

Report to Congress on the Use of the Waste Isolation Pilot Plant to Develop and Demonstrate Transparency Technologies

Introduction

This report describes the Department of Energy's plan for evaluating the use of the Waste Isolation Pilot Plant (WIPP) repository system to develop transparency technologies. This report fulfills the requirement of Senate Report 106-50 on the National Defense Authorization Act for Fiscal Year 2000 for the Department of Energy (DOE) to develop a plan to establish a nuclear waste disposal demonstration test bed facility.

Congressional Request

In Report 106-50 the Senate Armed Services Committee directed DOE to develop a plan to establish a demonstration and training program using the WIPP repository system as a test bed facility to develop transparent monitoring technologies for waste storage and to demonstrate them to the international community.

Transparency Technology and WIPP

Nuclear weapons production and commercial nuclear power plants have generated large quantities of radioactive materials. Providing for safe, secure, and transparent disposal of these radioactive materials promotes the implementation of some arms reduction processes, reduces proliferation vulnerabilities, and develops public confidence in the continued use of nuclear power. It is widely accepted that the safest and most secure method for disposal of radioactive materials is interment in geological repositories.

The concept of transparency is a tool for developing confidence and acceptance of geologic disposal. Transparency is a term used to describe a combination of technologies and processes that provide information to outside parties for independent assessments of nuclear material control. Transparency applies to all aspects of a geologic repository system: site selection, characterization, transportation systems, operations, and materials control.

At local, national and international levels, a transparency program could facilitate acceptance of the geologic repository and its associated operations. In addition, transparency is a mechanism for assuring that international nonproliferation obligations are satisfied.

Diversion of weapons-usable fissile materials from either spent commercial reactor fuel or weapons production waste disposal presents a risk to international security. The transparency of these activities is just as important to our nonproliferation goals as the manufacturing and transportation phases where the materials may be judged more attractive or more accessible. Transparency technologies that could be applied at disposal facilities in the U.S. and other countries are, thus, a necessary part of international nonproliferation strategy.

The concept of using WIPP as a test bed for transparency monitoring technologies at the back end of the nuclear materials cycle has been explored. Initial transparency test bed definition and discussions of a framework for establishing back end nuclear materials transparency took place at a WIPP-sponsored workshop during February 1999. The framework would include identification of the stakeholders, the major concerns of each stakeholder group, and the information



from transparency measures that would be required to address stakeholder concerns.

Several transparency monitoring experiments that demonstrate the value of a transparency test bed at WIPP were conducted and the results were demonstrated at the DOE International Conference on Geologic Repositories in November 1999. One of the major sessions at the conference featured an international panel of experts that focused on “Safety, Security, and Transparency Monitoring of Nuclear Materials in Repository Systems.” As a result of the panelists’ presentations, the discussion among more than 50 participants from the international community, and the WIPP transparency demonstrations, the conference panel encouraged the development of a transparency test bed at WIPP for international collaborations on safeguards, security, and transparency of geologic repository systems.

Conducting a transparency test bed program at WIPP could utilize the existing operating facility to establish international leadership in technical development and demonstration. The results of these activities would enable WIPP to assist DOE and international agencies, such as the International Atomic Energy Agency (IAEA), in developing safeguards technologies for implementation at national and international spent fuel repositories. WIPP efforts as a transparency and safeguards test bed should be focused on demonstrations, and not affect WIPP disposal operations.

A “laboratory” is needed to develop, test, and earn acceptance for such measures. WIPP is the world’s only operating geological repository. WIPP is, therefore, a candidate test bed for the development, testing, and demonstration of repository transparency techniques and technologies.

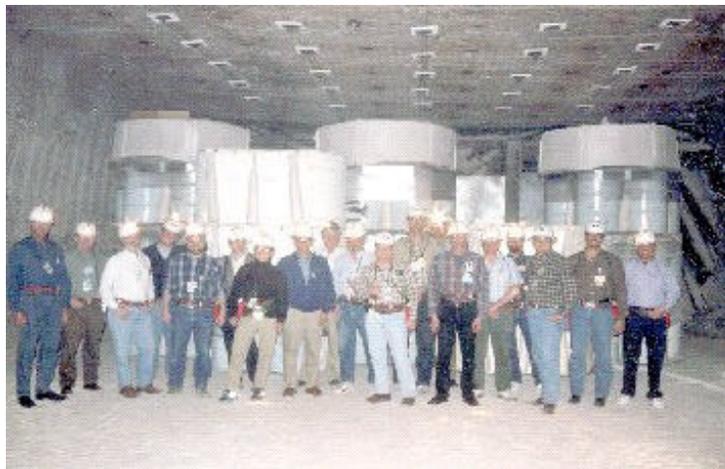
Future projects in this “laboratory” could include:

- (1) Development and testing of monitoring devices and technologies,
- (2) International demonstration experiments,
- (3) Transparency technology workshops,
- (4) A visiting scientist program, and
- (5) Educational outreach

The WIPP facility is located in southeastern New Mexico, 26 miles (42 kilometers) east of Carlsbad, New Mexico. The surrounding area is relatively unpopulated with approximately 30 permanent residents living within a 10-mile radius. The WIPP facility includes a waste handling building, four shafts, the excavated underground operations area and surface support buildings. The repository is located 2,150 feet below-the surface.

Infrastructure and Current Activities

During FY2000, the Office of Arms Control and Nonproliferation will review opportunities for transparency activities at WIPP. Depending on the availability of resources these activities might include an international transparency demonstration experiment and a workshop with Asian nuclear experts to discuss concepts for transparency at nuclear waste repositories and long-term storage facilities. Such a workshop could then be used to refine the framework for transparency developed at a US workshop on repository transparency in February 1999. Other activities, which have been suggested, include: (1) safeguards technology for geologic repositories and (2) a transparency workshop with European experts.



Participants in the Workshop on Transparency at the Back End of the Nuclear Fuel Cycle view simulated storage rooms at WIPP

Evaluation Plan

It appears that WIPP could provide an attractive environment for a number of research and development projects involving several disciplines. In the international safeguards and nuclear nonproliferation areas there are projects which may be of substantial international interest. While many activities have been suggested, an evaluation process is needed to work through the list of potential transparency program activities to identify priorities. It may also be prudent to consult with the International Atomic Energy Agency (IAEA) to solicit international participation in the evaluation process. With the assistance of the IAEA, it should be possible to determine the size and scope of a transparency technology program at WIPP, as well as the external sources of funding to carry it out.

With those thoughts in mind and subject to the availability of resources, the Department of Energy is considering initiating, with IAEA collaboration, a transparency technology workshop to be held in Carlsbad, NM. The purpose would be to examine proposed transparency related activities,

assign priorities, identify external sources of funding and develop a proposed project plan. The role of WIPP in any transparency research program would be limited to that of providing a test bed for the development, testing, and demonstration.

Conclusion

The mission of WIPP is to safely and permanently isolate transuranic radioactive waste from the accessible environment. The concurrent use of the facility as a test bed for the development of transparency technologies is attractive. An evaluation process is needed to list other potential projects, prioritize and identify international sources of support. All transparency technology activities at WIPP would have to be coordinated between the Office of Defense Nuclear Nonproliferation and the Office of Environmental Management so that they do not impact on safety or transuranic waste disposal operations.