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Emplacement Inspection Report

EPA INSPECTION No. EPA-WIPP-6.03-17b
OF THE
WASTE ISOLATION PILOT PLANT
June 17-19, 2003

U. S. ENVIRONMENTAL PROTECTION AGENCY
Office of Radiation and Indoor Air
Center for the Waste Isolation Pilot Plant
401 M. Street, S. W.
Washington, DC 20460

October 2003

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1.0 EXECUTIVE SUMMARY

In accordance with 40 CFR 194.21, the U.S. Environmental Protection Agency (EPA or the Agency) conducted an inspection of the U.S. Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, from June 17 to 19, 2003. The WIPP is a disposal system for defense-related transuranic (TRU) waste as defined by the WIPP Land Withdrawal Act.[1] EPA certified that the WIPP complies with the Agency's radioactive waste disposal regulations (Subparts B and C of 40 CFR Part 191) on May 18, 1998.

Six DOE transuranic waste sites have shipped waste to the WIPP for disposal. These sites are: Argonne National Laboratory- East (ANL-E) in Illinois, Los Alamos National Laboratory (LANL) in New Mexico, Idaho National Engineering and Environmental Laboratory (INEEL), Hanford Site in Washington, Rocky Flats Environmental Technology Site (RFETS) in Colorado, and Savannah River Site (SRS) in Georgia. The first shipment was received by the facility in March 1999.

EPA inspected the WIPP to verify that waste is being emplaced in the underground facility in the manner specified in DOE's Compliance Certification Application (CCA) for the WIPP (EPA Air Docket A-93-02, Item II-G-01, and associated documents). The inspection also verified the proper emplacement of backfill material (magnesium oxide) with the waste packages. EPA had one finding regarding the emplacement of waste in the WIPP with respect to commitments made in the CCA.

2.0 INSPECTION PURPOSE AND SCOPE

The purpose of this inspection was to determine whether waste sent to the WIPP has been emplaced in the underground facility in the manner specified in DOE's Compliance Certification Application for the WIPP. EPA performed the inspection under authority of 40 CFR 194.21, which authorizes the Agency to inspect the WIPP during its operational period to verify continued compliance with EPA's WIPP Compliance Criteria and the certification decision of May 18, 1998. Emplacement of waste, and backfill in particular, is relevant to compliance because the emplacement method supports models that DOE used in the WIPP performance assessment to understand the potential for transport of radionuclides out of the mined rooms. The WIPP site is operated by Washington TRU Solutions (WTS) under contract to DOE. The majority of waste related activities onsite are described by or controlled through WTS procedures. A list of all WTS procedures examined for this inspection is provided in Table A.

[1]WIPP Land Withdrawal Act, Public Law 102-579, Section 2(18), as amended by the 1996 WIPP LWA Amendments, Public Law 104-201.

Table A
Listing of WTS Procedures Examined During Inspection

- *WTS Quality Assurance Program Description*, Waste Isolation Pilot Plant Procedure WP 13-1, Revision 23; Effective Date October 15, 2002
- *Specification for Repackaged MgO Backfill*, Waste Isolation Pilot Plant Procedure D-0101, Revision 4, ECO Number 10182; Effective Date December 18, 2002
- *CH Waste Processing*, Technical Procedure WP 05-WH1011, Revision 20; Effective Date January 13, 2003
- *WIPP Waste Information System Program*, Waste Isolation Pilot Plant Procedure WP-08-NT.01, Revision 8; Effective Date February 27, 2003
- *TRU Waste Receipt*, Management Control Procedure WP-08-NT3020, Revision 8; Effective Date May 28, 2003
- *Waste Stream Profile Form Review and Approval Program*, Waste Isolation Pilot Plant Procedure WP-08-NT.03, Revision 3; Effective Date March 3, 2003

The activities within the scope of this inspection included:

- demonstration of the site's ability to receive, process, and emplace TRU wastes within the repository
- the use of magnesium oxide (MgO) backfill in appropriate amounts to fulfill CCA commitments
- maintenance of relevant waste packaging records, including the electronic WIPP Waste Information System (WWIS).

The Inspectors observed waste that had been emplaced in the repository and reviewed records documenting that waste emplacement was conducted in accordance with procedures. To date, the waste received at the repository are contact-handled (CH) transuranic wastes from ANL-E, LANL, RFETS, INEEL, SRS, and Hanford. These wastes are in one of three configurations: Standard Waste Boxes (SWBs), 55-gallon (208 liter) drums assembled in groups of seven called a Seven Pack, and Ten Drum Overpacks (TDOP). Both the SWB and Seven Pack have the same "footprint" —that is, they occupy equivalent floor space—and can be stacked in vertical columns as described in this report. The TDOPs have a different footprint and must be placed at the bottom of a column. A list of wastes emplaced in the repository as of the date of this inspection is provided in Attachment A.

3.0 PERFORMANCE OF THE INSPECTION

The EPA Inspectors were Nick Stone, the WIPP Project Officer for Region 6, and Chuck Byrum and Tom Peake, Office of Radiation and Indoor Air. Richard Farrel, the acting CBFO Waste Operations Program Manager, was the chief DOE contact for the inspection. A list of all inspection participants is provided in Table B.

Table B
Inspection Participants

INSPECTION TEAM MEMBER	POSITION	AFFILIATION
Nick Stone	Inspector	EPA Region 6
Tom Peake	Inspector	EPA ORIA
Chuck Byrum	Lead Inspector	EPA ORIA
Shankar Ghose	Observer	EPA ORIA
CBFO / WTS PERSONNEL	**POSITION**	**AFFILIATION**
Richard Farrel (acting)	Waste Operations Program Manager	DOE/CBFO
Jody Plum	RCRA Compliance Manager	DOE/CBFO
Hardy Bellows	Waste Operations Program Manager	WTS
Dave Speed	WWIS Data Administrator Team Leader	WTS

The inspection took place on June 17-19, 2003, at the WIPP facility, which is located approximately 30 miles south east of Carlsbad, New Mexico. The opening meeting with CBFO and WTS personnel was held on June 17, 2003. The Inspectors interviewed WTS personnel about current shipments and emplacement in the underground.

The EPA Inspectors then accompanied CBFO and WTS personnel into the underground repository, in order to view waste packages that had been emplaced. The Inspectors selected eight containers and noted their numbers; the records for these containers were examined later. The WTS personnel explained how waste packages are handled and emplaced and answered questions from the EPA Inspectors. The inspection continued the next day with an examination of records and interviews of WTS personnel in charge of the WIPP Waste Information System (WWIS), which took place at the Carlsbad Field Office in Carlsbad. A closeout meeting was held at the end of each day.

3.1 WASTE EMPLACEMENT/WWIS

The repository is subdivided into panels, each panel consisting of seven (7) rooms. Panel 1 is being closed with Rooms 7, 3, 2, and 1 filled. Rooms 6, 5, and 4 were only partially filled due to creep closure in those rooms. Panel 1 contains 39,414 containers. These containers consist of 38,138 drums, 1239 standard waste boxes, 35 ten drum overpacks, and two 85 gallon drums.[2] At the time of inspection, the facility was emplacing waste in the end of Room 7 in Panel 2.

Wastes are stacked in columns (also called waste stacks) three high in any combination of SWBs and Seven Packs, both having the same "footprint." The Inspectors observed several TDOPs which are placed at the base of a waste stack to accommodate its different footprint. There is no particular order in which SWBs and Seven Packs are stacked; wastes are emplaced as received from waste generators. A series of three columns spans the distance of the disposal cell from left to right with ample space between columns. Space between the repository wall and the waste column is left open at alternating ends, as represented in Table C below. A second row of three columns is emplaced parallel to the first, but each column is staggered such that it is located between two columns from the previous row; these two left-to-right rows of three columns each are designated a row and numbered, as shown in Table in C below. This results in each waste Seven Pack, TDOP, or SWB having a unique identifier that indicates its location underground according to the row, the column and the position within the column (see Attachment B). MgO is placed on top of each column or waste in 4,000 pound super sacks.

Table C
Schematic of Waste Emplacement in Columns

Column 1		Column 3		Column 5		Combination of 2 left-right
	Column 2		Column 4		Column 6	columns is a Row

The EPA inspectors randomly selected five Seven Packs and three TDOPs emplaced in the repository, and WTS personnel read their identification numbers directly off the drums. The EPA Inspectors were unable to read them directly because the area adjacent to the emplaced waste was posted as a Radiation Area and access was restricted. The containers selected are identified in Table D below.

[2] Procedure WP 05-WH1011 identifies the order of waste emplacement in the repository.

Table D
Randomly Selected Waste Containers Examined During Inspection

Site of Origin	Waste Container Identifier	Container Type
ANL	AE25971	55 Gal Drum
ANL	AE25520	55 Gal Drum
RFETS	RFDC2141	55 Gal Drum
RFETS	RFDB2749	55 Gal Drum
SRS	SRTP00196	TDOP
INEEL	IDRF004000066	55 Gal Drum
SRS	SRTP00200	TDOP
SRS	SRTP00199	TDOP

Some records were paper, while others were electronically recorded in the WIPP Waste Information System (WWIS) database. The WWIS is an on-line database system used to record, track, and document the range of activities required for shipping TRU wastes to WIPP. The WTS personnel stated that the reliance on electronic approvals instead of paper was deliberate and was designed to minimize the use of paper. The EPA Inspectors examined the following modules:

- Characterization Module, linked to the Waste Container Data Report
- Certification Module, linked to the Acceptance Report or Rejection Report
- Shipping Module, linked to the Shipment Summary Report
- Inventory Module, linked to the Nuclide Report and Waste Emplacement Report.

Dave Speed produced either paper or electronic records of all modules requested (Attachment C). All records were found to contain the required information.

3.2 MAGNESIUM OXIDE BACKFILL

Magnesium oxide (MgO) is used in the repository as backfill, as specified in DOE's Compliance Application (CCA). WTS Procedure D-0101, *Specification for Prepackaged MgO Backfill*, contains specifications for the amount and specific placement of prepackaged MgO for four waste configurations: 85 gallon Over Packs, Ten Drum Over Packs, Seven Packs, and Standard Waste Boxes. WTS Technical Procedure WP 05-WH1011, *CH Waste Processing*, details a procedure for MgO placement and the means to document that MgO placement has been accomplished correctly (CH Waste Processing Data Sheet). The EPA Inspectors observed that MgO had been placed properly in the row that was visible from outside the restricted access area. The MgO is placed on top of each column in supersacks. Records examined for the eight (8) waste containers discussed earlier in this report indicated that MgO had been placed in compliance with Technical Procedure WP 05-WH1011.

4.0 SUMMARY OF RESULTS

The Inspectors asked DOE to demonstrate compliance with the random emplacement assumption used in the Performance Assessment in the CCA. Review of the WWIS indicated that waste emplaced in Panel 1 was not homogeneously random. The CCA Performance Assessment parameters were based on an assumption that waste would be random, thereby justifying homogeneous waste parameters (i.e., average values) for the model. The Inspectors asked DOE to provide documentation of random emplacement. The documents indicate heterogenous emplacement of waste based on the acceptable knowledge associated with each container. This inspection has determined the finding listed below in reference to DOE's inability to demonstrate random emplacement consistent with the CCA.

FINDING:

The CCA assumes that DOE will emplace waste in a random (i.e. homogeneous) fashion. The inspection team reviewed the available data in the WWIS and could not determine that the waste was emplaced in a random (i.e. homogeneous) manner. DOE must perform additional analysis to confirm that the actual emplaced waste loading does not adversely affect the long-term performance of the WIPP disposal system. We expect that such analyses can be completed as part of the recertification process, which would also provide updated inventory estimates based on waste already emplaced or characterized for WIPP disposal.

Attachment A
Listing of TRU Wastes Emplaced at WIPP As of June 11, 2003

Site	Drums	Pipe Overpack	SWB	TDOP	85 Gal Overpack	Dunnage Drums	Total
ANL-E	42						42
Hanford	844	112				3	959
INEEL	14,833		158		2	518	15,511
LANL	724	2	147			51	924
RFETS	4,276	17,605	1260			43	23,184
SRS	2,268		98	188			2,554
Total	22,987	17,719	1,663	188	2	615	43,174

Argonne National Laboratory - East (ANL-E)
Hanford Site (Hanford)
Idaho National Engineering and Environmental Laboratory (INEEL)
Los Alamos National Laboratory (LANL)
Rocky Flats Environmental Technology Site (RFETS)
Savannah River Site (SRS)

Drums = 55 gallon (208 liter) steel drums
Pipe Overpack = 55 gallon drum pipe overpack
SWB = Standard Waste Box
TDOP = ten drum overpack
Dunnage = sand filled dunnage drums

Attachment B
Waste Emplacement Report Data For Five (5) TRU Waste Containers

TRUPACT No.	129	129	153	153	170	181	162	154
Container No.	AE25971	AE25520	RFDC2141	RFDB2749	SRTP00196	IDRF004000 066	SRTP00200	SRTP00199
Row Number	132	132	128	128	134	134	135	136
Height	Middle	Bottom	Top	Top	Bot/Mid	Bot/Mid	Bot/Mid	Bot/Mid
Column	6	6	2	4	6	2	5	2
Disposal Cell	Main Room	Main Room	Main Room	Main Room	Main Room	Main Room	Main Room	Main Room
Disposal Room	7	7	7	7	7	7	7	7
Disposal Panel	2	2	2	2	2	2	2	2
Disposal Date	06/16/03	06/16/03	06/13/03	06/13/03	06/16/03	06/16/03	06/18/03	06/18/03

Attachment C

- Inspector's Checklist
- Shipment Summary Reports
- Waste Emplacement Report
- Waste Container Data Reports
- Attachments 1 and 4 from WP 05-WH1011
- Container Approval/Rejection Report

WIPP Waste Emplacement Inspection Checklist

June 2003

Inspectors: Nick Stone and Tom Peake

#	Question	Comments (Objective Evidence)	Documentation	Results
	Waste Emplacement			
1	Is waste being emplaced in the underground facility in the manner specified in DOE's Compliance Certification Application (CCA)?	Observed the waste emplaced in Panel 1, within the access drift near the opening of Room 2. The waste emplacement appeared to be compliant with the requirements in the CCA.	WP 05-WH1011	Adequate
2	Are waste containers stacked in columns three high?	Inspectors observed the waste stacks. All stacks were three drums high with an MgO super sack above each.	WP 05-WH1011	Adequate
3	Are waste containers emplaced as received?	Inspectors observed waste removed from TRU-PACT II containers and staged for transport into the underground.	WP 05-WH1011	Adequate
4	Are records adequate? Randomly select five waste containers to verify records for waste approval, shipment, and receipt:	Site of Origin / Identifier / Type Rocky Flats RFDB0279 Idaho IDRF741202926 Rocky Flats RFS00855 Rocky Flats RFDA7881 Rocky Flats RFDA0323	N/A	Adequate
5	Verify documentation for the containers listed in item 4 - waste generator site transmittal of waste to WIPP, WIPP approval, shipment certification for transport to WIPP, shipment initiation documentation, shipment received at WIPP records, waste emplace in the underground, and placement of backfill [MgO].	Reviewed the Shipment Summary Report, the Waste Container Data Report, and the CH Waste Processing Data Sheet (Attachment 1 of WP 05-WH1011) for each of the selected drums.	Attachments 1 and 4 of WP 05-WH1011.	Adequate

WIPP Emplacement Inspection Checklist

#	Question	Comments (Objective Evidence)	Documentation	Results
	Backfill [MgO] Emplacement			
6	Is DOE properly emplacing backfill material (magnesium oxide [MgO]) with the waste packages?	Inspectors observed the MgO super sacks placed on top of the waste stacks.	WP 05-WH1011	Adequate
7	Are Super Sacks placed on top of waste stacks as described in Volume 1, Section 3.3.3 of the CCA; approximately 4,000 pounds, multi-wall construction with a vapor and moisture barrier?	Inspectors observed the MgO super sacks to be constructed of polymer multi-walled material and sized properly to contain 4,000 lbs of MgO.	WP 05-WH1011	Adequate
#	Question	Comments (Objective Evidence)	Documentation	Results
	WIPP Waste Information System (WWIS)			
8	Is DOE maintaining records of waste shipments and emplacement properly?	Reviewed the WWIS reports and WP 05-WH1011 attachments for the five selected drums.	WP 05-WH1011	Adequate
9	Do the characterization module, certification module, shipping module, and inventory module adequately record the required information?	Interviewed Dave Speed and reviewed the characterization module, certification module, shipping module, and inventory module for each of the five drums selected.	WP 05-WH1011	Adequate
10	Characterization Module - Review a WWIS Waste Container Data Report. Does this report adequately record the Waste Stream Profile Form information?	Reviewed the Waste Container Data reports for each of the selected drums. Determined that each report reflected the Waste Stream Profile form information.	WP 05-WH1011and RP0360	Adequate
11	Characterization Module - Does the data administrator verify that DOE/CBFO has granted certification and transportation authority to the generator/shipper site prior to review of generator/shipper characterization data?	Reviewed the Container Approval/Rejection Report. This document confirms that CBFO certifies and grants authority to each generator prior to review of the characterization data.	WP 05-WH1011and RP0510	Adequate

WIPP Emplacement Inspection Checklist

#	Question	Comments (Objective Evidence)	Documentation	Results
	WIPP Waste Information System (WWIS)			
12	Certification Module - Examine an Acceptance Report and a Rejection Report. Do these adequately record waste information?	Reviewed RP0510 "Container Approval/Rejection Report."	WP 05-WH1011and RP0510	Adequate
13	Is the generator/shipper denied any further write access to certification information after the data passes the limit and edit check and a review by the WWIS data administrator?	In discussions with Dave Speed and Mike Strum inspectors determined that the generator sites are denied write access to WWIS data that has been confirmed by CBFO prior to shipment.	WP 05-WH1011	Adequate
14	Shipping Module - Review the Shipment Summary Report. Does the report correctly record the containers shipped?	Reviewed the Shipment Summary Report for each of the drums selected. Determined that each drum was accurately described in the report.	WP 05-WH1011and RP0390	Adequate
15	Inventory Module - Review the Container Emplacement Report. Does this report adequately record the date of receipt, disposal locations of containers, and the emplacement of MgO?	Reviewed the Container Emplacement Report for each of the drums selected. Determined that the report accurately showed the receipt date, location, and placement of MgO.	WP 05-WH1011and RP0440	Adequate
16	Does the WWIS adequately document waste shipment and emplacements information for waste containers selected item 4 above?	After review of the documents provided, inspectors determined that the WWIS accurately reflects the waste shipment and emplacement information for the drums selected in Item 4.	WP 05-WH1011and RP0390, RP0440, RP0360, RP0510, and Attachments 1&4 of WP-05-WH1011	Adequate
17	Can DOE demonstrate that the waste emplacement conforms to the assumed waste loading conditions as specified in 194.24(f)? In the CCA and as of 2003, the waste must be randomly (i.e., homogenously) emplaced to conform with the performance and compliance assessment assumptions.			Finding