

WIPP Hazardous Waste Facility Permit Update

B. Kehrman, W. Most
Washington Regulatory and Environmental Services
4021 National Parks Highway, Carlsbad, NM 88220
USA

ABSTRACT

The Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP) was issued on October 27, 1999 [1]. Since that time, the WIPP has sought modifications to clarify the permit language, provide alternative methods for meeting permit requirements and to update permit conditions.

Significant advancements have been made in transuranic (TRU) waste management as the result of modifications to the HWFP. Among these advancements is a modification to obtain a drum age criteria (DAC) value to perform headspace gas sampling on drums to be super-compacted and placed in a 100-gallon overpack drum. In addition, the Section 311 permit modification request that would allow for more efficient waste characterization, and the modification to authorize the shipment and disposal of Remote-Handled (RH) TRU waste were merged together and submitted to the regulator as the Consolidated Permit Modification Request (PMR). The submittal of the Consolidated PMR came at the request of the regulator as part of responses to Notices of Deficiency (NODs) for the separate PMRs which had been submitted in previous years.

Section 311 of the fiscal year 2004 Energy and Water Developments Appropriations Act (Public Law 108-137) [2] directs the Department of Energy to submit a permit modification that limits waste confirmation to radiography or visual examination of a statistical subpopulation of containers. Section 311 also specifically directs that disposal room performance standards be to 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 sampling and analysis and solids sampling and analysis. These methods, as appropriate, will continue to be used by the generator sites during hazardous waste determinations or characterization activities. This modification is expected to reduce the overall cost of waste analysis by hundreds of millions of dollars [3].

Combining both the §311 and RH TRU waste permit modification requests allows for both the regulator and DOE to expedite action on the modification requests. The Combined PMR reduces costs by having only one administrative process for both modification requests.

INTRODUCTION

The WIPP HWFP was issued on October 27, 1999 as a first of a kind permit for a mined geologic repository. As both the WIPP staff and the generator/storage sites gained experience with the HWFP, numerous changes were identified in order to reduce cost, reduce radiation exposure, clarify conditions, provide alternative methods for meeting permit requirements, remove redundant conditions, and to update permit conditions.

While some modifications have been required to “fix” problems with the permit (e.g., clarify requirements), most have been strategically planned to provide benefit to the generator/storage sites as they prepare their waste for shipment to WIPP. For example, a major modification to allow the compositing of gas samples [4] was successfully submitted and approved to support the timely

completion of the 3,100 cubic meter project in Idaho. Likewise, packaging specific drum age criteria [5] were incorporated into the Permit in order to facilitate the shipment of waste from the Advanced Mixed Waste Treatment Facility and to support the closure of the Rocky Flats Environmental Technology Site. Fig. 1. summarizes several of the more significant modifications that have been approved over the past six years.

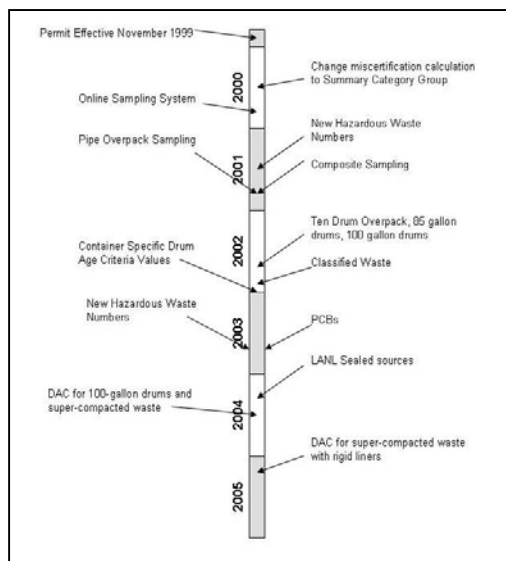


Fig. 1. Significant modifications to the WIPP hazardous waste facility permit

PROGRESS IN 2005

During the past 12 months, the focus of the permitting activity at WIPP has been on a single Class 3 PMR. This PMR is referred to as the Consolidated PMR and represents the combination of three Class 3 PMRs that were pending before the New Mexico Environment Department (NMED). These are the Remote-Handled TRU waste PMR [6], first submitted in June 2002; the Container Management Improvements PMR [7] submitted in January 2004 and the Section 311 PMR [8] also submitted in January 2004. The development of this Consolidated PMR was the culmination of many hours of discussion with the NMED aimed at taking advantage of the six years of operational experience. NMED issued a draft Permit, based on the Consolidated PMR in November 2005 [9].

Background

On June 28, 2002, the DOE submitted a Class 3 PMR for Remote-Handled TRU mixed waste. On March 5, 2003, the NMED issued a NOD for the RH PMR [10]. Sixty-days later, the DOE submitted a response to the RH NOD that included a matrix indicating how each comment in the NOD was resolved, several informational attachments, and a revised PMR.

On January 7, 2004, the DOE submitted a Class 3 PMR requesting, among other things, increased storage capacity at the WIPP facility. This request was necessitated, among other reasons, by the higher throughput rates that are being achieved by the generator/storage sites.

On January 9, 2004, the DOE submitted a PMR pursuant to Section 311 of the Energy and Water Development Appropriations Act for fiscal year 2004, Pub L. 108-137. Section 311 requires that the Secretary of Energy file a permit modification request to the Waste Analysis Plan (WAP) and associated provisions contained in the Hazardous Waste Facility Permit for the Waste Isolation Pilot Plant (WIPP to

incorporate specific provisions of the statute. Specifically, Section 311 stipulated that the DOE develop a waste confirmation program to be used in lieu of the extensive confirmation being conducted at the generators/storage sites and that repository monitoring program be revised to sample for volatile organic compounds in lieu of the current practice of sampling each container of waste.

On December 30, 2004, the NMED issued an NOD [11] for the Section 311 PMR that required the DOE to submit a response to NMED within sixty days. On February 28, 2005, NMED granted the DOE request for an extension of time to respond to the NOD, to March 30, 2005.

On March 29, 2005, NMED issued a second NOD [12] for the RH PMR and directed the DOE to develop an approach that "addresses both CH and RH waste characterization in a unified manner, through a consolidated response and a revised PMR." NMED also stated that the DOE may include other proposed changes not previously identified in the Section 311 or RH PMRs, including a request for additional storage capacity in the Parking Area and Waste Handling Building Units and the designation of separate holding areas for waste containers undergoing the waste acceptance process at WIPP prior to storage and disposal. The NOD granted the DOE a 30-day extension, to April 29, 2005, to respond to both the Section 311 NOD and the second RH NOD.

The DOE provided the consolidated revised PMR on April 29, 2005 as requested by the NMED. The DOE modified the submittal by comment in June 2005. NMED issued a final NOD in September 2005 [13]. DOE responded in less than 30-days, keeping the schedule on track for a draft Permit in late November. [14]

Revisions to the Waste Analysis Plan

Perhaps the biggest change in the consolidated PMR is the use of the Acceptable Knowledge (AK) Sufficiency Process to minimize the need for chemical sampling and analysis. This process is depicted in Fig. 2., *Simplified Waste Analysis Process*. Under the consolidated PMR, if a generator/storage site can demonstrate that AK information is sufficiently complete to document the physical and chemical properties of the waste, then the site can request an AK Sufficiency Determination. The sufficiency of AK information will be determined based on the following criteria:

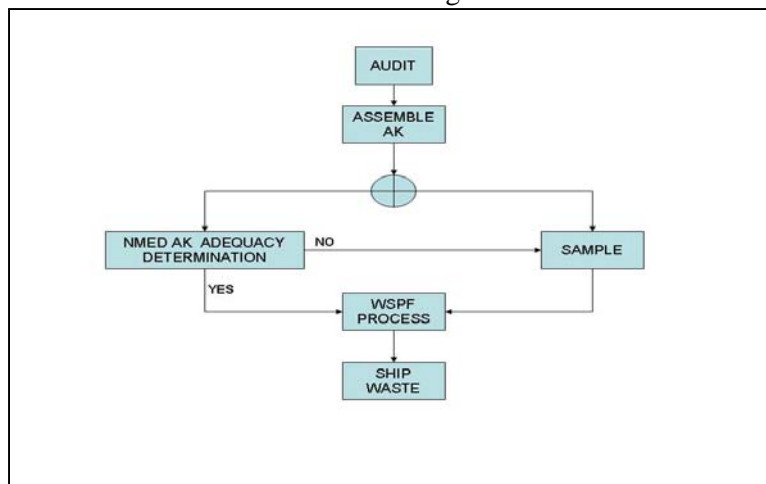


Fig. 2. Simplified waste analysis process

- Mandatory AK information is available
- The waste stream has been properly delineated and meets the Permit definition of a waste stream

- The AK process described in the Permit was followed (for example, AK personnel were appropriately trained, discrepancies in the AK record were documented and resolved)
- The generator/storage site developed a written procedure for compiling the AK information and assigning hazardous waste numbers as required by the Permit
- The generator/storage site has assessed the AK process
- The generator/storage site has documented evidence that the waste meets the TSDF-WAC

The DOE will review the generator/storage site's data and either request additional information, reject the request, or provisionally approve the request. Provisionally approved requests will be reviewed by the NMED to determine if the DOE approval is appropriate. If the NMED concurs, the approval will be finalized and the generator/storage site can complete a Waste Stream Profile Form (WSPF) using the AK information only. If the request is not approved, the generator/storage site will have to use headspace gas sampling and analysis for debris waste or homogenous waste sampling and analysis for non-debris waste to provide additional chemical information to resolve the assignment of hazardous waste numbers. The consolidated PMR requires that such sampling be representative, consisting of either 10 headspace gas samples or 5 solids samples taken randomly from the entire waste stream. (See Fig. 3., *Proposed Sampling and Analysis Process Flow*.)

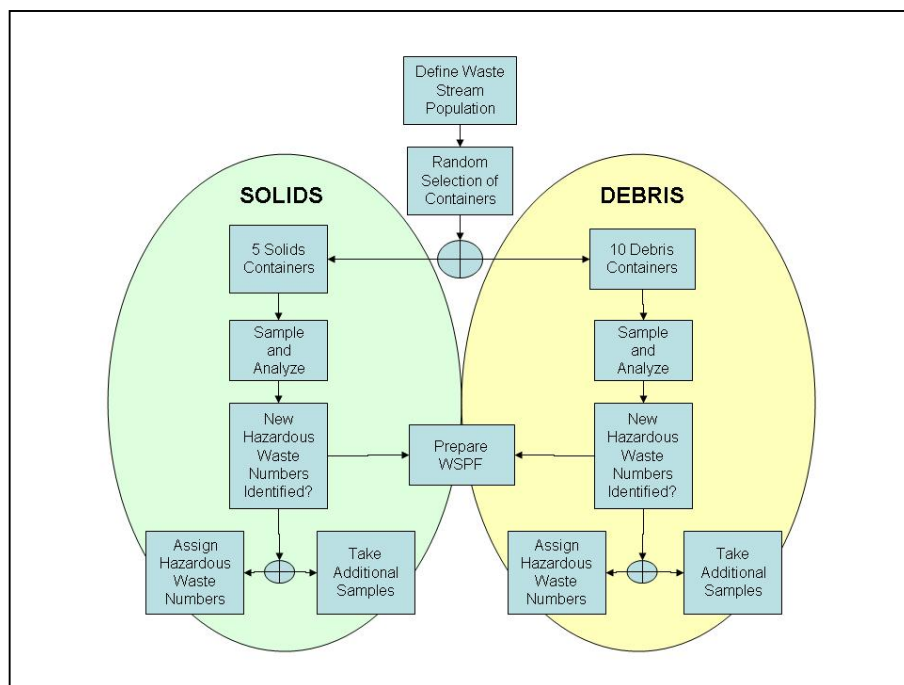


Fig. 3. Proposed sampling and analysis process flow

In the consolidated PMR the DOE requires the generator / storage sites to conduct chemical analyses using laboratories that are qualified as described in the Permit. The Permittees intend to designate two approved laboratories to perform analytical work under the mandate of the Permit. These will be the Argonne National Laboratory-West facility at the Idaho National Laboratory (INL) and the Carlsbad Environmental Monitoring and Research Center in Carlsbad, New Mexico. Both facilities would be qualified to analyze solid samples and gas samples in SUMMA[®] canisters. The INL laboratory would also be qualified to sample homogeneous solids.

In addition, the consolidated PMR ensures continued compliance with environmental performance standards, using room-based monitoring for volatile organic compounds (VOCs) in the WIPP repository.

This replaces the current requirement to report VOCs for 100 percent of the containers that are being sent to WIPP for disposal.

A significant change proposed in the consolidated PMR is the opportunity for the DOE to perform certain waste confirmation activities at WIPP (radiography and/or review of visual examination data [videotapes or records] for select waste containers). Under the current Permit, all confirmation is performed by the generator/storage site as part of the waste characterization process. The current program involves radiography or visual examination of each container and headspace gas sampling on nearly every container. The DOE controls the confirmation process under the current Permit through the Permit mandated audit and surveillance program.

Under the proposal, the DOE will confirm seven percent of every waste stream in every shipment. This would amount to a minimum of one drum per TRUPACT-II. Confirmation will involve radiography, either at the WIPP site or at an off site facility like the generator/storage site. Authorization to perform confirmation at WIPP is dependant on the DOE demonstrating the ability to return shipments with prohibited items to the generator. This process is complicated by the fact that some of the items prohibited for storage and disposal at WIPP are also prohibited from transportation in TRUPACT II.

In some cases, confirmation may be accomplished by visual examination (VE) at the generator site or by a review of the VE records. This would particularly apply to RH TRU waste streams, the majority of which are not yet packaged in a configuration acceptable for shipment to WIPP. The DOE envisions that the generator will perform the Permit mandated visual examination technique while packaging or repackaging the waste, thereby documenting the contents of the waste container. The DOE would then review the records for seven percent of the waste in each waste stream in each shipment.

There may also be times when, because of the shipping configuration (e.g., drums in a ten-drum overpack) that the DOE will perform confirmation at the generator site prior to placing the waste into the shipping container.

The consolidated PMR requests additional storage capacity in the parking area and waste handling building units and the designation of separate "holding areas" for waste containers pending confirmation at the WIPP facility. This increase and change in designation is necessitated by the high throughput rates that DOE is achieving for waste shipment to WIPP. Additional storage areas are also needed in the case of equipment downtime and inclement weather when surges would occur whenever the operational situation returns to normal. When the Permit was first issued, the anticipated throughput was on the order of 14 TRUPACT-IIs per day, four days per week or about 19 shipments per week. Actual throughput rates are much greater and are expected to increase. The WIPP facility is requesting the increase in storage space to handle these throughputs more efficiently. Currently, workers are required to work extended shifts or overtime to assure sufficient storage capacity for incoming shipments.

In addition, areas are being designated for holding waste that is awaiting confirmation. In this way, only waste that is confirmed is moved into permitted storage areas, thereby avoiding a permit violation should an unacceptable load be discovered.

The Consolidated PMR makes other changes to the Waste Analysis Plan that will streamline the review and approval of waste characterization data. For example, several redundant data reviews are removed. Another change that is implemented by the consolidated PMR is the manner in which material parameter weights are estimated. In the Permit, one objective of radiography is to estimate each waste material parameter weight. (See Table I.) These parameters were identified for evaluation as important parameters in the numerical modeling that was performed to evaluate repository performance. Of these

parameters, only those related to gas generation were determined to be important. These material parameters are routinely evaluated by the generator/storage site when conducting radiography.

Table I. Material Parameters Reported for TRU Waste

Material Parameter
Iron-based Metals/Alloys
Aluminum-based Metals/Alloys
Other Metals
Other Inorganic Materials
Cellulosics
Rubber
Plastics (waste materials)
Organic Matrix
Inorganic Matrix
Soils/gravel
Steel (packaging materials)
Plastics (packaging materials)

The Permit derives values for material parameter weights from radiography or VE when it is conducted in lieu of radiography. Because the consolidated PMR is proposing reduced rates for radiography or VE, an alternative method is proposed. The revised PMR will require the generator/storage site to estimate material parameter weights using AK information.

In order to evaluate the consequences of changing the method for estimating material parameter weights, a comparison of reported material parameter weights to what would be estimated based on the AK record was performed. This comparison used 19 specific wastes streams disposed as of April 1, 2005, that had material parameter information both in the WIPP Waste Information System (WWIS) and the published AK record [15]. The result is shown in Table II. Non-corrodible metals were combined into one group as were cellulose, plastic and rubber since these combined material parameters are of interest. A value greater than one in Table II. indicates that the AK information over-predicts the material parameter weights. All the values in Table II. are greater than one but are very close to one meaning that AK is as good an indicator of material parameter weights as is the estimate from radiography.

Table II. Comparison of Material Parameter Weights Determined through AK and Those Reported in the WWIS

Material Parameter	Containers	AK	WWIS	Ratio
Iron Base Metal Alloys	12,803	1.48E+05	1.39E+05	1.07
Other Metal/Alloys	12,746	2.58E+04	1.74E+04	1.48
Other Inorganic Materials	12,878	7.94E+05	7.84E+05	1.01
Cellulosics, Rubber, Plastic	12,880	1.68E+06	1.59E+06	1.06
Solidified Inorganic Material	7,799	2.07E+05	1.81E+05	1.15
Steel Container Materials	12,880	5.24E+06	5.20E+06	1.01
Plastic/Liners Container Materials	12,880	3.84E+05	3.65E+05	1.05

The use of AK information to estimate material parameter weights has several distinct advantages. First, the waste processing time is shortened because generator/storage sites do not have to dwell on radiography images to estimate material sizes and associated weights. Second, radiography training is significantly easier, since operators will be able to focus on recognizing prohibited items and not estimating weights. Shorter radiography cycle times will reduce overall costs. The results of this method may produce an overestimate of those parameters that have maximum values associated with them. This is conservative since it may result in less gas generation in the closed repository. The use of AK also produces overestimates of those parameters that have minimum values associated with them. This could be non-conservative except that one of the parameters with a minimum value is Other Metal/Alloys and the minimum repository limit has already been satisfied so that future estimates are inconsequential and the other parameter, Corrodible Metals, will be satisfied by the volume of iron in containers that are disposed, therefore the corrodible metal content of the waste is also inconsequential.

Remote-Handled Waste

RH TRU waste is part of WIPP's Mission under the WIPP Authorization Act of 1979 [16] and the WIPP Land Withdrawal Act [17]. Storage and disposal of RH TRU mixed waste at WIPP is prohibited by permit because the NMED was not convinced that the DOE could adequately characterize RH TRU waste. Approximately 95 percent is not yet packaged in WIPP containers, thereby presenting the opportunity to collect needed information when the waste is packaged or repackaged into WIPP payload containers.

The consolidated PMR proposes to remove the storage/disposal prohibition. Acceptable knowledge will be used primarily to characterize RH TRU mixed waste. Supplemental information may be collected when the waste is packaged. Packaging records will be used to perform the confirmation of seven percent of the RH TRU waste in each waste stream in each shipment.

Repository Monitoring

As required by Section 311(b), the Consolidated PMR proposes to change the method for ensuring that the WIPP underground disposal rooms are compliant with the environmental performance standards in the Permit. Under the current permit, compliance with the environmental performance standards is demonstrated through the use of headspace gas sampling and analysis (HSGSA). Nearly all waste containers are 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 revised PMR proposes sampling, analysis, and quantification of the VOC concentrations in rooms of active disposal panels in which TRU mixed waste has been emplaced. See Fig. 4., *Proposed Process for Room-Based VOC Monitoring*. [18]

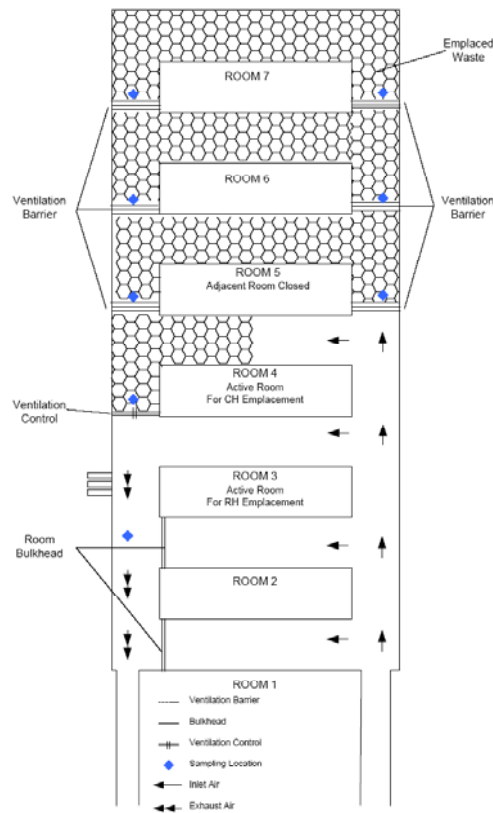


Fig. 4. Repository air monitoring locations

No changes to the environmental performance standards are proposed. The current monitoring of VOCs at Station VOC-A in the underground will remain unchanged. The consolidated PMR proposes a system to directly measure the VOC concentrations inside disposal rooms in which waste has been emplaced until panel closure.

The PMR proposes a 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. Station VOC-A samples will continue to be collected twice each week.

Action levels for the room-based VOC monitoring program are established to assure early warning if the concentrations of VOCs in the closed rooms approach levels that could exceed the repository limits. Actions are triggered if the monitoring results reach 50 percent of the limit (monitoring frequency increases) and 95 percent of the limit (room is closed and waste disposal moves to the next room).

SCHEDULE

The NMED issued a draft Permit on November 23, 2005. The formal Public Comment Period will close February 22, 2006. At the same time, the NMED noted that if a hearing were requested, a date would be set after the end of the formal Public Comment Period. If this schedule holds, a final permit decision is expected by the end of this summer.

CONCLUSION

The Department of Energy (DOE) and its contractor at the Waste Isolation Pilot Plant (WIPP) have proposed a series of modifications to the WIPP hazardous waste facility permit that would streamline procedures for analysis of transuranic (TRU) waste, increase emissions-monitoring in the WIPP underground facility, and set conditions and requirements for the receipt of remote-handled waste at WIPP. The proposal has a number of important benefits:

- Promotes Safety:
 - The proposal promotes public and worker safety in Carlsbad:
 - It requires a comprehensive emission-monitoring program for volatile compounds in the underground WIPP repository, as a substitute for the current sampling of containers in an effort to "bound" potential emissions.
 - It requires waste confirmation activities at WIPP to ensure that waste meets disposal requirements before being placed in the underground facility. Noncompliant waste must be shipped off-site within 60 days.
- Expands and Enhances State Oversight Role:
 - The proposal reinforces and expands the State's inspection role in all phases of the TRU waste disposal program:
 - In addition to the State observing DOE audits at waste-generator sites, the State -- through the New Mexico Environment Department -- can inspect the waste confirmation activities conducted at WIPP. The State can require additional radiography during inspections.
 - The State can review and determine the appropriateness of decisions by the Permittees to use acceptable knowledge and no sampling for any waste stream.
 - The State will review air-monitoring reports and notices generated through a new, comprehensive WIPP emission monitoring system -- and can assure corrective actions are taken in a timely manner if emission limits are exceeded.
- Facilitates meeting goals of disposing of legacy TRU waste:
 - The proposal facilitates the disposal of TRU waste as follows:
 - Accelerates the waste analysis process by moving waste confirmation to WIPP, eliminating unnecessary sampling and analysis, allowing faster waste examination methods, and reducing the amount of paper work reviews that take place.
 - Authorizes the shipment of RH TRU waste.

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