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Poison in the Vadose Zone:
An examination of the threats to the Snake River Plain aquifer
from the Idaho National Engineering and Environmental Laboratory

Statement of Arjun Makhijani, IEER

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The Institute for Energy and Environmental Research has done a number of studies on nuclear waste management as well as on problems of clean up of nuclear weapons related contamination. This is our first report that is focussed on water resources as such.

For fifty years, nuclear activities at the Idaho National Engineering and Environmental Laboratory (INEEL) as well as weapons production activities elsewhere (at Rocky Flats in Colorado) created large quantities of radioactive and hazardous chemical waste that were injected directly into the aquifer, discharged into surface ponds, or dumped into shallow pits and trenches at the INEEL site. The packaging for these wastes was a 55-gallon drum or a cardboard box or a wooden box. *Poison in the Vadose Zone* is the first comprehensive investigation of all the available data regarding contamination resulting from the early waste discharge practices at INEEL. We have concluded that these contaminants pose a serious threat to the lifeblood of the region, the Snake River Plain aquifer.

The overall evidence, including measurements of plutonium, americium, and other contaminants in the Snake River Plain aquifer as well as the vadose zone - that is the zone of soil and rock between the land surface and the water table - is compelling, as my colleague Michele Boyd's statement will make clear. It is thoroughly documented in the report. The problems have long been known to the Department of Energy and its contractors. Yet the DOE has yet to make a firm decision to retrieve the wastes, which is the basic preventive action that is needed to protect the Snake River Plain aquifer. The one attempt to plan the retrieval of a part of the waste (in an area known as Pit 9) ended in complete failure due to mismanagement and other factors before a single barrel of waste was retrieved. It is urgent that the DOE put

into place a workable plan that will actually result in the recovery of the waste. It is my considered judgment, based on two decades of assessing nuclear waste related issues, that, with enough care and planning, this can be done.

Water pollution from past nuclear dumping threatens many vital water resources across the United States, besides the Snake River Plain aquifer. The Columbia River, the largest in the West, is threatened by the Hanford Site in Washington State and the Savannah River by the Savannah River Plant in South Carolina, are among them. We chose to study Idaho first for several reasons:

- It is a sole source aquifer.
- More than a ton of plutonium was dumped into shallow landfills there.
- Plutonium, americium and other radionuclides are migrating there (as at other sites) far faster than anticipated at the time of dumping.

Our main recommendations are that:

- buried wastes be recovered from the dumps and processed in order to stabilize them for storage,
- all shallow land burial of radioactive wastes be stopped,
- the vadose zone be remediated to the extent possible, and
- a more vigorous groundwater monitoring program be implemented.

Waste recovery and processing will not be a simple project. It will need to be carried out very carefully, with great regard for worker safety. For instance, work can be done remotely, in small, explosion proof modules with processing being done in small amounts in many parallel lines of equipment.

The DOE and its contractors have tended to rush into projects without proper technology development and to ignore promising approaches that require patience. The DOE's tendency to rush into huge untested technologies and to commission full-scale plants before they are developed has been a central management problem. DOE has also proceeded into big, risky projects without careful back up plans. This approach has led to several huge failures, including the Pit 9 project in Idaho. It should be abandoned. IEER has found that management of clean up and the manner in which technologies are selected and projects are contracted are bigger hurdles than the technical challenges of complex clean-up projects.

Recovery of the wastes is also essential for security. If site control were to be lost, as is very likely to happen well within the 24,000-year half-life of plutonium (if history is any guide), the dumps would potentially become mines for nuclear weapons usable plutonium. The amount of plutonium they contain - more than one metric ton - is enough to make more than 200 nuclear bombs. Hence, it is far too dangerous to leave this waste in place for security as well as environmental reasons.

The DOE has the scientific and engineering capability to carry out these projects in

the form of many highly trained professionals. But it must marshal these resources far better and make proper priorities so as to make clean up effective and timely. Fortunately, the vast majority of the contamination still appears to be in the disposal areas or not far from the pits and trenches, so it is not too late. There is time to act. But should plutonium migrate in large amounts into the aquifer, the prognosis may be grimly different. I hope that the DOE will use the occasion of the release of this IEER report to carefully re-assess its clean up program at INEEL and urgently begin the task of implementing a plan to recover these wastes. As a public interest scientific institute, IEER stands ready to do its part to help the DOE and its contractors create such a plan.