stimulate the local economy and attract research money, scientists and professionals. States competed for the privilege of hosting the facility.

The Super Collider was described so glowingly that everyone wanted that which there would be only one of, concentrating all those benefits in one location: an \$8.5 billion project with 2700 employees that would attract a thousand visiting scientists a year. Texas is putting up \$1 billion of those dollars to have the facility in Ellis County, just thirty miles from Dallas!

Contrast that project with LLW facility siting effort with no greater inherent risk. LLW facility projects have been cast as threats and liabilities to be overcome; therefore no one wants them. And thus, everyone gets one, with as many as sixteen to be located throughout the country! With such a distribution of facilities, the annual million cubic feet of waste will be so dispersed around the country that even community benefits will be minimized as they, too, are dispersed over as many locations.

This is not simply a matter of money. By adding all that has been spent on LLW facility development so far, the total exceeds a billion dollars - more than has been spent on the Super Collider. The difference lies in how the money is spent. In the LLW effort, money is spent on responsibility avoidance, or delay, and designs for conventional disposal technology. Although, engineering enhancements modify the methods of disposal, all the proposals simply isolate the waste from the environment and the environment from the waste.

Why can't LLW be more like the Super Collider? Why can't it encourage innovation and creativity for new methodology for waste treatment and recovery, and attract research and scientists, warranting some of the millions of dollars that are already committed to LLW management?

Such a transformation will not take place in the existing atmosphere of regional and state border protection and patrol that requires multiple facilities. States and regions need to yield to the real demand for less disposal and more treatment. They need to work to combine resources, to concentrate effort, to localize the benefits and to maximize the potential for advances in waste management and in understanding the waste form components and their behavior.

TRANSPORTATION

Concentrating effort with fewer facilities located at greater distances raises the matter of transportation. The system of proper LLW disposal has historically relied on long-distance transportation, and has not demonstrated risk. The record is impeccable, relying on strict regulations, strictly followed and enforced. Confidence in transportation of LLW is affirmed by the current LLW system, which relies

increasingly on transporting LLW to treatment facilities for volume reduction, then transporting the treated waste back to the point of origin for on-site storage until new disposal capacity is available.

WHAT ARE THE INVESTMENTS?

The current system of LLW disposal is not investing in lives saved; there have been no lives lost. It is not providing additional environmental protection; environmental integrity has not been violated at the present facilities. Just what are we investing in - what are we trading for? Can we afford not to alter the course of events, to return to a market situation, where efficient economic behavior demands and provides an improved product at a better price?

WHAT IF WE CAN MAKE SOME CHANGES?

What if everyone who ever thought about LLW took some responsibility for a more reasoned approach to the issue? What if we stop relying on "the political process"? What if we talk about appropriate technology (17) price and behavior and their interactions, and consider trade-offs for an efficient, cost effective, creative system of innovative LLW management that returns real benefits to everyone: to developers, to communities, and to those who benefit from use of radioactive materials?

WHAT IF WE USE OUR KNOWLEDGE?

Over the course of the years that LLW has been discussed as a public policy issue, tremendous knowledge has accumulated. We seem to be hiding that knowledge, not applying it to a situation that truly needs new life and illumination. What if we all concentrate on finding a better way?

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