

---

## Cleanup Overview

---

At the DOE nuclear weapons production sites, disposal of radioactive and hazardous materials has frequently involved lax standards and band-aid solutions. Beginning in the 1940's hazardous, long-lived wastes were disposed of with a shocking disregard for public safety. Wastes were either directly injected into major aquifers, dumped into nearby streams and rivers; or placed in unlined landfills, pits, ponds and trenches that inevitably leaked. Dangerous wastes were stored in cardboard cartons, cement boxes and carbon steel tanks, many of which, in the intervening years, have degraded and leaked. Although many of these older waste management techniques seem both remarkably antiquated and risky in the 21st century, unfortunately, in 2003, DOE continues its old habits. As we have seen repeatedly throughout this report, unsafe and unwise decisions continue to be made within the DOE complex.

The amount of waste that needs to be cleaned up is staggering. Based on DOE data, the National Academy of Sciences estimates 1.8 billion cubic meters of contaminated groundwater are migrating beneath DOE facilities and 75 million cubic meters of soil are contaminated.<sup>1</sup> It's difficult to put these numbers into perspective. What is the volume of 75 million cubic meters? Visualize a football field 25 kilometers high. While this report is focused on 13 DOE sites, including five of the largest, DOE is responsible for many more, 113 installations in 30 states.<sup>2</sup>

The cost of this undertaking is also staggering, particularly so as the sagging economy, the war on terrorism and a rising military budget is driving the federal budget into trillion dollar deficits. Estimates for the cost of remediation at all of its sites range from \$250 billion to \$350 billion. The five largest and most contaminated sites, Hanford, INEEL, Oak Ridge, Savannah River, and Rocky Flats together comprise 2/3 of the total DOE clean-up budget.<sup>3</sup> And we have no way of knowing the certainty of these estimates. The final cost could be considerably higher. DOE has consistently underestimated the magnitude of the problem. It's likely the costs of remediation are similarly underestimated.

In an ideal, world the concept of remediation is different than waste management. In the latter, the waste is temporarily managed, but the methods of storing the waste continues to need oversight, on-going maintenance and repair. Remediation involves (or should) a more fundamental correction with the problem of leakage and dispersal of the wastes permanently prevented, with the result that maintenance is no longer required.

In the world of radioactive waste and toxic chemicals, however, the neat line between these two concepts is frequently blurred. That which DOE's says is "remediated," in fact, will still need long-term management. An example is the current DOE proposal for "remediation" at

Hanford, Idaho, Savannah River and West Valley, where the idea is to re-define residual high-level waste and dump cement into the high-level waste tanks. This approach would leave a major source of contamination on-site and cannot be called “remediation.”

The primitive and inadequate storage methods used by the Manhattan Project, the Atomic Energy Commission and DOE may have resulted in decreased costs at the time, but they left a harmful and costly legacy that contaminated waterways and aquifers and placed large numbers of people at risk. Improperly stored, unstable wastes will continue to pose unacceptable risks for generations unless complete remediation is carried out. In addressing the remediation and long-term stewardship of each of the sites, long-term decisions must be made even as additional questions and problems arise.

For each of the DOE sites we need to ask, can full remediation be achieved? How and when will groundwater be remediated? Will all the hazardous radionuclides be removed from aquifers and other underground sources of water? What is the proper method of removal of contaminated materials? Where can the wastes be stored? How will these wastes be maintained and regulated essentially forever? Where are the funds to come from to support this extraordinarily expensive project? And, with changing legislative priorities and looming budget crunches in Washington DC, will the commitment to a full cleanup be jeopardized?

Unfortunately, DOE, the agency responsible for remediation, frequently has operated in secrecy. This practice is a vestige of its Manhattan Project origins, and continues to this day. DOE has still not been forthcoming regarding the magnitude of contamination problems at its nuclear weapons factories. Often vital monitoring programs have been cut back and documentation regarding problems has been denied to legislators and citizen groups. It is absolutely crucial that the remediation program proceed with transparency. There must be full participation by the public in decision-making regarding this national effort. Access to all reports and studies must be assured for the public’s participation to be meaningful.

A key failing in existing remediation programs is that the technology for the full remediation of ground water does *not* currently exist. Contaminants occur as a mixed soup, a combination of volatile organics, dense non-aqueous phase liquids, and radionuclides and metals. Eliminating one contaminant does not necessarily eliminate others. For example, pump-and-treat, is being used to strip volatile organics from groundwater and to remove uranium from groundwater. Pump-and-treat is one technology in place at several sites. With this technique contaminated groundwater is pumped out, treated and then pumped *back* into the ground. But this technology is primarily used to remove volatile organics; with few exceptions, radionuclides are pumped back into the ground or released in public waterways. Besides, pump-and-treat is not always successful in reaching contaminants; this is also a function of the geology at each site. Without a strong commitment by the DOE, the US Congress and the scientific community to research and develop this technology, “remediation” of much of the weapons complex will be inadequate, will regress back to unsafe, band-aid solutions of the last century.

Alarming, there are very few examples within the nuclear weapons complex where radionuclides are being removed from groundwater and surface water. At Fernald, uranium is being removed from groundwater. At Paducah, a pilot plant is in operation to remove technetium-99 via ion-exchange, but it is not yet clear how effective this pilot plant is. DOE is vague regarding whether uranium is being removed at Rocky Flats. Relatively small amounts of cesium and strontium-90 have been removed from high-level waste tanks at Hanford, again using the ion-exchange technology. Otherwise it does not appear that radionuclides are being treated in DOE’s vast complex. This is an extremely serious, widespread failing of the cleanup project.

Though politicians and government bureaucrats are reluctant to articulate the thought, it must be recognized that specific contaminated areas may never be fully remediated. Certainly major rivers, whose waters and sediments have been polluted, such as the Columbia River and the Savannah River, will never be completely clean and the consequence of this to downstream communities drawing water and fish from these rivers must be addressed.

Further, the DOE has functioned as a self-regulated entity. Through its contractors, DOE operates the facilities and also regulates its operation; asking itself, in effect, whether it is doing a good job. Compounding the problem, DOE funds research into health effect, influencing to what extent radiation is deemed harmful. It is clearly not in DOE's interest to know if radiation is more harmful – that would change regulations, increase the cost of operations, and open itself to more personal injury law suits. DOE has systematically quashed unwelcome findings. As one example of many, DOE demonized, then fired long-time health effects researcher, Thomas Mancuso, for his important work showing a higher rate of cancer among Hanford workers at average radiation doses only about twice background radiation.

There is little incentive for contractors to completely and quickly remediate a site. That only means the contractor is out of business. But DOE has recently been changing the rules of the game. Replacing these older contracts, DOE is instituting a new accelerated cleanup program throughout the DOE complex. They are now offering incentives to contractors to meet shortened timetables. That is, incentives are given for speed, but few incentives are given for quality work and creative waste disposal methods. Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), DOE is short-cutting the public involvement process, reducing the time for State governments to review plans, and limiting real input by the public into the decision-making process.

Under these agreements, DOE is telling each site to determine which hazards pose the greatest risk and to focus on these hazards first. Provided enough is known of the potential risks and with assurances that the lesser risks are also dealt with, this would be desirable. But state governments that do not sign agreements with DOE that allow for this accelerated timetable will be left with sites that have reduced funding for cleanup operations. Under these agreements, States cannot throw roadblocks in the way of DOE remediation. Requiring States to sign accelerated agreement or lose cleanup dollars borders on blackmail. While hastening the cleanup process is desirable, reducing the public's role, a continuation of secrecy born out of the Manhattan Project, is not in the public's best interest.

There are additional aspects of remediation that need to be examined. Decommissioning and cleanup can create more waste that must be safely sequestered somewhere. Exhumation and cleanup techniques may pose health risks to surrounding communities and to workers that should be fairly and impartially assessed.

There has been an unfortunate tendency by DOE to exaggerate the risk to workers as an excuse to not proceed with clean up. This DOE policy is ironic given the fact that, for decades, the agency refused to acknowledge the threat to workers health posed by unsafe practices at weapons sites. For example, at the Fernald site, employees worked in virtual clouds of uranium-contaminated dust, but never were told of the hazard or provided with protective masks. Furthermore, "in 1997, the DOE admitted that, until 1989, the agency had never calculated the radiation dose to workers resulting from inhalation or ingestion of uranium, plutonium, and other radioactive materials present at any of its nuclear weapons plants, even though the raw data to do so were often available."<sup>4</sup>

The new DOE emphasis on worker safety is welcome. Of course where there is a real risk to workers all care must be taken to protect workers. Workers' health and safety can and must be adequately protected. This can be achieved with careful monitoring, use of protective suits and masks (where necessary) and by limiting exposures with adequate shielding and time-limited work shifts.

Another important question is what standards are going to be used for cleanup? Sometimes DOE has used internal standards that are less restrictive than EPA standards. For example, the EPA requires a decommissioning standard of 15 mrem/year total effective dose commitment (TEDE) to future residents, and a 4 mrem/year groundwater standard, whereas DOE has an off-site standard of 25 mrem/year.

Finally, the classification of wastes needs to be addressed. It is not in the interest of the public for wastes to be redefined in such a way that high-level wastes are reclassified as low-level wastes and then disposed of according to less stringent standards. This is the proposed policy at Hanford where DOE wants to re-classify high-level wastes as "waste incidental to reprocessing," then dump cement in the tanks and leave these highly radioactive materials in the tanks. A similar approach is planned for Savannah River.

A similar strategy is being promoted by the Department of Energy for Savannah River, INEEL and West Valley, New York, where expensive vitrification and disposal in a high-level waste repository would be avoided by re-classifying high-level wastes as "waste incidental to reprocessing," and, again, leaving highly radioactive "incidental" sediments in the bottom of tanks.<sup>5</sup> Clearly this policy is deliberately deceptive to the general public (who could be alarmed by "incidental" waste?) and will trigger disposal options that are hazardous to the public and to the environment.

Many considerations will need to be taken into account in remediation and long-term stewardship for each of the sites. Regardless of the methods used, it is imperative that remediation is completed and that long-term stewardship is initiated and sustained indefinitely. Clearly since September 11, 2001 there are new priorities in the US. With a skyrocketing military budget and greatly increased anti-terrorism programs there will be pressure to cut back on "non-essential" programs. The DOE clean-up budget for the nuclear weapons sites is essential. It must remain at full funding levels.

---

<sup>1</sup> National Academy of Sciences, *Groundwater and Soil Cleanup, Improving Management of Persistent Contaminants*, National Academy Press, Washington, D.C., 1999, p. 15.

<sup>2</sup> *Ibid*, Preface.

<sup>3</sup> NAS, p. 21.

<sup>4</sup> Makhijani, Arjun, *Pacucah—Never Again*, The Washington Post, August 17, 1999, p A 15

<sup>5</sup> Alliance for Nuclear Accountability, *Critiquing the Department of Energy's Accelerated Cleanup Plans : A Summary of Comments Made to DOE Site Performance Management Plans*, August 2002, at [www.ananuclear.org/slushfundsummary.html](http://www.ananuclear.org/slushfundsummary.html).