Summarizing Ten Years Operating the Waste Isolation Pilot Plant - 9501

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ABSTRACT

Ten years ago this month, the Waste Isolation Pilot Plant (WIPP) received the first shipment of Transuranic (TRU) waste for permanent isolation from the bioshpere. Twenty years of planning, site characterization studies, licensing and permitting went into that first shipment. Now, after ten operating years, WIPP has demonstrated that deep geologic disposal of long-lived radioactive waste is not only feasible, it has also shown that it can be accomplished safely and efficiently.

This paper presents the lessons learned from ten years of operations. It describes the issues of keeping the pipeline full, so that disposal operations progress smoothly. Balancing the various generator site's waste removal priorities (risk reduction) with characterization and transportation resources requires constant communication between WIPP and the Department of Energy (DOE) TRU waste complex. The paper describes the changes that had to be made to authorize Remote Handled (RH) TRU waste operations, and the difficulty in balancing CH and RH waste receipt rates to avoid losing disposal capacity.

As a licensed and permitted facility, all WIPP operations are in a constant state of oversight. This oversight is spread across numerous organizations and effectively results in competition. The WIPP project is one of the most scrutinized operations in the DOE and substantial resources are needed to satisfy the information requirements resulting from the oversight.

Finally, the paper looks to the next ten years of WIPP operations. With a freshly re-permitted and re-licensed regulatory regime, and with the easily characterized waste streams already emplaced, the goal will be to keep the pipeline filled. New and more difficult waste streams will make the road to WIPP disposal more challenging.

INTRODUCTION

Thirty years ago, Congress passed the "National Security and Military Applications of Nuclear Energy Authorization Act" in 1979. That Act authorized DOE to construct the Waste Isolation Pilot Plant and to seek New Mexico endorsement to operate a geologic repository for waste generated for defense purposes. One of Congress' primary intentions behind the Act was to firmly separate weapons production waste and other related radioactive waste from the Nation's defense programs from power production waste disposal in the US.

Because this paper intentionally includes an historical perspective, Table 1 is included to allow the reader to review the major events leading up to WIPP's operating phase. For brevity, there are many important events left out of the table, such as President Jimmy Carter canceling the 1979 authorization of WIPP by executive order, and President Ronald Reagan dismissing that executive order within months of his new administration. For a fascinating tale of the politics over the years leading up to opening WIPP, the reader is encouraged to read Chuck McCutcheon's book, "*Nuclear Reactions, The Politics of Opening a Radioactive Waste Disposal Site*"[1].

Within a few months of the start of disposal operations, DOE began increasing operational safety and efficiency by focusing on decreasing vulnerability by reducing, eliminating, or optimizing requirements that did not enhance safety or add value. When issued in October 1999, the initial Hazardous Waste Facility Permit (HWFP) paved the way for disposal of mixed waste at WIPP, however, it contained

several provisions that DOE considered unnecessary and overly burdensom. As part of the draft permit process, DOE raised concerns, but was unable to convince critics that these provisions should be retracted. Thus almost immediately after operations were authorized, DOE began proposing changes, according to the change process allowed by each regulatory agency with authority over the facility. This sometimes tortuous road to making changes in WIPP's regulatory authorization dominates the story of the first ten years of WIPP's operation.

1957	National Academy of Science recommends geologic disposal of radioactive waste in salt
1968	Experiments begin in existing salt mine at Lyons, Kansas
1972	Lyons site rejected (both politically and technically). Carlsbad city leaders learn of AEC problems at Lyons, and offer nearby potash mines
1975	Initial WIPP site selected (minor changes made as site specific characterization proceeds)
1979	Public Law 96-164 authorizes WIPP for Defense TRU waste - separates weapons waste disposal from power production
1980	FEIS Published; Record of Decision only includes defense-related TRU waste
1981	Site and design validation work begins
1983	Site validation, full-facility construction starts
1985	EPA promulgates 40 CFR 191, establishing long-term repository performance standards
1987	DOE applies RCRA rules to WIPP
1988	WIPP technically ready – but politics steps in……
1989	No migration variance petition filed with EPA
1990	EPA grants conditional NMVP
1991	DOE again declares WIPP readiness, and obtains WIPP Site Administrative Land Withdrawal; The State of New Mexico files for preliminary injunction
1992	WIPP Land Withdrawal Act (LWA); transfers land from DOI to DOE; established EPA as repository regulator, but reaffirms New Mexico authority over mixed (hazardous) waste
1993	In situ test plans with radioactive waste at WIPP site issued and then abandoned (tests to be performed at Los Alamos National Laboratory)
1995	DOE submits draft compliance application to EPA, and draft RCRA permit to NMED
1996	EPA promulgates compliance criteria as 40CFR194; Amendment to WIPP LWA removes RCRA land disposal restrictions; DOE submits Compliance Certification Application to EPA
1997	WIPP Disposal Phase Final Supplemental EIS issued
1998	EPA certifies that WIPP complies with 40CFR191 and NMED issues draft RCRA Permit
1998	DOE announces intent to dispose of non-mixed waste
1998	NM Attorney General (now Senator) Tom Udall & others file suit over EPA certification
1998	NMED protests but later confirms initial LANL waste is non-mixed
1999	WIPP receives first non-mixed waste from LANL, RFETS and INL

FILLING THE PIPELINE

The first shipment to WIPP came from the largest DOE clean-up site in New Mexico (Los Alamos National Laboratory – LANL). It was met by thundrous cheers and applause from almost 500 local Carlsbad residents and WIPP workers at 4:00 am on a chilly March 26, 1999 morning. To some, it represented their entire career in making it happen. DOE had made a decision to begin shipments of non-mixed waste before the Resource Conservation and Recovery Act (RCRA) permit was issued by the New Mexico Environment Department (NMED). This decision was met with severe criticism by WIPP critics, who claimed that DOE had promised it would not dispose of waste in WIPP outside the umbrella of a permit issued by the State of New Mexico.

When the permit (HWFP) was eventually issued by NMED later in 1999, it contained provision IV.b.2.b: "*…Permitees shall not dispose TRU mixed waste in any underground Hazardous Waste Disposal Unit if*

the underground HWDU contains non-mixed TRU waste not characterized in accordance with the requirements of the WAP" (waste analysis plan in the permit). This unexpected requirement essentially precluded WIPP from emplacing waste characterized according to the permit requirements alongside non-mixed waste disposed of before the permit, which was not characterized according to the new requirements. While disagreeing on the need for such separation, DOE immediately modified its mining plans to accelerate the completion and readiness of Panel 2 for mixed waste disposal by July 2000. Subsequent negotiations between NMED and DOE changed this requirement to apply only to waste received after the permit became effective, thereby ameliorating the urgency to make Panel 2 ready for disposal operations.

There were other surprises in the permit that required DOE to make significant changes in the way sites characterized their waste streams before disposal operations could resume[2]. DOE immediately suspended shipments of non-mixed waste to WIPP when the permit was issued in October 1999. It required about 6 months before generator sites were able to modify their procedures to meet the new WAP requirements. The first mixed waste shipments, characterized according to the permit WAP, began in September 2000.

While the requirements of the RCRA permit had a significant impact on characterization and disposal of waste, the transportation between the generator sites and WIPP was largely not affected by its issuance. When WIPP began shipment of non-mixed TRU waste, there were only 15 TRUPACT-II shipping containers in its fleet, which was only sufficient to efficiently make 4-5 shipments per week from sites in the Rocky Mountain region. DOE therefore accelerated its plans to procure additional TRUPACT-IIs and additional transportation services from fleet operators. By 2005, the TRUPACT-II fleet grew to 85, with an additional 14 HalfPACT packages, which is a shorter and lighter version of the TRUPACT-II. The Land Withdrawal Act[3] requires that all shipments to WIPP be in type B packages, certified by the NRC. WIPP now operates the largest Type B shipping fleet in the world today.

In 2001, the larger sites with significant quantities of TRU wastes were using existing or new fixed facilities to characterize (determine chemical, radiological, and physical attributes), treat, certify, and load TRU waste. However, several needed additional capabilities to meet closure schedules and agreements. In addition, the sites with small quantities of TRU waste (so called Small Quantity Sites – SQSs) generally lack the fixed-facilities, and it would be prohibitively expensive to build fixed facilities at each of these small sites. Also, transportation requirements would still have to be met if the SQS waste was to be shipped to a larger site for characterization. This led DOE to propose the Centralized Characterization Project (CCP) to perform TRU waste characterization, certification, and transportation[4].

CCP assures compliance with WIPP requirements by providing standardized processes including, communication systems, process control systems, interface plans, training, records, waste characterization and certification procedures, and quality assurance (QA) programs. The quality and efficiency of characterization and certification operations across the complex were improved by centralization because a single team of qualified personnel uses standardized processes. CCP has been deployed to eight sites since its inception.

Shipments to WIPP have now become routine. Over 7000 shipments have been received and waste emplaced in WIPP. Figure 1 shows a year-by-year tally of the number of shipments from each generator site. The SQS numbers, shown as a single category in Figure 1, combine Argonne National Laboratory near Chicago, the Nevada Test Site and Lawrence Livermore National Lab in California. Note that shipments from Rocky Flats ended in 2005, with the succesful completion of that major environmental cleanup effort. Most shipments today come from the Idaho National Laboratory (INL), where the Advanced Mixed Waste Treatment Facility (AMWTF) is repackaging and supercompacting retrievable waste and the Accelerated Retrieval Project is exhuming targeted TRU waste in a CERCLA removal action. Both of these efforts are supplemented by CCP efforts.

Achieving the highly efficient shipping realized by the AMWTF required significant regulatory interaction. Although supercompaction simply increases the density of the waste (no waste form or composition change), both EPA and NMED required DOE to demonstrate that this more dense waste would not affect compliance with the permit or long-term repository performance.

DOE continues to inspect all shipments at time of loading according to the most stringent requirements of the Commercial Vehicle Safety Alliance (CVSA Level VI). Over the past 10 years, WIPP shipments have logged over 16 million miles (both loaded and out-bound). While there have been several traffic incidents involving WIPP shipments (both loaded and unloaded), only two accidents have been attributable (driver citation) to WIPP drivers. The majority have been minor "fender benders", however, a few have required an exchange of WIPP equipment to complete the shipment. There has been only one instance where shipping packages were damaged, when an out-bound (unloaded) tractor and trailer on the way to INL tipped over, and three empty TRUPACT-II packages tumbled to rest along Interstate 15 just south of Blackfoot, Idaho. All three were leak tested after the accident, indicating that they would have maintained containment had they been loaded.

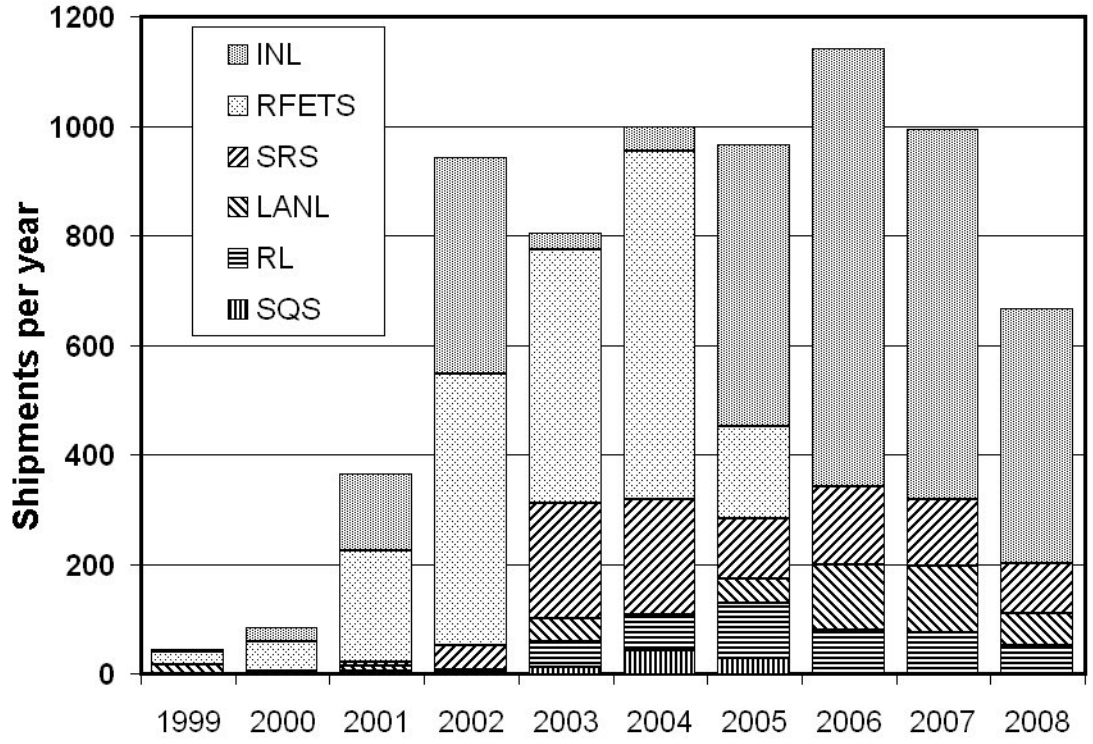

Fig. 1 Shipments to WIPP by generator site over the first ten years

ROUTINE REPOSITORY OPERATIONS

As the National Academy of Sciences recognized in 1957, the primary reason for permanently isolating long-lived radioactive waste in a deep salt formation is creep closure at lithostatic pressures. After an opening is no longer intentionally kept open, salt slowly closes, healing fractures, and encapsulating the waste in re-consolidated rock. This positive feature also presents an operational challenge. Mining of the first of ten disposal panels at WIPP was completed in 1988, when DOE initially declared it ready for disposal operations. However, the legislative and regulatory groundwork to authorize WIPP's first waste receipt took an additional eleven years. During that time, significant maintenance was need to maintain that first disposal panel in a safe state of readiness. Extensive roof bolting, along with comprehensive

monitoring of the ground conditions, allowed DOE to preserve panel 1 for waste disposal. However, a prudent safety decision was made to abandon portions of rooms 4-6 without emplacing any waste.

As shipments to WIPP ramped up, the "just-in-time" mining of disposal panels 2-5 was accomplished with much less issue than panel 1. Each disposal panel requires mining and removal of about 150,000 tons of salt. After mining, each disposal panel is outfited with lighting, communications, and monitoring capabilities, with total disposal panel development duration of about 2 years. As disposal rooms are filled in each panel, they are removed from the ventilation circuit in that panel simply by lowering a brattice cloth "curtain" on the inlet and outlet sides of the room. Each of the seven rooms in a disposal panel can contain about 10,000 drum equivalents of waste (disposal panels are limited by the permit to less than 18,000 cubic meters).

After panel 1 was filled, DOE installed two 4-meter thick solid concrete block walls on the inlet and outlet sides. This was required by the provisions of the HWFP. This requirement derived from an extraordinarily conservative engineering analysis of the effect of a hypothetical explosion due to hypothetical worst-case flammable gas generation in a closed panel. In its Compliance Certification Application (CCA) to EPA in 1996, DOE presented a range of options for sealing each disposal panel when filled, each considered compliant with the disposal requirements for WIPP. In its approval of the CCA, EPA designated that DOE must install the most robust option (called Option D), which also included an "explosion wall", to protect the panel seal from the effects of the hypothetical explosion during the life of the facility. NMED followed EPA's lead when it issued the HWFP, which also required Option D. DOE subsequently submitted requests to both NMED and EPA to delay the construction of the robust Option D panel seal, but NMED only allowed the delay contingent on installation of the explosion wall. While Panel 2 was being filled, DOE proposed to monitor flammable gas concentrations behind the ventilation barriers in closed rooms to demonstrate that significant concentrations of flammable gases were not building up. This proposal was eventually approved, but not before the HWFP time limit required DOE to install explosion walls in the inlet and outlets of Panel 2 (See Figure 2).

Beginning with Panel 3, DOE installed steel bulkheads instead of explosion walls. Concentrations of flammable gases are monitored bi-weekly in all seven rooms in Panel 3 (total of 14 locations), and in each filled room in the currently active disposal Panel 4. When Panel 4 is soon completely filled, it also will be sealed from mine ventilation with a simple steel bulkhead and flammable gas concentrations will continue to be monitored. To date, with literally thousands of flammable gas measurements made in the filled rooms of Panels 3 and 4, concentrations have been insignificant. DOE intends to seek approval to replace Option D panel seals with simple backfill barriers of run of mine salt in the coming years.

In 2003, concerns about characterization of waste bound for WIPP reached the U.S. Congressional delegation from New Mexico. Out of these concerns came Section 311 of the FY 2004 Energy and Water Developments Appropriations Act[5], which directed DOE to submit a permit modification request that limited waste confirmation to radiography or visual examination of a statistical subpopulation of waste containers and directed that disposal room performance standards should be met by monitoring for volatile organic compounds in the underground disposal rooms. This statute translates into the elimination of other waste confirmation methods such as headspace gas and solids sampling and analysis. The New Mexico delegation proposed Section 311 to be consistent with an ongoing study by the National Academy of Sciences[6], which was reviewing various aspects of the WIPP waste characterization program (at DOE's request).

For three years following the Section 311 legislation, DOE followed the RCRA process for permit modification, but was repeatedely denied, with the State basing rejection on claims of incomplete information. Eventually, DOE and NMED were able to resolve differences and a Class 3 permit modification was approved in November 2006. As an indication of the political sensitivity of what would otherwise be expected to be a routine change, the Governor of New Mexico and the State Environment Department Secretary staged a highly-visible public permit signing ceremony a week before the elections.

The Section 311 permit modification also included the elimination of a prohibition on remote handled waste disposal at WIPP (see next section). Had the Section 311 changes not been implemented, it is doubtful that RH waste disposal would be permitted yet today[7].

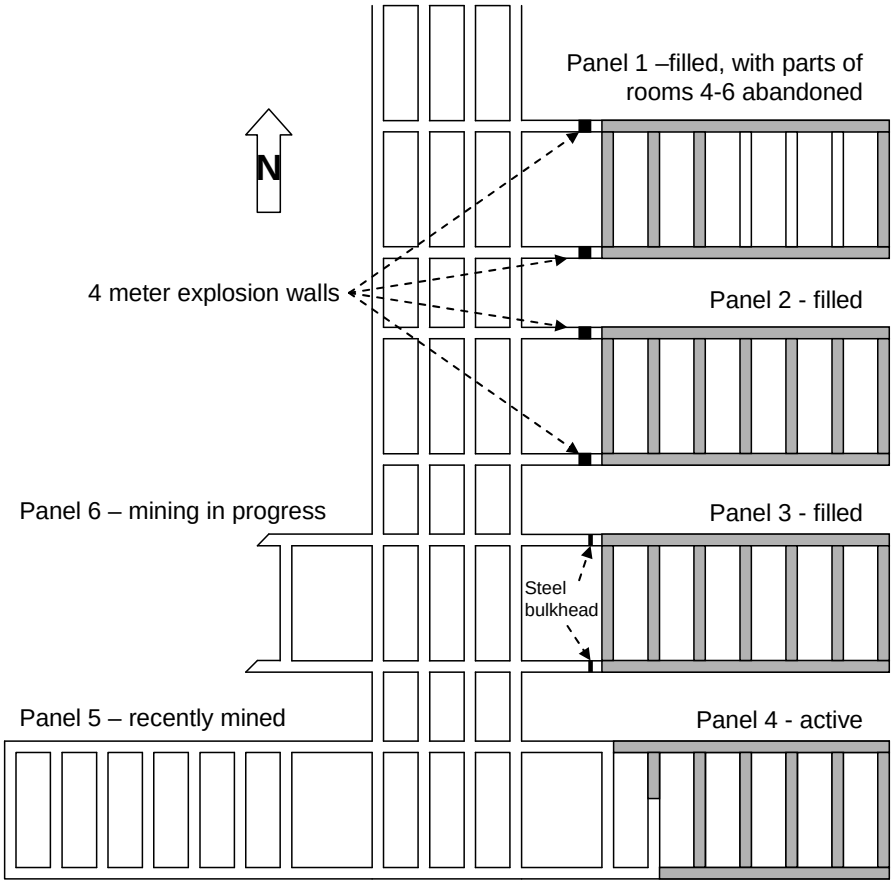

Fig. 2 Schematic layout of WIPP disposal status at the end of 2008.

To be sure, even with the successes over the first ten years, there have been mistakes made. A records check in July 2007 revealed that one of four drums overpacked in a standard waste box, and emplaced in Panel 4, contained less than a cup full of free liquid, which is prohibited by the WIPP waste acceptance criteria. This drum was mistakenly overpacked instead of another at INL that had been properly characterized. When the issue was self-identified, 36 rows of waste containers had already been placed in front of the allegedly non-complaint package. Analysis showed beyond rational doubt that leaving the drum in place presented less risk than all retrieval options. DOE also made the case that the amount of liquid was technically compliant with the permit since the drum was overpacked in a much larger standard waste box. EPA, with focus on the radiologically toxic waste constituents, raised no objection to leaving the drum underground. However the State of New Mexico, with regulatory authority over hazardous materials, ordered the drum to be retrieved and returned to INL. WIPP employees accomplished actual retrieval of the package quickly and accident-free, but at considerable risk as well as expense in lost time. The drum with prohibited liquid was subsequently repackaged and the small volume was identified as aqueous cleaning agent (soapy water). The water was absorbed during repackaging and the drum contents re-shipped to WIPP in a compliant form. In a separate instance shortly after receipt and emplacement, DOE elected to remove another drum that was arguably compliant to eliminate any possibility that the State might order it removed after other waste was emplaced in front of it.

Another operational issue facing WIPP as it continues to age is the design life of the facility. When construction finished in 1988, the 25-year design life of the structures and infrastructure seemed far off.

Twenty years later, some failures are beginning to affect routine operations. WIPP operations are exhaustively checked for readiness and frequent preventative maintenance. Examples of infrastructure wearing out include fire suppression water line break requiring extensive repair and certification, overhead crane equipment replacement, hoisting system repair, etc. While DOE will continue its aggressive program to ensure that WIPP operations are safe, the effort to repair and replace will likely increase throughout the remainder of its operational life.

One final illustrative example issue that blossomed only once operations began is the management of the salt removed from the underground. With almost a century of potash mining in the region, the area around WIPP is home to a number of potash refineries. The tails from these operations consist of salt and other residues after removal of the potassium based minerals. As much as 1 billion tons of salt sits at the surface within 20 kilometers of WIPP. In its much smaller mining operation, WIPP has brought about a total of 1 million tons to the surface (~0.1% of that from potash production in the basin). Before WIPP mining began, DOE was granted a groundwater discharge permit for stormwater runoff to be discharged to unlined salt disposal cells in the early 1980s. This discharge permit remained in effect through WIPP startup operations. However in 2002, DOE elected to modify its management of the salt brought from underground in a more environmentally protective manner. The existing salt pile was covered with geotextile liner and several feet of topsoil for vegetation growth and stabilization. A new salt management pile was constructed with a liner, and all runoff was directed by lined channels to lined storm-water evaporation ponds. Essentially WIPP has become a zero-discharge facility since beginning operations.

REMOTE HANDLED DISPOSAL

The WIPP Land Withdrawal Act of 1992 authorizes disposal of two categories of TRU waste. Contact handled (CH) waste is defined as that material exhibiting a dose rate at the surface of its packaging of less than 2 mSv/hr. It further defines remote handled waste (RH) as that material exhibiting a dose rate at the surface of its packaging greater than 2 mSv/hr. Planning for emplacing CH and RH waste differently began in the early 1970's, when DOE's plans for WIPP also included disposal of high level waste from defense spent fuel reprocessing. The dose rate from this category of waste was estimated to routinely be in the range of 10-50 Sv/hr and greater. Clearly, these dose rates required very substantial shielding. Thus, the baseline plan was to emplace such high penetrating radiation waste in the walls of the underground disposal panels, followed by insertion of a 1.5 meter thick concrete shield plug so that dose rates in the open room would be safe for workers to subsequently place waste exhibiting less penetrating radiation dose rates on the floor of disposal rooms.

When negotiations in the 1980's, held between the State of New Mexico and DOE, converged on the final waste forms that would be allowed at WIPP, the nominally highest dose rate allowed was 1 Sv/hr (there was a provision for less than 5% of the RH waste to exhibit a dose rate between 1 and 10 Sv/hr). Dose rates of waste currently permitted in WIPP are thus much lower than the baseline plan was intended to accommodate, thereby making current RH waste disposal methods overly conservative.

In 1999, the initial compliance certification by EPA and the subsequent issuance of the HWFP by NMED, both specifically prohibited disposal of RH waste. Both regulatory agencies tied their prohibition to their assessment that DOE had not adequately demonstrated that RH waste would be characterized with the same degree of certainty that was demonstrated for CH waste. It took 5 years to introduce a characterization program that convinced EPA that it would adequately meet data quality objectives. In 2004, EPA approved DOE's RH Waste Charactrization Program Implementation Plan, which formed the basis of an auditable program[8]. However, the prohibition on RH waste disposal in the HWFP remained in effect. In the end, the RH waste characterization program that EPA approved was essentially the same as that for CH waste.

One of the reasons that approval from the State of New Mexico for RH waste disposal took so long was politically driven. In 2003, WIPP critics complained that a significant fraction of the RH waste inventory that DOE projected would be disposed of in WIPP was comprised of waste in 12 tanks at the Hanford site, which they claimed contained high level waste. While this material was managed as high level waste (still is), along with the other tanks, it originated as part of the bismuth phosphate plutonium extraction process employed at Hanford before PUREX operations began. Although DOE believed it could successfully demonstrate that the material was not high level waste, its plan to treat and package it for disposal at WIPP as RH TRU waste became quite controversial. In November 2003, NMED proposed to modify the WIPP permit to limit acceptable waste to only those waste streams that were cited in a 1995 TRU waste inventory report, which did not include the bismuth phosphate tanks. This would have made changes to the projected inventory to be emplaced at WIPP almost impossible. As an alternative, DOE proposed a permit modification that specifically prohibited any TRU waste from tanks that was ever managed as HLW unless that waste stream was specifically authorized for disposal in WIPP through a Class 3 permit modification process. NMED subsequently approved a Class 2 permit modification to this effect, and introduced yet another prohibition into the permit along with the prohibition on RH waste in general.

As described in the previous section, approval for RH waste disposal in WIPP via the HWFP had to await completion of negotiations on implementation of Section 311, which finally removed the prohibition established in the original permit from 1999. The first shipment of RH waste was received from INL in January 2007. Like the first shipment of CH waste 8 years earlier, this first shipment of RH waste was also met by a cheering crowd of WIPP workers and Carlsbad citizens who gathered before the chilly dawn to celebrate the symbolic importance of its arrival.

Shipments of RH waste started out slowly (about one per week), but quickly ramped up to 3-4 shipments per week. Unfortunately, DOE has not been able to maintain RH waste receipt rate high enough to balance the rate at which the CH waste continues to fill disposal rooms. Figure 3 shows a snapshot of Panel 4 indicating both filled and abondoned RH boreholes in disposal rooms 2-5 at the end of 2008. Note that CH waste filled rooms 3-5 and room 2 was being filled at that time.

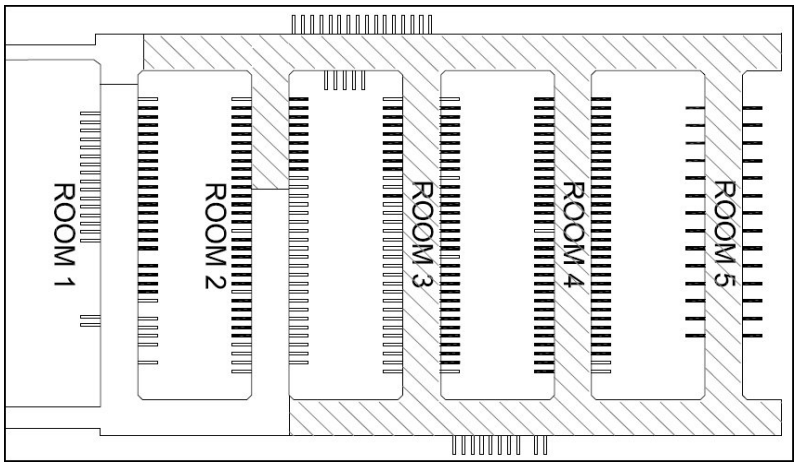

Fig. 3 Disposal status in Panel 4 at the end of 2008.

THE NEXT 10 YEARS

WIPP is now a mature program. Yet there are still many efficiencies to be gained by optimizing its regulatory envelope. In addition, there are a number of waste streams yet to be packaged that will require regulatory changes in order to qualify them for disposal in WIPP. WIPP's critics may resist these changes, claiming that they will compromise the "deal" between DOE and the stakeholders that allowed WIPP to open in the first place.

An ongoing effort, begun in 2006 to avoid repackaging materials from boxes too large to package into currently authorized payload containers, is DOE's large box program. Several elements of the large box initiative have been developed and are in various stages of regulatory authorization. The TRUPACT-III is a rectangular type B shipping package currently under review by NRC. Because the exisiting large boxes in the TRU inventory are not Type A containers (e.g., DOT-7A certification makes DOE's

authorization basis much more straightforward for waste handling operations at WIPP), a Standard Large Box (SLB-2), which is DOT-7A certified, has been developed to overpack the box inventory. DOE proposes to overpack large boxes into the SLB-2, which will then be shipped in the TRUPACT-III. This will preclude the need to build expensive waste re-packaging facilities at several sites with large box inventories. To meet the characterization requirements needed to ship large boxes, DOE has also developed large box non-destructive assay and non-destructive examination capabilities[9]. Once NRC certifies the TRUPACT-III and grants a Type B license, DOE will submit change requests to NMED (proposed as a Class 2 permit modification) and to EPA to allow waste handling and emplacement of these new shipping and payload container configurations.

Another initiative that will greatly improve the shipping and disposal of RH waste is WIPP's shielded container proposal, wherein TRU waste that would otherwise result in surface dose rates that would qualify it as RH waste, will be packaged into shielded containers[10]. DOE proposes to load 110 liter drums of what would otherwise be RH waste into specially built shielded containers with 2.5 cm of lead sandwiched between 0.4 cm layers of steel, and with 8 cm thick steel end caps. These shielded containers would then be shipped in shock absorber dunnage inside the existing licensed HalfPACT Type B shipping container. To ameliorate criticism that it is artificially "converting" RH waste into CH waste, DOE is proposing to count this material against the RH waste volume limits imposed in the WIPP Land Withdrawal Act. While waste packaged in this fashion would meet both the letter and the intent of the definition of Contact Handled, DOE recognizes the special status WIPP critics give to RH waste. The NRC is currently reviewing the license amendment for the HalfPACT for this purpose, and when approved, DOE will submit change requests to NMED (most likely a Class 2 permit modification) and to EPA to allow waste handling and emplacement of these new shipping and payload container configurations.

The 10-year anniversary of WIPP also coincides with a dual regulatory re-authorization cycle. The Land Withdrawal Act requires EPA to re-certify that WIPP meets the 40CFR Part 191 disposal standards every five years. DOE submitted the first compliance re-certification application to EPA on March 26, 2004. The second compliance re-certification application will be submitted by March 26, 2009. Also requiring periodic renewal is the HWFP under RCRA rules, which provide for a ten-year authorization. Thus, DOE will submit a renewal application to the State of New Mexico in May 2009 (see the related paper in these proceedings "*WIPP's Hazardous Waste Facility Permit Renewal Application*" by William Most). Both agencies require that WIPP not seek substantive changes to their regulatory requirements as part of these re-authorizations. Thus, these forthcoming submittals essentially propose a status quo in WIPP operations. However, DOE intends to resume seeking efficiency improvements in the requirements of both agencies via their respective change process immediately following approval of the re-authorizations by both agencies.

After 10 years, it should not be surprising that the TRU waste inventory originally planned for disposal at WIPP has been "cherry-picked". Those waste streams with few prohibited items or with clear non-controversial pedigree were chosen to fill the pipeline for disposal first. Many of the remaining waste streams will be more challenging to compliantly package, characterize and emplace in WIPP. This makes the need to streamline the regulatory requirements, with no resultant reduction in protection of human health or the environment, even more important. Those requirements that do not add protection can and should be at least minimized, if not eliminated.

There are other events external to WIPP's regulatory envelop that could change in the coming years. The 2005 Energy Policy Act, in conjuction with the authority given to DOE in the 1985 Low Level Radioactive Waste Policy Amendments Act, requires DOE to develop an Environmental Impact Statement under the National Environmental Policy Act (NEPA) on the disposition of all waste meeting the criteria established by the NRC as "Greater Than Class C" (GTCC) low level waste (LLW). This ongoing NEPA action includes disposal at WIPP as one alternative. DOE is required to subsequently

provide a report to Congress that summarizes the disposal alternatives evaluated and identifies any actions required by Congress (e.g., legislative changes) to facilitate GTCC LLW disposal.

Should the WIPP disposal alternative be recommended to Congress and accepted, the WIPP Land Withdrawal Act would have to be amended to allow non-defense waste, as well as non-TRU waste to be disposed of at WIPP. The final EIS and report to Congress are not expected until 2010. DOE must then await Congress' action prior to issuing a Record of Decision; the timing of the ROD, therefore, is uncertain.

CONCLUSIONS

Ten years after opening, WIPP has demonstrated that long-lived radioactive wastes can be safely and efficiently isolated in a deep geologic repository. Permanent isolation from the biosphere in a salt medium was recommended by the National Academy of Science in 1957 for all radioactive waste. WIPP is successfully doing just that for defense-related TRU waste. It has filled over a third of its legislated capacity. It has de-inventoried 14 sites that once managed defense-related TRU waste. No unplanned worker exposures or release of radioactivity has occurred in these ten years. Industrial safety accidents at WIPP and transporation incidents along shipping routes have occured, and will continue to occur. However, all statistical measures of the safety and reliability of the WIPP characterization, transportation and disposal system show it to be a model for the future of radioactive waste disposal around the world.

Making a “pilot” contibution, WIPP is also demonstrating that the back end of the nuclear fuel cycle can work. It has become a symbol for many nations on how to site and authorize such a controversial facility. Many hundreds of visits to WIPP from nuclear power agencies (both regulators and industry alike) from around the world (both nuclear and non-nuclear nations) have spread its reputation. WIPP participation is earnestly sought in every international forum on radioactive waste disposal to discuss lessons learned. WIPP will continue to set an international high standard as other nations establish their deep geologic disposal programs over its next ten years of operation.

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