

The WIPP Hazardous Waste Facility Permit Improvements--2007 Update

R. Kehrman, W. Most
Washington Regulatory and Environmental Services
PO Box 2078, Carlsbad, NM 88220, USA

ABSTRACT

The most significant changes to the Waste Isolation Pilot Plant Hazardous Waste Facility Permit to date were completed during the past year with the implementation of significant revisions to the Waste Analysis Plan and the authorization to dispose of remote-handled transuranic waste. The modified Permit removes the requirement for reporting headspace gas sampling and analysis results for every container of transuranic mixed waste and provides for the use of radiography and visual examination to confirm a statistically representative subpopulation of the waste stream in each waste shipment as well as other changes that streamline the analytical data management process. Implementation began on November 17, 2006.

INTRODUCTION

On October 16, 2006, New Mexico Governor Bill Richardson and New Mexico Environment Department (NMED) Environment Secretary Ron Curry jointly approved modifications to the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), successfully concluding an administrative process that began in June 2002 and resulted in significant changes to the process for characterizing and accepting transuranic (TRU) waste and allows the Department of Energy (DOE) to proceed with the disposal of remote-handled (RH) TRU waste. In addition to allowing RH TRU waste disposal the modified permit that went into effect on November 16, 2006:

- Reduced waste characterization burden on generators,
- Implemented a waste confirmation process mandated by federal law,
- Improved in-repository monitoring for air emissions,
- Implemented expanded notification to stakeholders,
- Expanded on-site storage capacity, and
- Expanded disposal capacity in each repository panel.

ADMINISTRATIVE HISTORY OF THE CHANGES

The administrative history for these changes goes back to the WIPP Authorization Act of 1979 [1] wherein Congress authorized DOE to dispose of defense generated TRU waste in the WIPP. The supporting Environmental Impact Statement, published in 1980 described both contact-handled (CH) and RH TRU waste disposal. Congress reiterated the RH TRU portion of WIPP's mission in the WIPP Land Withdrawal Act of 1992.

The DOE submitted applications to regulatory agencies that included RH TRU waste in 1996; however, both the New Mexico Environment Department and the Environmental Protection Agency withheld approval for RH TRU waste until additional information related to waste characterization was provided.

Specifically, both agencies needed assurance that the waste characterization processes proposed by the DOE for CH TRU waste would be adequate for RH TRU waste such that reliable information could be collected and reported. DOE submitted information to the Environmental Protection Agency (EPA) and the NMED in June 2002 to address each agency's concerns about RH TRU waste.

In 2003 [2] and again in 2004 [3], Congress directed the DOE to further change the process used to characterize waste for WIPP (these statutes are referred to as Section 311 in this paper). Using nearly identical language in both years, Congress stated:

(a) The Secretary of Energy is directed to file a permit modification to the Waste Analysis Plan (WAP) and associated provisions contained in the Hazardous Waste Facility Permit for the Waste Isolation Pilot Plant (WIPP). For purposes of determining compliance of the modifications to the WAP with the hazardous waste analysis requirements of the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.), or other applicable laws waste confirmation for all waste received for storage and disposal shall be limited to: (1) confirmation that the waste contains no ignitable, corrosive, or reactive waste through the use of either radiography or visual examination of a statistically representative subpopulation of the waste; and (2) review of the Waste Stream Profile Form to verify that the waste contains no ignitable, corrosive, or reactive waste and that assigned Environmental Protection Agency hazardous waste numbers are allowed for storage and disposal by the WIPP Hazardous Waste Facility Permit. (b) Compliance with the disposal room performance standards of the WAP hereafter shall be demonstrated exclusively by monitoring airborne volatile organic compounds in underground disposal rooms in which waste has been emplaced until panel closure.

In response to these statutes, the DOE submitted the required permit modification request (PMR) to the NMED in January 2004. This request proposed changes to the HWFP that were consistent with the:

- Requirements of Sections 311 which directs the Permittees to confirm that waste contains no ignitable, corrosive, or reactive waste using radiography or visual examination (VE) and that the Permittees use monitoring of closed disposal rooms to determine compliance with environmental performance standards;
- Overall waste analysis requirements of the permit because the proposal continued to require the collection of needed chemical and physical information for each waste stream and that the Permittees verify each shipment of waste;
- Administrative requirements because the proposal did not change the sampling and analysis methods established in the HWFP through the administrative process;

NMED issued a notice of deficiency (NOD) for the Section 311 PMR on December 30, 2004. In response to the NOD, the NMED and the DOE held a series of informal meetings between January and March, 2005. The purpose of the meetings was to discuss both the RH TRU PMR and the Section 311 PMR. On March 29, 2005, NMED issued a second NOD for the RH PMR, which directed the Permittees to develop and submit a consolidated permit modification request that included both RH TRU waste and Section 311. The Permittees submitted the consolidated PMR on April 29, 2005. The Permittees reissued the PMR on June 9, 2005 to correct layout and typographical errors. NMED issued an NOD on the consolidate PMR on September 1, 2005. The Permittees responded with additional revisions on September 22, 2005.

On November 25, 2005, NMED developed and issued a draft Permit based on the June 9, 2005, and September 22, 2005, consolidated PMR. The draft Permit proposed to authorize the DOE

- To manage and store RH TRU waste;
- To implement a repository monitoring program in lieu of using headspace gas sampling and analysis to determine compliance with repository environmental performance standards; and

- To implement specified changes to the Waste Analysis Plan (WAP), including the confirmation of waste in each waste stream shipment that is received at WIPP for storage and disposal.

Subsequent to issuance and prior to conducting the public hearing, the NMED encouraged stakeholders who opposed the draft permit and the DOE to negotiate those areas of disagreement. The DOE entered into negotiations with stakeholders and the NMED beginning in March 2006, resulting in a stipulation, that with certain exceptions, the DOE, the NMED, and the stakeholders endorsed a modified version of the NMED's draft permit.

The negotiations successfully removed multiple issues from the public hearing and facilitated a shortened public hearing with regard to the technical aspects.

The hearing officer deliberated on the information provided at the hearing and, on September 13, 2006, issued a recommendation that the Secretary of the NMED accept the draft permit with the stipulated modifications negotiated by the parties.

SPECIFIC CHANGES

Remote-Handled TRU Waste

The DOE has successfully demonstrated that RH TRU waste can be characterized to meet the requirements of both the NMED and the EPA. Characterization will be principally accomplished through a compilation and review of acceptable knowledge. This is an acceptable method since nearly 95% by volume of RH TRU waste has yet to be packaged into WIPP acceptable containers. Packaging will provide ample opportunity to assure that there is sufficient chemical and physical information about the waste to demonstrate that it is acceptable for disposal at WIPP.

All RH TRU waste packages will have to have either documentation that the waste was visually examined during packaging or that post packaging radiography was performed.

In addition, the DOE convinced the NMED that the waste can be safely managed at the WIPP facility. This includes implementation of new contingency measures, training programs, equipment inspections, and processes for use of the hot cell for packaging RH TRU waste that arrives in 55-gallon drums.

The modified permit defines two processes for RH TRU waste handling at WIPP as depicted in Figure 1. One uses the RH TRU 72 B shipping cask to handle canisterized waste. In this case, the canister remains in the shipping cask or in the facility cask at all times. The other process uses the CNS 10-160 B cask to ship waste in 55-gallon drums. In this case, the drums must be canisterized in the hot cell prior to transfer into the underground for disposal.

The DOE has implemented the RH TRU waste program at WIPP by successfully completing both the contractor and DOE operational readiness reviews. Simultaneously with this, the DOE is preparing RH TRU waste at Idaho to ship to WIPP. These preparations include implementing the RH TRU waste characterization program and having the program elements inspected by and approved by the EPA and the NMED.

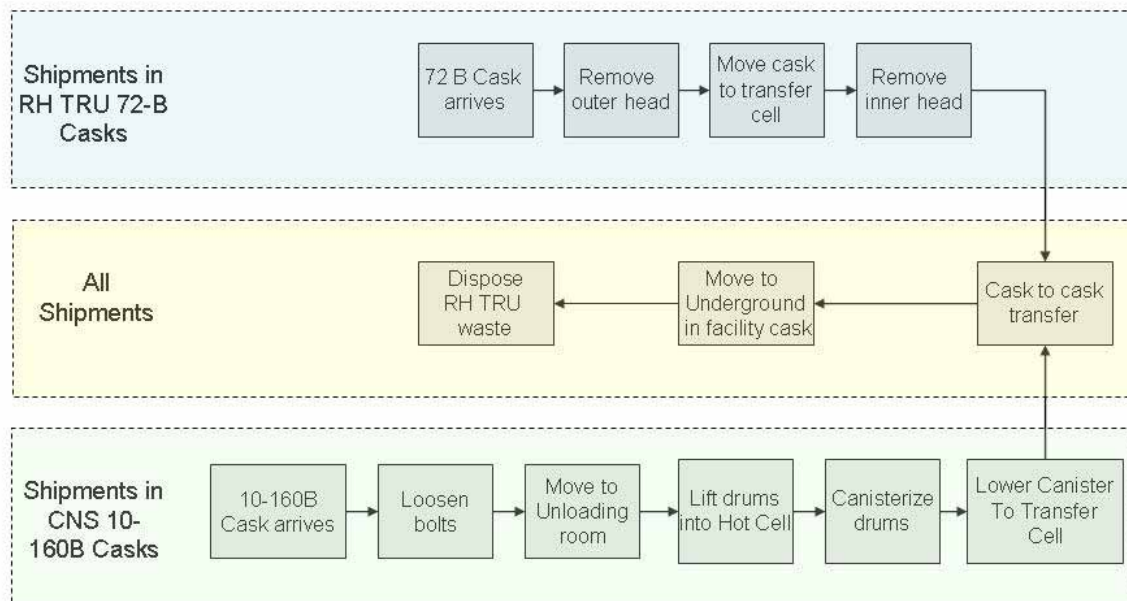


Fig. 1. Alternative RH TRU waste receipt and handling processes at the Waste Isolation Pilot Plant.

Reductions in Waste Characterization

Prior to the issuance of the modified permit, the process for preparing waste for shipment to WIPP was complex and data intensive. Previously, the following steps were needed in order to prepare a waste stream profile form for approval of a waste stream by WIPP (steps were not necessarily performed in the order listed):

- Step 1.** Compile acceptable knowledge information regarding the materials and processes that were used in generating the waste stream and any previously analytical results. Acceptable knowledge criteria are detailed in the HWFP.
- Step 2.** Perform radiography or visual examination to determine the physical form of the waste and to identify prohibited items, such as aerosol cans or liquids. Radiography or visual examination was also used to confirm the accuracy of Acceptable Knowledge.
- Step 3.** Perform headspace gas sampling of each container to determine the concentration and type of hazardous gases in the container. Headspace gas analysis was also used to confirm acceptable knowledge.
- Step 4.** (for homogeneous solids or soil/gravel waste) Perform solids sampling on at least 5 containers to determine if the waste exhibited the toxicity characteristic. Solids sampling was also used to confirm acceptable knowledge.
- Step 5.** Perform radioassay on the container.
- Step 6.** Perform visual examination on a sample of waste containers that have been radiographed as a quality check on radiography.

Step 7. Review data at the data generation level (independent technical reviewer and technical supervisor review)

Step 8. Review data at the project level (Site Project Quality Assurance Officer Review and Site Project Manager Review.)

Step 9. Prepare Waste Stream Profile Form and submit to DOE for approval.

The modified Permit allows alternative pathways that generator sites can follow for waste approval. Each pathway leads to waste that is fully characterized and proven acceptable for disposal at WIPP. One pathway requires the generator/storage sites to compile the AK information into an auditable record for the waste stream and if the acceptable knowledge information is not sufficient to resolve the assignment of hazardous waste numbers, the generator site can perform sampling and analysis on a representative portion of the waste stream. Likewise, the generator site may have to perform radiography or visual examination on the waste if there is insufficient documentation that the waste contains no prohibited items. Another pathway applies to those waste streams that, in the opinion of the Permittees, have sufficient acceptable knowledge information to determine the physical and chemical properties needed to satisfy the TSDF-WAC (e.g., to assign EPA hazardous waste numbers). The use of headspace gas sampling and analysis (**HSGSA**) and homogenous waste sampling and analysis (**SSA**) as routine methods of waste analysis to confirm the AK record are eliminated. The alternative pathways available under the modified permit are shown graphically in Figure 2.

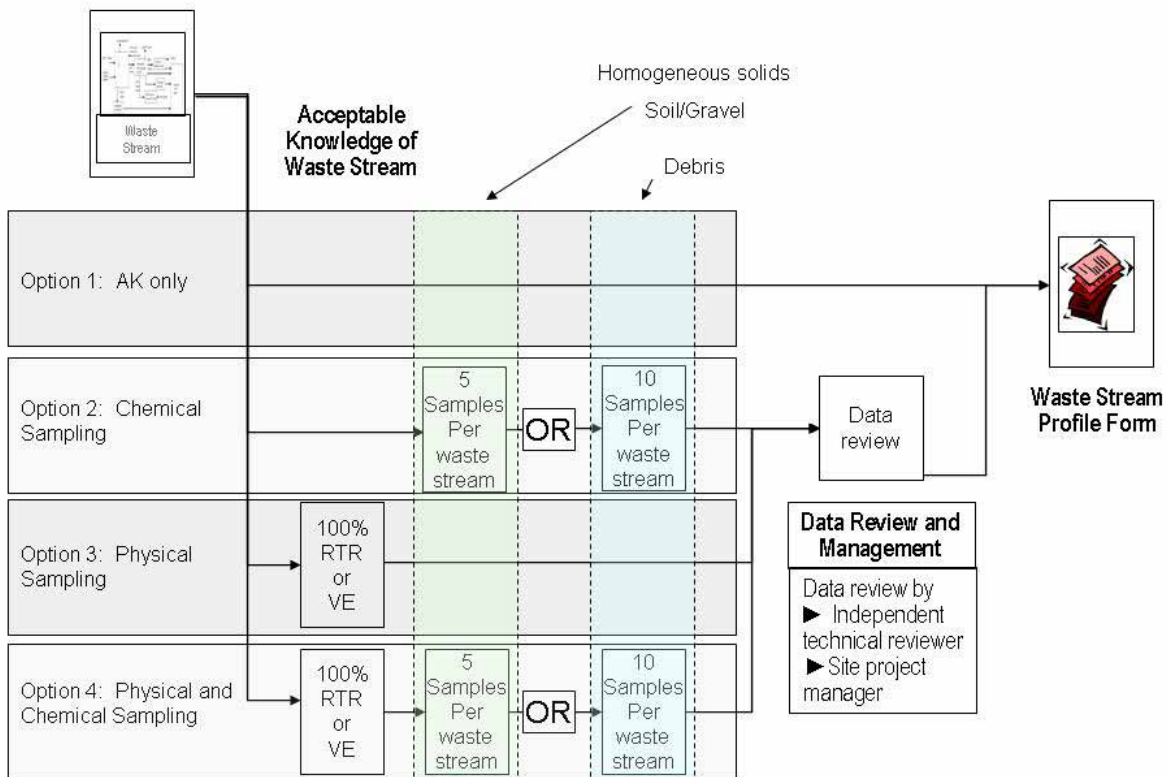


Fig. 2. Options for performing waste characterization activities at generator sites

The alternative pathways include Option 1, which is provided for waste streams that have sufficient acceptable knowledge information to thoroughly characterize the waste stream. The sealed source waste stream at Los Alamos is an example of such a waste stream. Option 2 is for those waste streams that have sufficient acceptable knowledge information to demonstrate the absence of prohibited items and to provide a physical description of the waste stream, however, there may be questions regarding the assignment of hazardous waste numbers, requiring representative chemical sampling. Representative sampling is defined as follows:

- 5 randomly selected solids samples from homogeneous solids or soil/gravel waste streams
- 10 randomly selected headspace gas samples from debris waste streams

Option 3 is for those waste streams that have sufficient chemical characterization; however there is insufficient documentation to assure the absence of prohibited items or the documentation indicates that the waste stream may contain prohibited items. The final option is for waste streams where both physical and chemical sampling is needed. In all cases, when physical sampling is needed (radiography or visual examination), it is performed in 100 percent of the containers.

The modified Permit improves the waste management practices by tailoring the required waste analysis to the information needed for the assignment of hazardous waste numbers and to meet the requirements of the TSDF-WAC.

Waste Confirmation

In order to assure compliance with the specific requirements of Section 311, the modified Permit includes the use of radiography, visual examination (VE) or the review of VE or radiography records to verify that the waste contains no ignitable, corrosive or reactive waste. Radiography, VE, or the review of VE or radiography records would be applied to a statistically representative subpopulation of the waste and would be conducted by the Permittees before waste is shipped to WIPP. (See Figure 3.)

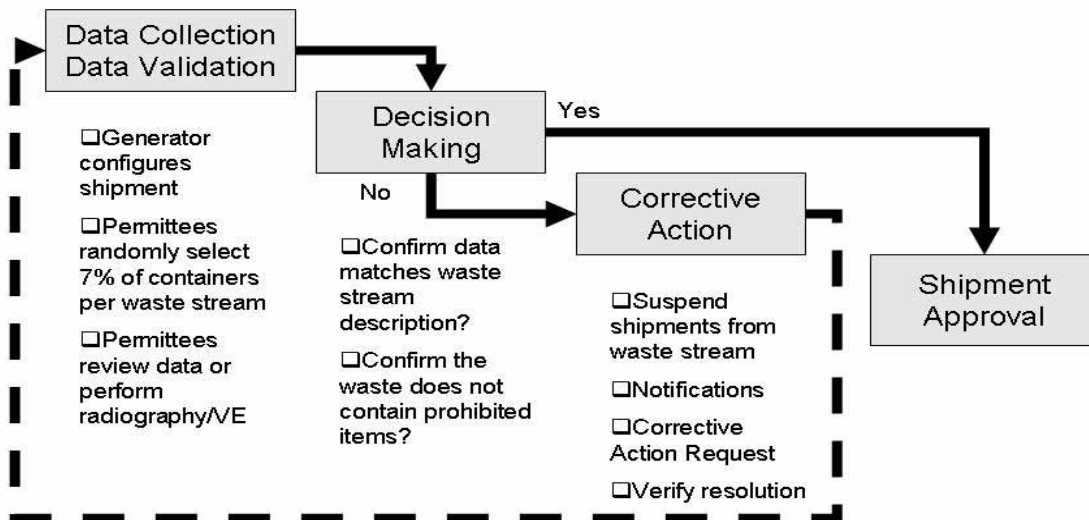


Fig. 3. Waste Isolation Pilot Plant waste confirmation process.

Waste confirmation occurs on a minimum of seven percent of each waste stream in each shipment. The DOE has assembled two confirmation teams. One team is stationed at Idaho and is devoted to confirming Idaho waste. This includes waste currently being shipped by the Advanced Mixed Waste Treatment Facility and the Central confirmation Project. The second team is located in Carlsbad and they are responsible for confirming all other waste shipments. Thus far, all confirmation has been through the review of data (e.g., radiography videotapes). Confirmation personnel are trained as radiographers and visual examination experts and could perform independent radiography if it were necessary.

Repository Monitoring

As required by Section 311 [2], the modified Permit changes the method for demonstrating that the WIPP underground disposal rooms are compliant with the environmental performance standards in the HWFP. Previously, TRU waste containers were subject to HSGSA for purposes of identifying and quantifying the concentrations of VOC constituents in the total waste inventory to ensure compliance with the environmental performance standards. The modified Permit eliminated this requirement and relies exclusively on monitoring in rooms of active disposal panels in which TRU mixed waste has been emplaced. In order to implement this provision, the DOE now installs sample heads inside each active RH TRU and CH TRU mixed waste disposal room behind the exhaust drift bulkhead. When a disposal room is filled, another sample head will be installed in the inlet of the room, ventilation barriers installed, and collection of closed room samples will commence. This sequence will proceed in the remaining disposal rooms until panel closure activities are initiated by installing the inlet air ventilation barrier in Room 1 of the panel. This process is depicted in Figure 4.

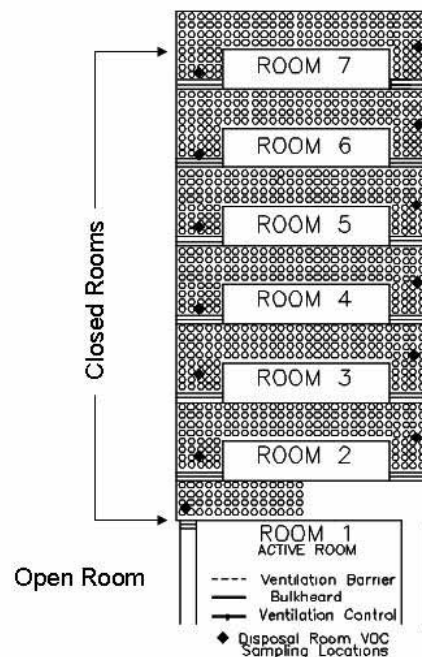


Fig. 4. Room-based volatile organic compound sampling location in an open panel at the Waste Isolation Pilot Plant

The modified Permit requires bi-weekly sampling frequency for disposal rooms based on the experience from actual measurements of VOCs in closed disposal rooms in Panel 1. Bi-weekly frequency is conservative and appropriate for the room-based monitoring program.

Action levels for the room-based VOC monitoring program are imposed by the modified Permit. If the results of the bi-weekly monitoring shows that the concentration of one half the Room-Based Limit (**RBL**) for any target analyte in any room is reached, the sampling frequency will be increased to once per week for that room, and NMED will be notified. The once per week sampling frequency will continue until concentrations in the room(s) fall below 50 percent of the RBL, or until closure of the panel, whichever occurs first.

In the event analytical results indicate that any target analyte concentration in the closed room immediately adjacent to the active room is at 95 percent of the RBL, the Permittees will collect a verification sample from the room within three working days of receiving such analytical data. If the results of the verification sample confirm the original results, the Permittees will discontinue use of the disposal room and proceed to the next room. NMED will be notified within five working days of receiving the analytical laboratory data for the verification sample.

E-mail notification process for stakeholders

The modified permit contains a new a condition to provide notifications to the public of certain activities that occur at WIPP. This notification is by e-mail and required the development of an e-mail notification list, which is a subscription service that can be activated through the WIPP home page at www.wipp.energy.gov. This e-mail notification process was the direct result of negotiations with stakeholders prior to the public hearing. When each of the following occurs, the DOE will send an e-mail to subscribers to the e-mail notification service providing a link to information regarding the activity:

- Final audit report submittal to the New Mexico Environment Department
- Submittal of an Acceptable Knowledge Sufficiency Determination to the New Mexico Environment Department
- Initiation of the Dispute Resolution Process
- Use of surge storage
- Need to increase disposal capacity in a panel

Increased storage capacity

When WIPP opened, storage capacities were sufficient. However, many factors have led to the need to increase this storage capacity. These are as follows:

First, Waste Handling Operations have become more efficient. Initially, rates for processing waste shipments took over eight hours. After 7 year's of waste handling experience, operators can process a shipment through the facility into the underground in about 2.5 hours.

Second, DOE has accelerated the rate at which waste is prepared and shipped from the generator sites.

Third, coupled with the increased emphasis by the DOE to remove stored waste from generator sites and safely dispose it at WIPP, the DOE has more than doubled the size of the shipping fleet, further exacerbating the shortage of storage capacity.

Fourth, when the storage volumes were determined, waste containers typically included 55-gallon drums and standard waste boxes, configured as TRUPACT II payloads. Since then, a more efficient payload container has been developed, referred to as the ten drum overpack. As the result, when

using a ten-drum overpack, the container uses 4.5 cubic meters of waste disposal capacity in the same physical space that holds 14 55-gallon drums or 2.9 cubic meters of disposal capacity. The result is to use the repository disposal capacity while consuming less physical space in the repository.

Fifth, it was necessary to increase storage capacity to accommodate the shipment of RH TRU waste. **Sixth**, recently the WIPP experienced an equipment outage that brought waste handling operations to an unexpected halt. Because there were TRUPACT IIs in the permitted parking area and more enroute, the DOE was concerned that the storage capacity would be exceeded.

In response to these needs, the modified Permit provides for a significant increase in storage capacity. The increased storage capacity would provide the following benefits:

- Allows operational flexibility to address variations between the scheduled and actual shipping rates;
- Provides more storage capacity during planned and unplanned activities that affect waste handling and hoisting (e.g., waste hoist maintenance or equipment outage);
- Reduces the need for extended work shifts and employee overtime; and
- Reduces the need to slow or stop shipments en route to the WIPP facility as a result of lack of storage capacity.

Coupled with the increases, the concept of surge storage was added to the modified permit. Surge storage allows the DOE to increase storage up to prescribed limits in the event operational conditions prevent the timely emplacement of waste into the underground or the unloading of shipment from shipping containers.

Increased Disposal Volume

The modified permit increases the disposal volume in each underground disposal unit. There are two reasons for this increase. First, increases were needed to accommodate RH TRU waste. These are specified on an increasing scale to accommodate the ramp-up or RH TRU waste shipments. Second, the use of larger disposal containers such as ten-drum overpacks and 100-gallon drums has resulted in more efficient use of volume in the underground. In Panel 2, the consequence was that authorized volume was reached before the panel was full. In order to prevent this from happening again in the future, the DOE negotiated a two step increase in CH TRU disposal capacity. The modified permit increases the capacity by 750 m³ to 18,750 m³. If the DOE believes additional capacity is needed in any disposal unit in the future, then an additional increase of 1,000 m³ can be implemented through the permit modification process.

IMPLEMENTATION

On November 17, 2006 the modified permit went into effect. On that day, the DOE implemented significant portions of the new program. Specifically, the DOE:

- Began confirmation of waste
- Instituted e-mail notification
- Began room-based monitoring

Also, on that date, the DOE began the phased implementation of changes to the generator site waste characterization program. Phased implementation was needed to transition from old requirements to new

requirements without stopping shipments while program documents are modified. The NMED granted a 120-day period for accomplishing transition for all generator sites.

RH TRU waste readiness activities were completed in January 2007. Mid-January 2007 is the anticipated first RH TRU waste shipment date. The RH TRU program is being implemented in accordance with the provisions of the modified permit. The readiness preparation process included a task to track changes that occurred to the RH TRU requirements as the permitting process drew to a close to assure that the final RH TRU facility is fully compliant with the modified permit.

CONCLUSION

The permit modification process has been successfully concluded such that:

- There is a reduced characterization burden on generator sites
- Remote-handled TRU mixed waste is permitted for disposal at WIPP
- Enhanced repository monitoring replaces 100 percent headspace gas sampling and analysis
- There is more transparency to the WIPP program through the e-mail notification system
- The DOE is assured sufficient storage and disposal capacity for anticipated waste shipments

The administrative process, while lengthy, was effective. The use of frequent discussions with the regulator and stakeholders and engaging in formal negotiations were effective in identifying concerns, finding resolutions and reaching agreement on nearly all issues surrounding the permit.

References

1. The Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980 Public Law 96-164, Section 213, December 29, 1979
2. Section 311 of the Energy and Water Development Appropriations Act, 2004, Public Law 108-137 (December 1, 2003)
3. Section 310 of the Consolidated Appropriations Act for 2005, Public Law 108-447 (December 8, 2004)