INTERNATIONAL COOPERATION AND PARTNERSHIPS AT THE U.S. DOE CARLSBAD FIELD OFFICE

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ABSTRACT

The U.S. Department of Energy`s (DOE) Carlsbad Field Office (CBFO) administers the Waste Isolation Pilot Plant (WIPP), which is the only currently operating, deep-geological nuclear repository in the world. The WIPP provides for the safe disposal of U.S. long-lived, defense-related transuranic (TRU) waste and is located 42 kilometers (km) east of Carlsbad, New Mexico. At WIPP are surface and subsurface facilities designed to facilitate the safe handling and disposal of TRU waste. The WIPP began receiving waste in March 1999.

During the 35-year disposal phase, continued investigations into certain scientific issues will allow the CBFO to develop more detailed knowledge which could enhance WIPP operations and performance. This is true of activities which will be conducted over the life of the operation or implemented late in the operational life.

To facilitate gathering of scientific information in a more effective and efficient manner, the CBFO has developed an international cooperative program. The purpose of this program is to promote solutions to nuclear waste management issues. This consists of three parts:

1. The timely and cost-effective acquisition of data and information enhancing the assurance and confidence in the CBFO's safe operation, closure, and decommissioning of the WIPP site;
2. The timely and cost-effective sharing of WIPP data and information with other similar programs; and
3. Vigorous, timely, and cost-effective international outreach promoting (a) the recognition of the CBFO as an international leader, peer, broker, source, and resource in radioactive waste management and disposal, and (b) Carlsbad/WIPP-based multi-national collaborations and partnerships.

Cooperative activities will include joint experiments, personnel exchanges, technical exchanges, and international organizations` workshops and meetings.

In some areas of broad international interest, the CBFO has developed a leading expertise through its 25-year WIPP repository and TRU waste characterization activities. In addition to participating in relevant and beneficial experiments, the CBFO will provide the international community convenient access to this information by sponsoring and hosting symposia and workshops on relevant topics and by participation in international waste management organizations and topical meetings. This paper

includes an update on the progress and achievements of CBFO in developing international collaborative efforts.

INTRODUCTION

The CBFO administers and operates the WIPP site, which hosts a deep geologic repository for safe disposal of U.S. defense-related TRU waste and is located 42 kilometers (km) east of Carlsbad, New Mexico. CBFO also manages the National Transuranic Waste Program (NTP), which oversees TRU waste management from generation to disposal. The WIPP began receiving waste in March 1999.

The CBFO's main programmatic responsibilities during the disposal phase are to operate a safe and efficient TRU waste repository at the WIPP, to operate an effective system for management of TRU waste from generation to disposal, and to comply with applicable laws, regulations, and permits. This responsibility requires maintenance and upgrades to the current technologies for TRU waste operations, monitoring, and transportation. This responsibility also requires the maintenance of scientific capabilities for evaluating the performance of the WIPP repository. This includes supporting probabilistic performance assessments with credible evidence of the nature and consequences of events and processes that may occur in the repository and the surrounding geological setting during the 10,000-year regulatory period. The CBFO firmly believes that international cooperative efforts will assist in the maintenance and advancement of the technological and scientific basis for the WIPP.

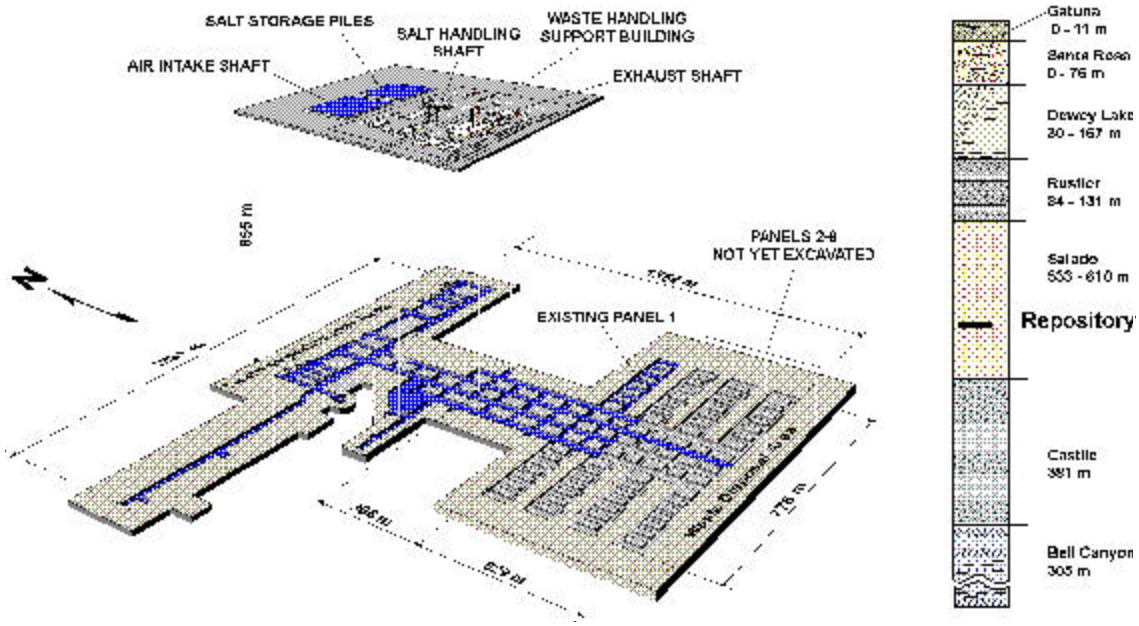

Fig. 1. Schematic illustration of the WIPP repository and the geologic stratigraphy at the site.

Located within the WIPP site's 42-km^2 set-aside area (Figure 1) are surface and subsurface facilities designed to facilitate the safe handling and disposal of TRU waste. More than one-tenth of the underground waste disposal area has already been mined in a bedded salt formation at a depth of 650 meters (m). Approximately 176,000 m^3 of TRU waste containing about 12,000 kilograms of plutonium and other actinides will be emplaced in disposal rooms 4 m high, 10 m wide, and 91 m long. Magnesium oxide (MgO) backfill will be emplaced with the waste to control the actinide solubility and mobility in the disposal areas. Properties of the repository horizon have been investigated in an underground test facility excavated north of the waste disposal area, in which seals, rock mechanics, hydrology, and simulated waste emplacement tests were conducted. Geologic and hydrologic characterizations of strata on the site have been conducted by surface-based boreholes and observations from the existing excavation.

In some areas of broad international interest, the CBFO has developed a leading expertise through its 25-year WIPP repository and TRU waste characterization activities. In addition to participating in relevant and beneficial experiments, the CBFO will provide the international community convenient access to this information by sponsoring and hosting symposia and workshops on relevant topics and by participation in international waste management organizations and topical meetings.

The bases for the CBFO's interest in and commitment to international collaborations and technical exchanges were initially outlined in the October 1, 1997, "Carlsbad Area Office International Research and Development Plan" (DOE/CBFO 97-1266, Rev. 0) and read:

> "The DOE will participate in international collaborative studies and experiments where such interactions (1) provide increased assurance of WIPP facility safety and reliability, (2) advance the scientific expertise or data collection in technical disciplines important to WIPP, (3) provide cost savings, or (4) expedite the acquisition of necessary scientific information."

The CBFO has agreed to exchange scientific information with eight foreign radioactive waste management organizations, and three more national radioactive waste management and disposal organizations have expressed interest in similar agreements for technical exchanges with the CBFO. These activities result in the cost-effective acquisition of scientific information in support of increased WIPP facility operational and post-closure assurance and reliability. It also demonstrates the CBFO's intent and resolve to honor international commitments and obligations.

INTERNATIONAL PROGRAM

The three main CBFO International Program objectives are:

1. The timely and cost-effective acquisition of data and information enhancing the assurance and confidence in the CBFO's safe operation, closure, and decommissioning of the WIPP site;
2. The timely and cost-effective sharing of WIPP data and information with other similar programs; and

3. Vigorous, timely, and cost-effective international outreach promoting (a) the recognition of the CBFO as an international leader, peer, broker, source, and resource in radioactive waste management and disposal, and (b) Carlsbad/WIPP-based multi-national collaborations and partnerships.

There are two main strategies designed to achieve the International Program objectives:

1. Identify and pursue foreign-based collaborations and partnerships with other radioactive waste management organization that may support (a) the recertifications of WIPP, (b) enhanced operational safety of the National TRU Program and WIPP, and (c) reduction of program costs; and
2. Identify and pursue USA-based collaborations and partnerships with other radioactive waste management organization that may support (a) the recertifications of WIPP, (b) enhanced operational safety of the National TRU Program and WIPP, and (c) reduction of program costs.

Foreign-based Collaborations and Partnerships

The CBFO has engaged in eight foreign-based collaborations and partnerships with mature radioactive waste management organizations in Canada, Germany (3), Japan, Spain, Sweden, and Switzerland. These collaborations and partnerships are based on the CBFO's monitoring and evaluation of foreign-based radioactive waste management programs and are projected to continue to add value to the International Programs. For example, the CBFO is currently engaged in multi-year collaborations with nuclear waste management organizations in Sweden and Switzerland. Also the CBFO is planning on increasing collaborations with waste management organizations in Germany, in particular.

A logical element of these collaborations is topical meetings and/or workshops. For example, the CBFO has held and/or co-sponsored several topical meetings, including two international workshops in Carlsbad on backfill in 1998 and GEOTRAP IV in 1999. Past topical meetings and workshops have been very conducive to focused and in-depth information exchanges and to the fostering of lines of communication for future technical exchanges and cooperation. They have also expanded the CBFO's visibility and international network of contacts, and enhanced the CBFO's credibility and standing in the international radioactive waste management community.

The CBFO will sponsor, either singularly or jointly with other organizations, two topical meetings/workshops per year. Whenever appropriate and concurred by the co-sponsor, organizations from other countries will be invited. This initiative/activity and approach will increase the visibility of the CBFO and allow it to share its state-of-the-art knowledge with other organizations as well as obtain current information on issues faced by, and needs of, other radioactive waste management organizations. The logical evolution of such topical meetings/workshops is the development of joint research activities.

Several additional nations have radioactive waste management programs that may contain, provide, or share data and information of potential value to the above-summarized main objectives of the International Programs. Currently, based largely on expressed external interest in the CBFO's programs and operations, radioactive waste management organizations in France, Hungary, Finland, the United Kingdom, Republic of China (Taiwan), Republic of Korea (South Korea), and Argentina are the main potential near-term possibilities for additional collaborations and partnerships. The CBFO's current goal is to establish relationships/dialogues with an average of at least one additional new national organization per year through FY04. It should be noted that these collaborations and partnerships include both foreign and USA-based activities.

USA-based Collaborations and Partnerships

Current USA-based collaborations and partnerships with foreign radioactive waste management organizations include hydrological and chemical laboratory tests, analyses, and modeling, which are principally conducted in Albuquerque, New Mexico, by SNL. A primary goal of future USA-based collaborations and partnerships is, whenever possible, to focus new activities in Carlsbad or at the WIPP site. Four main conditions encumbering increased Carlsbad/WIPP-based activities are:

1. The limited number of nations currently pursuing rock salt as a primary geologic medium for deep geological disposal of long-lived radioactive waste;
2. The limited global knowledge about the experience/knowledge vested in the WIPP-project participants;
3. The limited global knowledge about the CBFO's pending activities; and
4. The limited availability of resources, equipment, and facilities to conduct state-of-the-art earth sciences experiments in Carlsbad and at the WIPP site.

Crystalline rocks are currently the main geological media considered by other national programs for deep geological disposal of long-lived wastes. Another geological medium gaining international interest is clay. However, among the approximately 41 nations with radioactive waste management programs, 22 of these nations may have adequate rock salt formations for a geological repository. There clearly is an abundance of rock salt in many of the nations currently considering and/or actively pursuing deep geological repository programs. Consequently, in order to attract interest and participation in Carlsbad/WIPP-based collaborations, it is important that:

- The excellent long-term containment and isolation characteristics of rock salt are better understood and appreciated around the world;
- The CBFO's scientific and operational programs are better understood and appreciated throughout the world; and
- The resources, equipment, and facilities in Carlsbad and at the WIPP site are expanded.

CBFO`s first step in addressing these challenges has been the development of a concise document outlining the CBFO's future plans, including the resources, equipment, and facilities available in Carlsbad and at the WIPP site. This document is called the "Prospectus on Waste Management and

Repository Development Collaborations with the U. S. Department of Energy Carlsbad Area Office". The Prospectus lists select important future CBFO activities of potential interest to the international radioactive waste management community. The Prospectus contains concise information on the type, schedule and expected outcomes of the tests, model developments, and safety/performance assessment activities planned by the CBFO to support the recertification of WIPP. It also contains information on planned experiments designed to reduce (a) the conservatism in the current baseline design and (b) construction and operational complexities. The Prospectus has been distributed to radioactive waste management organizations in nations with potentially adequate rock salt deposits, ongoing repository siting efforts, and/or ongoing radioactive waste R&D programs. This document will serve to enhance the CBFO as a leading global broker of, and source and resource for, radioactive waste management and disposal services.

International Outreach

International outreach is the main key to successfully accomplish the D&R mission, objectives, and goals discussed above. Whereas the identification of potential foreign-based collaborations and partnerships are well advanced, Carlsbad/WIPP-based collaborations and partnerships require additional efforts and attention at appropriate conferences, symposia, topical meetings, and workshops.

In addition to attending domestic and international meetings, the CBFO believes that it is important to maintain current, and pursue new, opportunities for collaborations with or under the umbrella of international radioactive waste management organizations. International organizations deemed to be of particular interest to the successful accomplishment of the CBFO mission are the Commission for European Communities (CEC), the International Atomic Energy Agency (IAEA), United Nations Educational, Scientific, and Cultural Organization (UNESCO), the Organization for Economic Co-operation and Development/Nuclear Energy Agency (OECD/NEA), and the International Commission on Radiological Protection (ICRP). Collaborations with these organizations will provide both access to state-of-the-art information and enhance recognition of the CBFO as an international radioactive waste management leader, peer, broker, source, and resource. Collaborations have included CBFO membership in the OECD/NEA's Radioactive Waste Management Committee (RWMC) and, in prior years, the "Performance Assessment Advisory Group" (PAAG) and the "Site Evaluation and Design of Experiments" (SEDE) Group. The PAAG and SEDE have now been combined into the "Integrated Group for the Safety Case" (IGSC). In addition, CBFO is participating in the CEC's "Cluster Project", which has the mission of developing an international guidance document for the development, design, construction and implementation of deep geological disposal sites and underground research laboratories. The CBFO is also involved in the IAEA`s International Repository Development Project (IRDP), which is an IAEA initiative to foster collaborative projects in underground laboratories and repositories. Since WIPP is the only deep-geological disposal site for long-lived radioactive waste that is operating in the world today, it is appropriate and necessary for CBFO to be a participant in both the Cluster Project and IRDP.

One new Carlsbad-based concept to be promoted and pursued is the establishment of the "Salt Club". Membership in the "Salt Club" will be open to representatives from any international or national organization interested in staying abreast on the latest R&D and near-term plans for deep geological disposal of long-lived wastes in rock salt. The CBFO is working with other national waste management organizations and the OECD/NEA to establish the "Salt Club".

The CBFO may also sponsor scholarships/internships allowing students and scientists to work for a limited time on one or more of the CBFO's domestic R&D initiatives/activities. These scholarships/internships will foster greater understanding of the CBFO's mission and capabilities and aid in the sharing of relevant data.

SUMMARY AND CONCLUSIONS

The mission, vision, objectives, goals, strategies, approaches, initiatives, and activities described above comprise the framework for how the CBFO will pursue international collaborations and partnerships. The vigorous implementation of the initiatives and activities defined in this paper will maintain and enhance the DOE's, the CBFO's, and the WIPP project's visibility and credibility in the international radioactive waste management community. It will also provide cost-effective access to state-of-the-art data supporting the recertification of WIPP.

Further Reading on WIPP

Sandia National Laboratories for the U.S. DOE (Department of Energy). 1988. In-Situ Testing at the Waste Isolation Pilot Plant. SAND87-2382. Carlsbad, NM: USDOE.

National Academy of Sciences' Committee on the Waste Isolation Pilot Plant. 1996. The Waste Isolation Pilot Plant: A Potential Solution for the Disposal of Transuranic Waste. Washington, D.C.: National Academy Press.

Organization for Economic Co-operation and Development and the International Atomic Energy Agency. 1997. OECD/NEA - IAEA Joint International Review of Waste Isolation Pilot Plant 1996 Performance Assessment.

U.S. DOE (Department of Energy). 1997. Carlsbad Area Office Disposal Phase Experimental Program Plan. DOE/CBFO 97-1223, Rev. 0. Carlsbad, NM: USDOE.

U.S. DOE (Department of Energy). 1997. Carlsbad Area Office International Research and Development Plan. DOE/CBFO 97-1266, Rev. 0. Carlsbad, NM: USDOE.

U.S. DOE (Department of Energy). 2000. Prospectus on Waste Management and Repository Collaborations with the U.S. Department of Energy Carlsbad Area Office. Carlsbad, NM: USDOE.