

**The Effect of Congress' Mandate to Create Greater Efficiencies in the
Characterization of Transuranic Waste through the Waste Isolation Pilot Plant
(WIPP) Hazardous Waste Facility Permit - 8485**

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ABSTRACT

Effective December 1, 2003, the U.S. Congress directed the Department of Energy (DOE) to file a permit modification request with the New Mexico Environment Department (NMED) to amend the Hazardous Waste Facility Permit (hereinafter “the Permit”) at the Waste Isolation Pilot Plant (WIPP). This legislation, Section 311 of the 2004 Energy and Water Development Appropriations Act, was designed to increase efficiencies in Transuranic (TRU) waste characterization processes by focusing on only those activities necessary to characterize waste streams, while continuing to protect human health and the environment. [1] Congressionally prescribed changes would impact DOE generator site waste characterization programs and waste disposal operations at WIPP. With this legislative impetus, in early 2004 the DOE and Washington TRU Solutions (WTS), co-permittee under the Permit, submitted a permit modification request to the NMED pursuant to Section 311. [2] After a lengthy process, including extensive public and other stakeholder input, the NMED granted the Permittees’ request in October 2006, as part of a modification authorizing disposal of Remote-Handled (RH) TRU waste at WIPP. [3]

INTRODUCTION

This paper discusses issues leading to enactment of Section 311; the various issues facing the Permittees and NMED in seeking strategies to implement Section 311; final changes to the Permit in response to Section 311; and the technical and cost impacts of these changes since implementation began under the 2006 modification.

ISSUES LEADING TO ENACTMENT OF SECTION 311

When issued in October 1999, the initial WIPP Hazardous Waste Facility Permit paved the way for disposal of mixed waste at WIPP.[4] However, it contained several provisions the Permittees considered unnecessary and overly burdensome. As part of the draft permit comment process leading up to issuance of the initial Permit, the Permittees raised concerns about many of these provisions. However, they were unable to convince NMED and other stakeholders that these provisions should be retracted.

Under the initial Permit, as a prerequisite to disposal at WIPP, the Permittees were required to perform headspace gas analysis on each container of TRU waste as part their waste characterization programs. In general, headspace gas sampling was considered important to the characterization process primarily for three reasons: (1) to assign and verify hazardous waste codes; (2) to confirm that the waste was not ignitable, corrosive, or reactive; and (3) to determine the concentration of volatile organic compounds (VOCs) that could have an impact on workers in the repository.

Prior to the 1996 amendment of the WIPP Land Withdrawal Act (LWA) [5], the Permittees had filed two No Migration Variance Petitions with the U. S. Environmental Protection Agency (EPA) [6, 7] under the Resource Conservation and Recovery Act (RCRA). [8] The purpose of these petitions was to demonstrate that TRU wastes destined for disposal at WIPP did not require treatment pursuant to RCRA treatment standards, primarily due to the unique geologic properties of the WIPP repository. These geologic properties would effectively prevent migration of hazardous constituents from the repository. The DOE had filed one petition for the Test Phase involving TRU mixed wastes and another for the Disposal Phase. The Test Phase variance was granted by the EPA in November 1990. [9] In the Test Phase Petition, the DOE provided headspace gas sampling data, primarily as support for its conclusions regarding TRU mixed waste composition. [10] The Permittees later provided headspace gas sampling data in the initial Permit Application. [11]

Submittal of headspace gas sampling data in regulatory documents was intended to provide assurances to EPA, NMED and the public that the waste to be disposed at WIPP, absent application of the RCRA treatment standards, would still be protective of human health and the environment. The Disposal Phase variance, when granted, would have exempted TRU mixed waste from RCRA treatment. However, in 1996 with enactment of amendments to the WIPP LWA, Congress made clear that TRU waste destined for disposal at WIPP was exempt from the RCRA treatment standards. Nonetheless, headspace gas sampling provisions became integral parts of the initial Permit, which became effective in November 1999. Although requested, NMED and other stakeholders remained firm that the headspace gas sampling provisions were not to be eliminated from the permit.

The initial Permit also established requirements governing container age prior to headspace testing; i.e. Drum Age Criteria (DAC). In other words, TRU waste containers were required to remain constant for designated periods of time to assure equilibrium of VOCs before personnel commenced headspace gas testing. Some of these provisions established excessive time periods which created unnecessary delays in making drums of

waste available in a timely manner for headspace gas sampling. NMED later approved a permit modification changing the DAC to accommodate more timely characterization of TRU waste.

Because of provisions such as those for head space gas sampling and DAC, as described above, immediately after disposal of TRU mixed waste began in 2000 under the initial Permit, the Permittees began to identify strategies and proposals to seek changes to the Permit that would result in greater efficiencies in DOE's waste characterization program and would reduce or eliminate the expenditure of unnecessary resources. Among the proposed efficiencies was a desire to eliminate 100% headspace gas sampling and solids sampling (i.e. homogeneous and soil/gravel waste sampling). When included in the Permit, primary reasons for headspace gas sampling and solids sampling were to confirm the chemical properties of TRU mixed waste, for purposes of designating EPA hazardous waste numbers, and to confirm the absence of prohibited items. The Permittees believed that they could determine the appropriate chemical properties of TRU waste streams based upon Acceptable Knowledge (AK) [12], i.e. the historical records and existing analysis regarding TRU waste streams. Thus, the Permittees concluded that 100% headspace gas sampling and solids sampling were unnecessary.

In the early years after issuance of the Permit, the Permittees submitted various permit modifications seeking to streamline and make waste characterization processes more efficient and effective. Several modifications were granted; but the Permittees were not successful in convincing the state and other stakeholders of the benefits in reducing or eliminating solids sampling and headspace gas sampling.

In 2003, concerns about characterization of TRU mixed waste reached the U.S. Congressional delegation from New Mexico. Out of these concerns came the Section 311 legislation. During the U.S. Senate Proceedings and Debates regarding the 2004 Energy and Water Development Appropriation Act, [13] involving Senators Domenici and Bingaman of New Mexico, Senator Bingaman recommended, and Senator Domenici agreed, that the proposed legislation (i.e. Section 311) be considered for consistency "with the ongoing study by the National Academy." During this same time, the National Academy of Sciences (NAS) was reviewing various aspects of the WIPP waste characterization program with a goal of recommending improvements. [14] The NAS later published a report in 2004 recommending improvements in the WIPP waste characterization program, including headspace gas sampling, solids sampling and VOC monitoring. [15] The Section 311 legislation mandated certain actions by the DOE to eliminate redundant waste characterization provisions, while providing a mechanism, i.e., the RCRA permitting process, for public involvement and input. Specifically, Section 311) provides as follows:

- (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 shall be demonstrated exclusively by monitoring airborne volatile organic compounds in underground disposal rooms in which waste has been emplaced until panel closure.

Congress often directs agencies to perform various acts, but rarely does Congress direct federal agencies to file a permit modification within a particular state agency. In the case of Section 311, Congress could have out-right mandated the changes to the WIPP waste characterization program it considered reasonable and appropriate. Nevertheless, in apparent deference to the state of New Mexico, an EPA authorized state for purposes of implementing and enforcing RCRA, Congress apparently opted to encourage and preserve this relationship.

In general, Congress has a responsibility to be concerned about the manner in which its statutes are implemented and that implementation of federal laws is not hindered. Section 311 is directly related to Congress' mandate that WIPP be used for disposal of the nation's defense generated waste, as set forth in the LWA. Efficient and effective disposal of TRU waste is not possible if pre-disposal requirements are so unnecessarily onerous as to prevent or hinder the ultimate objective – disposal of the nation's defense TRU waste. Congress used Section 311 as an opportunity to require public participation in the process of determining proper waste streams to be disposed at WIPP by requiring the DOE to submit a permit modification request to the State of New Mexico; while also making clear its intent that unnecessary pre-disposal activities must be eliminated.

ISSUES IN FINDING STRATEGIES TO IMPLEMENT SECTION 311

In January 2004, the Permittees submitted their proposed permit modification pursuant to Section 311. In this document, the Permittees proposed to eliminate 100% head space gas sampling and solids sampling, with reliance on AK to determine hazardous waste codes and on radiography or visual examination (VE) to confirm that waste is free of prohibited items prior to disposal in WIPP. According to the Permittees, "Section 311 establishes that sampling and analysis of waste for determining compliance with the Solid Waste Disposal Act or the New Mexico Hazardous Waste Act are no longer required. However, generator/storage sites may use sampling and analysis to complete or supplement their AK records. . ." [16]

Surprisingly, the Permittees and the NMED interpreted Section 311 differently. The Permittees read Section 311 as a Congressional mandate that they submit a permit modification proposing 100% elimination of headspace gas sampling and elimination of solids sampling as requirements under the Permit. This testing would continue only when AK documentation was inadequate to fully characterize the waste. The Permittees also interpreted Section 311 as a mandate that they propose a permit modification to revise the VOC monitoring program at WIPP such that the Permittees would no longer rely upon headspace gas sampling data to assess repository impacts to workers, but would rely exclusively upon airborne monitoring of VOCs in the WIPP repository, which they considered adequate to assure worker safety. The Permittees also considered such a change to be consistent with Congress' mandate that the disposal room performance standards be demonstrated exclusively by monitoring airborne VOCs in the WIPP underground disposal rooms. Thus, the Permittees' January 2004 submittal proposed elimination of 100% headspace gas sampling and solids sampling during the characterization and confirmation stages of readying waste for shipment to WIPP. After NMED's review of the Permittees' initial Section 311 permit modification request, to the Permittees' surprise, and dismay, the NMED rejected the proposed modification.

In its response, dated December 30, 2004 [17], the NMED identified several issues, including:

- (1) The meaning of "confirmation" under Section 311 and the waste characterization requirements under RCRA and the New Mexico Hazardous Waste Act;
- (2) The Permittees' proposal to rely upon acceptable knowledge as the only means for waste characterization; and
- (3) The extent of the Permittees' proposal regarding room-based VOC monitoring.

It was quite clear that the NMED interpreted Section 311 as a directive to DOE to submit a permit modification that would propose elimination of headspace gas sampling and solids sampling *only* for purpose of "confirming" waste and not for purposes of TRU waste "characterization" processes. Although in NMED's view 100% headspace gas sampling could be eliminated for purposes of confirming TRU waste, NMED did not see the Congressional mandate as authorizing elimination of 100% headspace gas sampling and solids sampling for purposes of "characterizing" the waste. NMED's distinction between "characterization" and "confirmation" prompted a new debate about Congress' intent. The NMED was also unconvinced that AK was an acceptable alternative to chemical sampling and analysis of TRU waste.

With this disconnect in interpretation of Section 311, rather than argue with the NMED and risk a potential lengthy challenge, the Permittees opted for serious discussions with the state on how the revised permit modification would look, with a goal of reaching a compromise on the meaning and intent of Section 311.

After a series of meetings, it became apparent that a process was needed to assure the NMED and the public of the adequacy of AK regarding waste streams that would not undergo 100% headspace gas sampling and solids sampling.

In the spring of 2005, the NMED asked the Permittees to combine the next submittal of their Section 311 permit modification request with the Permittees' proposed modification for disposal of RH waste. This combined modification request was submitted to the NMED in April 2005, including a proposed AK sufficiency review process. This review process was designed to provide assurances to NMED and the public of AK adequacy.

FINAL CHANGES TO THE PERMIT IN RESPONSE TO SECTION 311

In December 2005, the NMED issued a draft permit proposing to implement the Permittees' proposed AK review process, which would provide assurances in lieu of 100% headspace gas sampling and solids sampling. The draft permit also proposed a revised VOC monitoring program, relying exclusively on monitoring of VOCs in the WIPP underground without the necessity of pre-disposal headspace gas data.

The proposed Permit underwent additional revisions as a result of negotiations between NMED, the Permittees, and numerous stakeholders. These negotiations continued over several months in early 2006, which proved to be quite productive in framing the final permit modification.

In general, under the final Permit, for characterizing waste, the generator/storage sites have several choices depending on the completeness of the AK record. The choices range from performing no chemical characterization or non destructive examination to performing statistical chemical characterization (as opposed to 100%) and 100% non destructive examination. The Permittees may use the AK Sufficiency Process delineated in the final Permit. This process allows the Permittees to use one of three specific scenarios in determining the extent to which waste would undergo or forego headspace gas sampling or solids sampling. These three scenarios are as follows:

- (1) Radiography or VE of the waste stream is not required, and chemical sampling and analysis is not required;
- (2) Radiography or VE of the waste stream is not required, but chemical sampling and analysis of a representative sample of the waste stream is required; or
- (3) Chemical sampling and analysis is not required, but radiography or VE of 100% of the containers in the waste stream is required.

The Permittees are required to evaluate AK Sufficiency Determination Requests submitted by generator/storage sites for completeness and technical adequacy; and provide the Requests to the NMED for review and a determination of whether the

Permittees' approval is appropriate. To date, the Permittees have submitted two AK Sufficiency Determination Requests to the NMED – one on May 2, 2007 and the other on September 4, 2007. Decisions from NMED are pending. Both are for RH TRU waste streams.

With regard to waste confirmation, the requirements are now limited to confirmation of seven (7) percent of the waste in each waste stream shipment; rather than to 100% of containers in the waste stream.

TECHNICAL AND COST IMPACTS OF SECTION 311 CHANGES SINCE IMPLEMENTATION BEGAN UNDER THE 2006 MODIFICATION

Since revision of the Permit in November 2006, the number of containers disposed at WIPP during years 2005 through 2007 have fluctuated markedly in some instances. For example, disposed containers from the Savannah River site, characterized by the Central Characterization Project (CCP), totaled approximately 429 from November 1, 2005 through October 31, 2006 (prior to Section 311 revisions); and 565 from November 1, 2006 through November 1, 2007 (after the Section 311 modification became effective). This reflects an increase of approximately twenty (20) percent from pre-Section 311 to post-Section 311 implementation. On the other hand, disposed containers from Los Alamos National Laboratory (LANL), also characterized by CCP, totaled approximately 3070 from November 1, 2005 through October 31, 2006 (prior to Section 311 revisions); and 2115 from November 1, 2006 through October 31, 2007 (after the Section 311 modification became effective). [18] The LANL data reflect a noticeable decrease in disposed containers from one year to the next, while the SRS data reflect a noticeable increase. Pinpointing reasons for these differences is difficult – it cannot be said that the increase from SRS or the decrease at LANL are directly attributable to Section 311. Numerous factors impact TRU waste characterization rates, including delays in audit approvals, alleged regulatory non-compliances and other programmatic or operational issues that may differ from year to year and from site to site.

In addition, since it has only been about a year after the Section 311 modification, limited data has been compiled and evaluated regarding impacts to characterization costs based upon changes under Section 311. A recent study, however, did attempt to address the impacts of Section 311 on the TRU waste characterization program. At DOE's request, an independent assessment of TRU waste characterization costs related to the CCP was completed by elements of the former DOE Office of Environmental Management (EM) Center for Acquisition and Business Excellence (CABE). [19] The CABE Report, finalized in September 2007, evaluated actual CCP costs for fiscal years 2005, 2006, and through September 2007, and compared these costs for all CCP activities with actual CCP production, i.e. containers certified for disposal, over the same time period. The CABE Report evaluated costs to the government for all CCP operations exclusive of performance based fee. Specific costs assessed in the CABE Report were those of labor, subcontractor costs, materials and supplies, prorated Project Office costs, and gross receipt taxes.

As set forth in the CABA Report, the average weekly number of containers processed by CCP at LANL, SRS, and the Idaho National laboratory (INL) are listed below in Table I. This Table also shows characterization costs per container – ranging from a low of \$1,800 in 2006 at INL to a high of \$5,900 at INL in 2005.

Table I. CCP Characterization Rates and Cost per Container by Site for FY 2005 – FY 2007^a

Fiscal Year	INL		LANL		SRS	
	\$/container	Containers/Week	\$/container	Containers/Week	\$/container	Containers/Week
		Actual		Actual		Actual
2005	\$5,900	68	\$2,600	45	\$3,100	80
2006	\$1,800	141	\$2,500	90	\$3,800	53
2007	\$2,400	122	\$4,000	76	\$2,600	78

^a(See Ref. 19)

According to the CABA Report, “Various factors impact the characterization cost per container and make it inappropriate to compare costs per container between sites, between years for a given site, or between parallel characterization processes unless all factors are known to be the same for both unit costs. Also a major variable in estimating the cost per container between years at a given site is the number of containers available to CCP for characterization.” Although several factors are inappropriate for determining cost impacts, based upon the above data (Table I) and other information in the CABA Report, the cost of characterizing TRU waste is deemed to be directly related to the amount of waste available for processing – i.e., the more certifiable waste containers available, the lower the costs. To support TRU waste characterization efforts, waste feed is essential. This need, however, may be difficult to satisfy in future years of the TRU waste characterization program. Many of the readily accessible TRU waste streams have been characterized and disposed at WIPP. More difficult waste streams remain to be characterized and will likely require longer periods for completion of characterization activities.

CONCLUSION

Implementation of the Permit under the revised Section 311 provisions is still in its early stages. Data are limited, as noted above. In view of these limited data and fluctuations in waste feed due to varying factors, at the current time it is difficult to determine with accuracy the impacts of Section 311 on the costs of characterizing TRU waste.

It is safe to say, however, that there have been many positive impacts flowing from Section 311. The generator sites now have more flexibility in characterizing waste. Also, RH TRU waste is now being disposed at WIPP – which was not possible before the 2006 Permit modification. As previously noted, the RH modification was approved at the same time as the Section 311 modification. Had the Section 311 changes not been implemented, RH TRU waste may not have been successfully permitted for disposal at WIPP. Changes made pursuant to Section 311 helped to facilitate approval of the proposed RH TRU modifications. For example, the three scenarios for use in AK

Sufficiency Determination Requests, described herein, are essential to securing approval of some RH TRU waste streams for eventual disposal at WIPP. Thus, even if characterization rates do not increase significantly, options for disposal of RH TRU waste, which may not have been possible without Section 311, are now available and the TRU waste disposal mission is being accomplished as mandated by Congress in the LWA. Also, with the Section 311 modification, the Permittees commenced room-based VOC monitoring in the WIPP repository, which is also a positive impact of Section 311.

Permit changes pursuant to Section 311 were a good beginning, but much more is need to encourage more efficient methodologies in waste characterization activities for TRU mixed waste destined for WIPP. Although the Permittees now have more flexibility in characterizing waste for disposal at WIPP, the processes are still lengthy, cumbersome, and paper-intensive.

As the generator sites continue to characterize waste under Section 311, more data will likely be compiled and evaluated to assess the longer term cost and technical impacts of Section 311. Also, further refinements in TRU waste characterization requirements through Permit modifications are likely in future years to eliminate, improve, and clarify remaining unnecessary and redundant Permit provisions. Continuous improvements to the TRU waste characterization program are bound to occur, resulting in even greater efficiencies in the characterization and ultimate disposal of TRU waste.

REFERENCES

1. Section 311 of the Energy and Water Development Appropriations Act for Fiscal Year 2004, Pub L. 108-137, § 311 (2004). Congress subsequently passed Section 310 of the Consolidated Appropriations Act, 2005, Pub. L. 108-447, § 310, 117 Stat. 2959 (2004), which is the same as Section 311 except for minor non-substantive word changes. (Both statutory provisions are referred to herein as "Section 311").
2. Notification of Class Three Permit Modification Implementing Section 311 of Public Law 108-137, January 2004.
3. Secretary's Final Order Approving Permit, in the Matter of Class 3 Modification to the Hazardous Waste Facility Permit for the WIPP, EPA ID. No. NM 4890139088, October 16, 2007.
4. Hazardous Waste Facility Permit for the WIPP, EPA ID. No. NM 4890139088, October 27, 1999.
5. WIPP Land Withdrawal Act (LWA), Pub. L. No. 102-579, 106 Stat. 4777-4796 (1992), as amended by Pub. L. No. 104-201, §§ 3181-3191, 110 Stat. 2851-2854 (1996).

6. Department of Energy (Test Phase) No-Migration Variance Petition, March 1989 (DOE subsequently submitted two addendums on October 1, 1989 and January 22, 1990). The Test Phase Variance was granted by the EPA, effective November 14, 1990.
7. Department of Energy (Disposal Phase) No-Migration Variance Petition, June 1996. EPA's review of the Disposal Phase Petition was terminated effective October 1, 1996 (See Termination of Review of Department of Energy Petition to EPA for a No-Migration Determination for the Waste Isolation Pilot Plant (WIPP) Under the Resource Conservation and Recovery Act, 61 FR 60704, November 29, 1996).
8. Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*
9. Conditional No-Migration Determination for the Department of Energy Waste Isolation Pilot Plant (WIPP), 55 FR 47700, November 14, 1990.
10. Notice Proposing to Grant a Conditional Variance to the Department of Energy Waste Isolation Pilot Plant (WIPP) From the Land Disposal Restrictions, 55 FR 13068, April 6, 1990.
11. Hazardous Waste Facility Permit Application for the Waste Isolation Pilot Plant, February 26, 1991.
12. Acceptable Knowledge (AK) refers to historical records and existing analysis regarding particular TRU Waste Streams.
13. 149 Cong. Rec. S11531-01 (daily ed. September 16, 2003).
14. National Academy of Sciences, "Characterization of Remote-Handled Transuranic Waste for the Waste Isolation Pilot Plant: Final Report," (2002).
15. National Academy of Sciences, "Improving the Characterization Program for Contact-Handled Transuranic Waste Bound for the Waste Isolation Pilot Plant," (2004).
16. Section 311 Permit Modification Request by the Department of Energy and Washington TRU Solutions, January 2004.
17. New Mexico Environment Department (NMED) Response to Permittees' Class 3 Permit Modification Request, December 30, 2004.
18. WIPP Waste Information System, Public Access Webpage.
19. DOE Office of Environmental Management (EM) Center for Acquisition and Business Excellence (CABE), September 2007.