INSTITUTE FOR ENERGY AND
ENVIRONMENTAL RESEARCH

6935 Laurel Avenue, Suite 201
Takoma Park, MD 20912

Phone: (301) 270-5500
FAX: (301) 270-3029
e-mail: ieer@ieer.org
http://www.ieer.org

Statement of Marc Fioravanti
IEER Press Conference, October 23, 1997, National Press Club

The Department of Energy's Environmental Management program is responsible for the environmental legacy of the U.S. nuclear weapons complex, consisting of 137 sites. The Environmental Management program describes itself as the "steward of the world's largest environmental cleanup effort." Containing the Cold War Mess presents case studies of three major DOE programs. Our analysis has led us to the conclusion that the prospects of DOE succeeding are poor, despite the billions of dollars DOE spends every year. The case studies point out a lack of coordination among DOE divisions, misplaced priorities, and inconsistent data. These recurring issues are causing needless problems in a job that is already difficult by its nature.

Our first case study covers DOE's management of a large volume of transuranic waste. Transuranic is a term that applies to elements such as plutonium. Transuranic waste consists of plutonium-contaminated sludges, clothing, and other waste from production of nuclear weapons.

Transuranic waste is of concern for several reasons, one of which is the long half-lives of some elements. Plutonium-239, for example, has a half-life of 24,000 years. It can also be used to make nuclear weapons. As little as one-millionth of an ounce of plutonium-239 deposited in the lung is likely to cause cancer. For such reasons, transuranic waste is required to be disposed of in a geologic repository.

The data on this waste is poor, but seem to indicate that roughly two-thirds of the waste is buried (generally before a 1970 directive ended this practice) in shallow pits and trenches. The other one-third is kept in "retrievable storage" -- mostly in covered, above-ground facilities.

The two charts in front of you demonstrate the type of data that DOE has published on buried transuranic waste. (See Summary.) These charts are compilations of data on the volume and radioactivity of buried transuranic waste at two sites, the Idaho Lab and the Savannah River Site. We have similar charts in our report for other sites. At the Idaho Lab, a 1995 study found that the radioactivity of the transuranic elements was roughly ten times what has been historically published. Yet it is the only site to have taken a careful look at records relating to buried transuranic waste. The other chart shows data published by the Savannah River Site. The

numbers jump around from year to year and one publication to the next without scientifically plausible explanations. This is more typical of what we found.

We also found that DOE's models concerning the movement of transuranic elements from buried waste are contradicted by real-world experience. For example, measurements at Oak Ridge have shown that transuranic radionuclides travel thousands of times faster than previously assumed. These models should be revised as transuranic elements have been found in the groundwater at Idaho, Oak Ridge, and Savannah River.

DOE's priority for its transuranic waste program has been on development of a geologic repository. This is the Waste Isolation Pilot Plant, or WIPP, in New Mexico. This repository is for the "retrievably stored" waste and for waste to be generated from future nuclear weapons activities. DOE has neglected to include buried transuranic waste for this repository. If it included the buried waste in its analysis, the inadequacy of the WIPP repository would be even more clear -- WIPP is does not have the capacity to handle the buried waste and associated highly-contaminated soil.

Our case studies show that DOE's priorities are the opposite of its precept. Specifically, DOE claims it is focusing on the most urgent problems. However, DOE is spending almost all of its resources on sending retrievable transuranic waste that is relatively safely stored to WIPP. It is devoting few resources to the far more urgent problem of buried transuranic waste, which is contaminating or threatening to contaminate groundwater. DOE's assumption that it can complete its responsibilities for "clean-up" without attending to buried transuranic waste is wrong and it should make this the highest transuranic waste priority.

Our second case study covers high-level radioactive waste stored in 177 large underground tanks at the Hanford site in Washington state. Some 55 million gallons of waste is stored in the tanks, mostly generated by the processing of irradiated nuclear fuel for the extraction of plutonium. Remediation of the high-level tank waste at Hanford is the most complicated and expensive component of the Environmental Management program.

DOE is on a needlessly risky course that may create more environmental problems in the future or fail to achieve results, or both. Much of DOE's plan for treatment and waste disposal is technically and environmentally unsound.

DOE is limiting its options for waste treatment without having done adequate technical work. It does not seem to be learning the lessons from mistakes made at other sites such as Savannah River and Fernald. It assumes vitrification is the right approach for Hanford though it has not done sufficient work on pretreatment or enough testing of glass-making technology. It has rejected calcining -- turning the waste into a storable powder -- for inappropriate reasons.

Further, DOE's plan for disposal of Hanford waste after treatment is not environmentally sound. It will leave much radioactivity in the tanks, put large amounts of waste in shallow land burial sites, and make it difficult or impossible to protect groundwater and the Columbia River. DOE's plan needs to be revised, with the long-term goal of emptying the tanks, decommissioning them, and remediating soil contaminated by leaks from the tanks.

Contamination of the soil, or vadose zone, around and under the Hanford tanks is a serious problem. Hanford's initial characterization of the extent of contamination has shown that the problem is much worse than previously thought. Contamination of the groundwater has been linked to leaks from the tanks, and the evidence presented in recent studies is that previous estimates of leaks from tanks are wrong. One tank, SX-109, was estimated to have leaked less than 10,000 gallons, yet recent work concludes that much or most of the 250,000 gallons of waste lost from the tank may have leaked into the vadose zone.

Our third case study covers waste contaminated by radium and thorium kept in three large silos at the Fernald site near Cincinnati. The waste in the silos acts as a continuous source of radon, historically the most dangerous air emissions from the site. In 1994, DOE signed a Record of Decision to treat the waste in the silos by vitrification, that is, to turn them into glass. This waste was then slated for disposal at the Nevada Test Site.

However, the pilot plant effort has been a failure. DOE and its contractor, Fluor Daniel Fernald, have shown a lack of basic engineering judgment, improper design and construction procedures, and weak oversight. The waste was not well-characterized and the treatment technology was not well-tested. Yet, DOE and its contractor proceeded with simultaneous design and construction of the project. When the key piece of equipment, the melter, was delivered, the parts did not match with what had been built at the site.

One major technical problem was the use of materials in the construction of the melter that were incompatible with the waste, especially in "bubbler tubes" used for agitation. In December 1996, the melter was destroyed as glass eroded the understructure of the melter. During the design stages, one of the project personnel stated a concern that "if wear cannot be controlled, the ends of the tubes will erode away and then erosion will take place on the melter bottom where the tubes are or were. Extensive erosion could result in a breach of the melter bottom." However, neither the melter designer (DURATEK), Fluor Daniel Fernald, nor DOE paid attention to the issue and the melter failed essentially as described.

The project is now stalled. DOE has spent more on the partially-completed pilot plant than the full-scale vitrification project was projected to cost. Meanwhile, measures that were implemented to reduce the short-term risk from radon are failing and, moreover, will complicate eventual treatment. DOE is also prepared to abandon vitrification for at least some of the waste even though there seems to be no essential technical obstacle to proceeding with a vitrification program. Finally, projected cost increases have not been independently evaluated.