UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 8 2005

Dr. Inés Triay, Acting Manager
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

OFFICE OF
AIR AND RADIATION

COPY

Dear Dr. Triay:

The Environmental Protection Agency (EPA) inspected the waste emplacement process and procedures at the Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP) from May 17-19, 2005. Enclosed with this letter is EPA's final emplacement inspection report. This letter and the inspection report will be placed in EPA's public dockets.

As a result of the emplacement inspection, EPA issued a letter to DOE on May 19, 2005, authorizing the emplacement of super-compacted waste from the Advanced Mixed Waste Treatment Project (AMWTP) waste in WIPP. In that letter EPA stated that there were no findings or concerns related to this inspection. However, upon further review, we have identified one concern that DOE needs to address related to maintaining information on the magnesium oxide (MgO) emplacement.

As discussed in the final inspection report, EPA's concern states that DOE needs to "back-populate" the WIPP Waste Information System with the amount of MgO in the repository, by room, to facilitate future estimates of the total MgO emplaced, and therefore the overall safety factor. DOE should be able to identify, when queried, where important transitions in the MgO emplacement history occur, such as initially tracking the MgO and the switch to no mini-sacks. EPA expects this to be completed by the end of August, 2005. We understand that a simple change can be made to the WWIS to achieve the MgO reporting that we have identified.

If you have questions regarding this inspection, please contact Tom Peake at 202-343-9765.

Sincerely,

Bonnie C. Gitlin, Acting Director
Radiation Protection Division

Enclosure

cc: George Basabilvaso, DOE/CBFO
Steve Casey, DOE/CBFO
Russ Patterson, DOE/CBFO
Steve Zappe, NMED

UNIQUE #	DOE UFC	DATE REC'VD	ADDRESSEES
0502759	5486.CD	JUL 18 2005	See back List

~~[illegible]~~ V. Davis	D. BIGNELL	PATTERSON
PIPER	J. ZWICKL	JOHNSON
NELSON	M. NAVARRETE	CHISM
PLUM	GALBRAITH	HOLLAND
WATSON	MCCALLISTER	MIEHLS
A. PANGLE	ZVONAR	D. MERCER
V. WALDRAM/P. FLOREZ	WIPP OPERATING RECORDS	S. CASEY G. BASABILVAZO

DOCKET NO: A-98-49
Item: II-B3-81

Emplacement Inspection Report

EPA INSPECTION No. EPA-WIPP-05021
OF THE
WASTE ISOLATION PILOT PLANT
May 17-19, 2005

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

June 2005

Table of Contents

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 May 17 to May 19, 2005 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.

The purpose of this annual inspection was to determine if waste sent to WIPP during the past year has been emplaced in the underground facility in the manner specified in DOE's Compliance Certification Application and other approvals. In addition to the normal emplacement inspection activities, a specific focus of this inspection was to determine if Magnesium Oxide (MgO) will be emplaced in the underground and appropriately tracked in the WIPP Waste Information System as required by EPA's letters (Docket A-98-49, Item II-B3-68, March 26, 2004 and Docket A-98-49, Item II-B3-72, May 20, 2004).

EPA examined objective evidence that additional MgO sacks used to control the impact of high CPR (cellulosic, plastic and rubber material) waste in the underground will perform as intended. "Objective evidence" is the documentation and observations that EPA can use to verify that DOE is conducting its operation appropriately.

EPA concluded that DOE's emplacement activities are adequate, that CPR is appropriately tracked and accounted, that additional MgO when needed is calculated properly (beginning with Panel 2, Room 1), and that all MgO is emplaced properly. EPA did not identify any findings from this inspection. EPA did, however, identify one concern. DOE needs to "back-populate" the WIPP Waste Information System with the amount of MgO in the repository, by room, to facilitate future estimates of the total MgO emplaced. DOE should be able to identify, when queried, where important transitions in the MgO emplacement history occur, such as initially tracking the MgO and the switch to no mini-sacks. In addition to this concern, EPA made two recommendations for improvements to DOE's waste emplacement activities. EPA recommends that DOE write a document that describes, in sufficient detail, how waste is received and emplaced and how the proper amount of MgO is calculated and emplaced. EPA also recommends that the MgO emplacement training manual be made a standard operating procedure.

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

2.0 INSPECTION PURPOSE AND SCOPE

The purpose of this inspection was to determine whether wastes sent to the WIPP have 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, are 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 WTS procedures examined for this inspection is provided in Table A.

Table A
Listing of WTS Procedures Examined During Inspection

- *WTS Quality Assurance Program Description*, Waste Isolation Pilot Plant Procedure WP 13-1, Revision 24; Effective Date August 8, 2003
- *Specification for Repackaged MgO Backfill*, Waste Isolation Pilot Plant Procedure D-0101, Revision 7, ECO Number 11280; Effective Date May 12, 2005
- *CH Waste Processing*, Technical Procedure WP 05-WH1011, Revision 22; Effective Date May 13, 2005
- *WIPP Waste Information System Program*, Waste Isolation Pilot Plant Procedure WP-08-NT.01, Revision 12; Effective Date May 5, 2005
- *WIPP Waste Information System User's Manual* WWIS Version 5.0, DOE/CBFO 97-2273, Rev. 8, December 16, 2004

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,
- tracking of CPR and MgO, and calculation of the MgO safety factor,
- verifying that waste handling staff are trained and qualified to perform waste emplacement,
- maintenance of relevant waste packaging records, including the electronic WIPP Waste Information System (WWIS).

The inspectors observed waste being emplaced in the underground and waste that had been recently placed in the repository. The inspectors also reviewed records documenting that waste emplacement and MgO tracking were conducted in accordance with procedures. To date, the waste received at the repository are contact-handled (CH) transuranic wastes from 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, Savannah River Site (SRS) in Georgia, and the Nevada Test Site (NTS) in Nevada. These wastes are in one of several configurations: Standard Waste Boxes (SWBs), 55-gallon (208 liter) drums assembled in groups of seven called a Seven Pack, and Ten Drum Overpacks (TDOP). 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 Chuck Byrum, Tom Peake, and Shankar Ghose from the Office of Radiation and Indoor Air. George Basabilvaso, the CBFO WIPP Site 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
Chuck Byrum	Inspector	EPA ORIA
Tom Peake	Inspector	EPA ORIA
Shankar Ghose	Inspector	EPA ORIA
CBFO / WTS PERSONNEL	**POSITION**	**AFFILIATION**
George Basabilvaso	Director, Office of Disposal	DOE/CBFO
Steve Casey	General Engineer	DOE/CBFO
Dave Kump	WTS WWIS Manager	WTS
Hardy Bellows	Waste Operations Program Manager	WTS
Terry Batchelder	Waste Handling Engineer	WTS
Dave Speed	WWIS Data Administrator Team Leader	WTS

The inspection took place on May 17-19, 2005, at DOE's Carlsbad Office and at the WIPP facility, which is located approximately 26 miles south east of Carlsbad, New Mexico. The opening meeting with CBFO and WTS personnel was held at 2:00 PM on May 17, 2005. George Basabilvaso, Hardy Bellow, and Dave Speed provided an overview presentation. Next the inspectors interviewed WTS personnel about current shipments and emplacement of waste and MgO in the underground.

The EPA inspectors accompanied CBFO and WTS personnel into the underground repository on the afternoon of May 18, 2005 in order to view waste packages that had been emplaced. Inspectors selected five containers and noted their numbers; the records for these containers were examined later in the WWIS computer database to verify correct waste information. 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, Dave Speed and Mike Strum. Dave Speed is in charge of the WIPP Waste Information System (WWIS) and Mike Strum is the WWIS Data Adminstrator. These discussions took place at the Carlsbad Field Office.

3.1 WASTE EMPLACEMENT/WWIS

The repository is subdivided into panels, each panel consisting of seven (7) rooms. Waste is currently being emplaced in Room 1 of Panel 2 and Room 7 of Panel 3. At the time of the inspection, the facility was emplacing waste in Panel 3 Room 7. No waste was being processed in the waste handling building at the time of inspection.

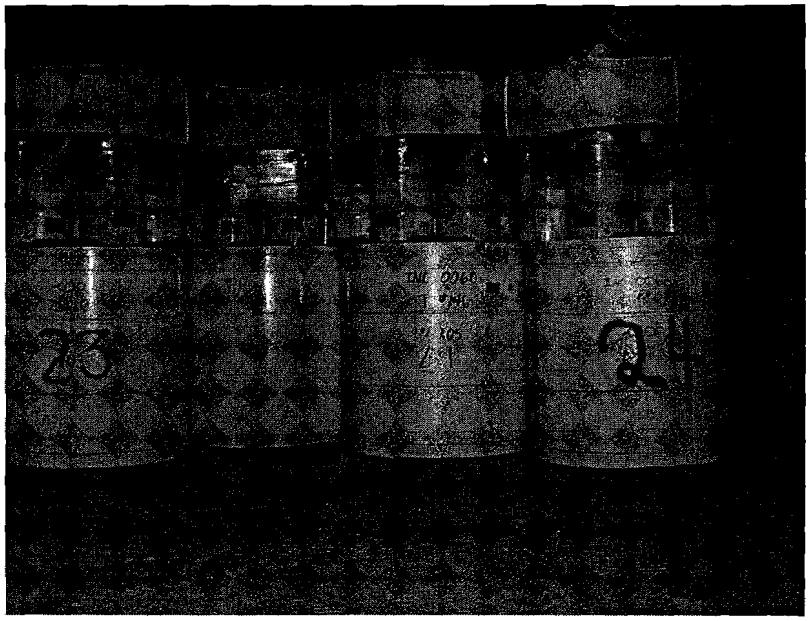


Figure 1 Ten Drum Overpacks placed in the underground with empty drums and supersacks.

Waste containers are stacked in columns (also called waste stacks) combining SWBs, Seven Packs, and TDOPs. TDOPs are always placed on the floor of the room, using the bottom and middle position of a waste column. When only TDOPS are being emplaced because of the lack of other wastes, empty dunnage drums are placed on top of TDOPs [Figure 1] and the MgO sacks are then placed on the dunnage drums. SWBs and Seven Packs are emplaced in no particular order with most wastes emplaced as received. The waste columns are in a series of staggered rows, with a row consisting of three columns that span the distance of a disposal room from left to right [Figure 2].

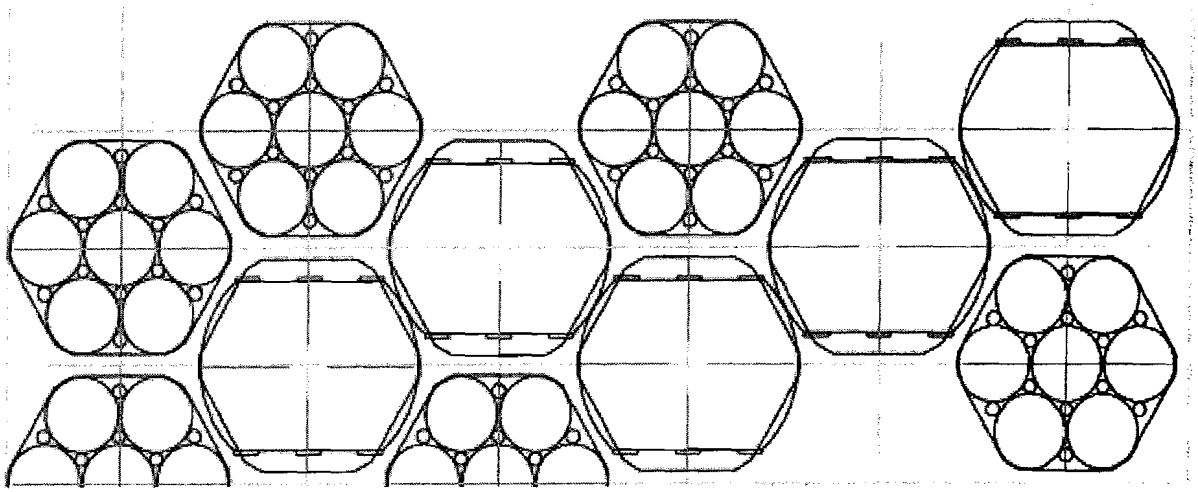


Figure 2. Example of Rows of Waste. Source: Attachment 2, Payload Assembly Positioning, *CH Waste Processing*, Technical Procedure WP 05-WH1011, Revision 22, Attachment 2; Effective Date May 13, 2005

Some (1-2 feet) space between the repository wall and the waste column may be left open, however, we observed that the TDOPs were placed touching or nearly touching the repository wall. A second row of three columns is emplaced parallel to the first, with each column placed between two columns from the previous row to minimize unusable space. These two left-to-right rows of three columns each are designated a row and numbered. 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 in 4,200 pound super sacks.

The EPA inspectors randomly selected one Standard Waste Box, and four Ten Drum Overpacks emplaced in the repository in two different rooms. The inspectors read the shipment identification numbers directly off the emplaced containers. The containers selected are identified in Table C below. Specific information on these containers is in Attachment B.

Table C
Randomly Selected Waste Containers Examined During Inspection

Site of Origin	Waste Container Identifier	Container Type
SRS	SRSB00200	Standard Waste Box
Hanford (RL)	0024917	TDOP
INL	BN10040647	TDOP
SRS	SRTP01301	TDOP
SRS	SRTP01299	TDOP

Some waste container records were paper, while others were electronic, with data recorded in what are called 'Forms' in the WIPP Waste Information System (WWIS) computer 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/Rejection Report
- Shipping Module, linked to the Shipment Summary Report
- Inventory Module, linked to the Nuclide Report, Waste Emplacement Report and the MgO safety factor calculation on the Emplaced Containers Underground Form 0420.

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). EPA has required DOE to maintain an MgO safety factor of 1.67 or greater, which means that at least 1.67 times the needed MgO will always be in the repository to control chemical conditions and remove carbon dioxide gas. However, DOE has not had the capability to track the MgO or determine the safety factor on a room basis until recently as required by the EPA. DOE started specific tracking of MgO emplaced in Room 1, Panel 2 and Room 7, Panel 3. A focus of this inspection was to identify whether DOE could accomplish these tasks before the disposal of supercompacted waste and its associated higher content of cellulosic, plastic, and rubber materials (CPR).

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). Attachments to WP 05-WH1011 have been

developed for recording the emplaced MgO underground or later entry into the WWIS. The EPA inspectors observed that MgO had been placed properly in each row that was visible. The MgO is placed on top of each waste column in supersacks. However, DOE has developed the option of emplacing additional MgO in racks containing 5 supersacks [Figure 3] if the safety factor falls below 1.67.

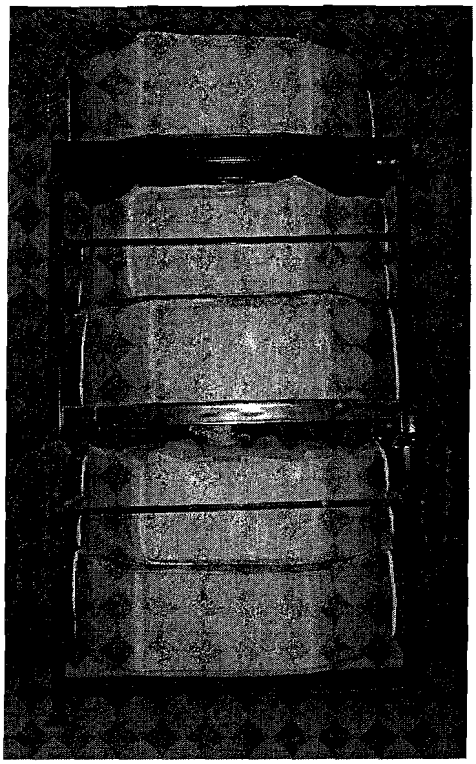


Figure 3 4200 pound supersacks on platform to be used if the MgO safety factor falls below 1.67.

EPA inspected the capabilities of DOE to track the total amount of MgO placed in the WIPP as waste is emplaced. We determined that DOE does have a system to track and calculate the actual MgO placed with WIPP waste at disposal. DOE incorporated the safety factor calculation into the WWIS in the Inventory Module Emplacement Container Form. DOE tested this safety factor calculation in a software validation test (MgO Emplacement Process and Safety Factor Calculation). In addition DOE can calculate the safety factor "on demand" for a room. The safety factor is now calculated on a daily basis at the end of each shift. This is important because a certain amount of MgO is necessary to act as the required engineered barrier. If too little MgO is placed in a room in the repository, then its pH buffering chemical conditions and carbon dioxide sequestration and removal, capabilities could be comprised, and actinides could dissolve more readily than predicted. DOE demonstrated that the safety factor is over 3.5 in the two rooms where disposal is currently occurring.

EPA inspectors were also interested in DOE's ability to produce objective evidence to demonstrate that the MgO information was being input appropriately into the WWIS. DOE developed training materials that addressed the input of MgO quantities into the WWIS and then calculate of the safety. These were found in the Waste Handling Manager's Training Course: Evaluation Criteria for Emplacement of Additional MgO. The information in this training material is essentially a procedure for the Waste Handling Engineers to use in inputting the MgO data into the WWIS. In addition, the Waste Handling Engineers used the WIPP WWIS Users Manual for general data entry and manipulation of WWIS data.

EPA is concerned, however, about the output of a query to identify the amount of MgO in the repository. In analyzing information from the query of inventory (from WWIS query in file mat_parms_epa8.pdf) data of waste components, it was not clear what the reported MgO mass represented. DOE staff clarified that the reported MgO mass only represented the two rooms in which MgO had been tracked to date. This is confusing now, and will only become more so as more waste and MgO is placed in WIPP. The WWIS needs to better report the MgO data, so that it is clear what is actually being presented in the type of query made during the inspection.

3.3 COMPARISON WITH INVENTORY LIMITS

EPA has established limits for certain important waste components at WIPP by approving a performance assessment. Some limits, such as for iron and other metals, are minium limits. The amount of iron base metal alloys is at approximately one-tenth of the 2E7 kg needed by closure, but steel provides an additional 6.1E6 kg, so that WIPP has attained over one-third of the iron needed. With over 168,000 kg of aluminum and other non-ferrous metals, the WIPP has already exceeded the minium amount stipulated in the certification.

Other waste component limits are maximum limits. Of special concern is the maximum limit on the total amount of cellulosic, plastic and rubber materials (CPR). DOE may not exceed 2.2E7 kg of CPR in the repository. As of this inspection, the WIPP contained 1.8E6 kg of CPR in waste and 0.5E6 kg of CPR in packaging material for a total of approximately 2.3E6 kg of CPR (from WWIS query in file mat_parms_epa8.pdf). Most of this is split between the cellulosic and plastic materials; the mass of rubber materials account for about 4% of the total mass of CPR. Thus, the WIPP contains about 10% of the CPR limit with two of the ten planned panels closed or essentially closed to new waste. This is not a problem, but with the disposal of supercompacted waste, however, this amount is expected to increase greatly.

4.0 SUMMARY OF RESULTS

The inspectors reviewed the emplacement operation and the associated documentation for selected shipments. It was determined that DOE is adequately emplacing waste in the repository as specified in the CCA dated May 18, 1998. EPA concluded from this inspection that DOE's emplacement activities are adequate, the CPR is appropriately tracked, the safety factor is calculated properly along with the additional MgO needed (since DOE began to track the MgO), and that all MgO is emplaced properly. DOE calculated the current safety factor is well above the mandated 1.67 on a room basis for Room 1, Panel 2 and Room 7, Panel 3. EPA did not identify any findings during this inspection.

4.1 Concern

The WWIS currently only reports the total MgO emplaced since DOE began to formally track the MgO and include the information in the WWIS. It does not include the MgO from rooms before Panel 2, Room 1. The WWIS database needs to be back-populated with the amount of MgO in WIPP to facilitate future estimates of the total MgO emplaced with the waste. Queries to the WWIS need to be able to identify whether the MgO information produced is on a repository or room scale.

4.2 RECOMMENDATIONS

1) The MgO emplacement training manual should be made a standard operating procedure. This will facilitate future inspections.

2) By the time of the next inspection, DOE should describe, in one document, how waste is received and emplaced and how the proper amount of MgO is calculated and emplaced.

Attachment A
Number of Contact Handled TRU Waste Containers
Underground at WIPP As of May 18, 2005

Site	Drums	Pipe Overpack	SWB	TDOP	85 Gal Overpack	Dunnage Drums	Dunnage SWBs	Total
ANL-E	318			12		4		334
Hanford	2610	1834		44		78		4566
INEEL	15014		158	258		519		15949
LANL	1444	2	166			94		1706
LLNL	678		2			8		688
NTS	1386		8					1394
RFETS	15460	21174	3910	4		529		41077
SRS	2268		197	1292				3757
WIPP	2				2	714	13	731
Total	39180	23010	4441	1610	2	1946	13	70202

NOTE: The drums listed for WIPP consist of two drums of site generated waste, two drums from RFETS that were overpacked on site, and 154 salt-filled and 560 empty dunnage drums added to certain TDOP assembles.

Argonne National Laboratory - East (ANL-E)
Hanford Site (Hanford)
Idaho National Engineering and Environmental Laboratory (INEEL)
Los Alamos National Laboratory (LANL)
Lawrence Livermore National Laboratory (LLNL)
Rocky Flats Environmental Technology Site (RFETS)
Nevada Test Site (NTS)
Savannah River Site (SRS)
Waste Isolation Pilot Plant (WIPP)

Drums = 55 gallon (208 liter or 0.208 m^3) steel drums
Pipe Overpack = 55 gallon drum pipe overpack
SWB = Standard Waste Box
TDOP = ten drum overpack
Dunnage = inert drums used to complete waste assemblies

Attachment B
Waste Emplacement Report Data For Five TRU Waste Containers

TRUPACT No.	TP175	TP143	TP154	TP177	TP150
Shipment No.	TPIN050062	RL050028	SR050046	SR050048	SR050050
Container No.	BN10040647	0024917	SRSB00200	SRTP01301	SRTP01299
Type	TDOP	TDOP	SWB	TDOP	TDOP
Row Number	24	22	33	41	42
Column	2	2	3	3	2
Height	B	B	T	B	B
Disposal Cell	Access Drift	Main Room	Access Drift	Main Room	Main Room
Disposal Room	1	1	7	7	7
Disposal Panel	2	2	3	3	3
Emplacement Date	4/26/2005	4/26/2005	5/13/2005	5/17/2005	5/18/2005

Height code: B = bottom, T = Top

Site of Origin	Waste Container Identifier	Container Type
SRS	SRSB00200	Standard Waste Box
RL	0024917	TDOP
INL	BN10040647	TDOP
SRS	SRTP01301	TDOP
SRS	SRTP01299	TDOP

Attachment C
2005 MgO Emplacement Inspection Checklist

#	Question: Waste Emplacement	Comments and Objective Evidence	Results
1	Is waste being emplaced in the underground facility in the manner specified in DOE's Compliance Certification Application (CCA)?	Yes. Procedure WP 05-1011, Rev. 22, *CH Waste Processing* (cob-emp-D-05), steps 4 -6, pages 21 through 24 describes the emplacement process. Our visual observation of actual waste being put into Panel 3, Room 7 (See pictures below) verify that waste is being emplaced appropriately.	Satisfactory
2	Are waste containers stacked in columns three high or appropriately given the type of container?	Yes. Our visual observation (See pictures below) confirm that waste is being stacked appropriately. TDOPs were being emplaced by forklift. Since there were no other waste containers besides the TDOPs, DOE was putting in a TDOP with empty drums placed on top of the TDOPs and an MgO supersack placed on top of the empty drums. Procedure WP 05-1011, Rev. 22, *CH Waste Processing*, Emplacement map–Payload Assembly Positioning, Attachment 2 of the procedure shows how waste is assembled underground in the waste rooms. Attachment 4 of the procedure is used for inputting the location of each container into the WWIS.	Satisfactory
3	Are waste containers emplaced as received?	Yes. During our inspection we observed that DOE was not storing waste in the Waste Handling Building and that waste was being emplaced usually within 24 hours of receipt. We also observed that it did not appear that DOE was selecting, or staging, was emplacement. Therefore, waste is emplaced as received. Procedure WP 05-1011, Rev. 22, *CH Waste Processing* does not describe any requirements to hold or store waste waiting to be emplaced.	Satisfactory
4a	Are records adequate? Randomly select five waste containers to verify records for waste approval, shipment, and receipt.	Yes, see question 5 below. Inspector selected the following containers: BN10040647 TDOP, 0024917 TDOP, SRSB00200 SWB, SRTP01301 TDOP, and SRTP01299 TDOP.	Satisfactory
4b	Does the WWIS adequately document waste shipment and emplacements information for waste containers selected item 4 above?	Yes. This information is accessed through multiple reports, such as container reports, shipment reports and waste emplacement reports. Also, the information used in the WWIS is from the underground emplacement map and Attachment 4 of WO 05-WH1011 which is how the emplacement staff records the location in the underground.	Satisfactory

Attachment C
2005 MgO Emplacement Inspection Checklist

#	Question: Waste Emplacement	Comments and Objective Evidence	Results
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].	Procedure WP 05-1011, Rev. 22, *CH Waste Processing Attachments* 3, 4, 5, and 6 document how waste containers and MgO are actually emplaced underground. Inspector examined shipment reports and container reports generated by the WWIS computer based database system. Inspector verified that the WWIS documented that the generator site transmitted waste information to WIPP, WIPP reviewed and approved the waste for shipment, that waste was placed underground, and that MgO was properly emplaced.	Satisfactory
6	Is DOE properly emplacing backfill material (magnesium oxide [MgO]) with the waste packages?	Yes. Visual observation (See pictures below). Procedure WP 05-1011, Rev. 22, *CH Waste Processing* Section 5.0, page 24, requires MgO to be emplaced. Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05) give specific instructions and decision making criteria to waste emplacement staff. (file: May 18 2005 Emplacement Inspection.pdf) Training essentially establishes another standard operating procedure. The combination of the requirement in WP 05-1011 and training WP14-TR3005 provide adequate evidence that MgO is emplaced properly.	Satisfactory
7a	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?	Yes. Visual observation (See pictures below) Procedure WP 05-1011, Rev. 22, CH Waste Processing, Section 5.0 states the requirement that MgO is to be placed on top of each waste column (and that additional MgO (5.2) will be emplaced as needed to assure a Safety Factor of 1.67, see questions 7b and 9 below) and Specification for Prepackaged MgO Backfill, describes the specifications for each MgO Super Sack.	Satisfactory
7b	For the MgO needed for high CPR, are there procedures or documentation for the WHE or WHM (or other appropriate personnel) identifying **when** additional MgO is needed?	Yes. Procedure WP 05-1011, Rev. 22, *CH Waste Processing* Section 5.0 page 24 states the requirement to add MgO as needed and that the safety factor must be greater than 1.67 by the time the end of a room is reached. Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05) describes the steps staff will use to decide when to add more MgO. (file: May 18 2005 Emplacement Inspection.pdf) Training essentially establishes another standard operating procedure—> should be put into a formal SOP, not just a training document.	Satisfactory With Comment.

Attachment C
2005 MgO Emplacement Inspection Checklist

#	Question: Waste Emplacement	Comments and Objective Evidence	Results
7c	Is there documentation that identifies for the WHE or WHM (or other appropriate personnel) **where** the additional MgO should be placed?	Yes. Procedure WP 05-1011, Rev. 22, *CH Waste Processing* Section 5.0 requires additional MgO as needed and states that MgO is to be emplaced on the top of each waste column and Attachment 6 shows the emplaced location of MgO. Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05), instructs the waste emplacement staff how the additional MgO is to be emplaced.	Satisfactory
7d	Is there documentation that identifies **how** the MgO should be placed with high CPR waste?	Yes. MgO emplacement plan shows 5 Super Stacks of MgO placed on the specially designed rack (called the BRT–big red thing; see picture below). Flowchart in Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05): instructs the waste emplacement how to use the BRT, racks, to add additional MgO as needed. During Hardy Bellows presentation, he stated that they would emplace additional MgO in full racks of 5 stacks of MgO Super Sacks if the safety factor went below 1.67. Inspector concluded that this approach is reasonable, and still achieves the goal of sustaining the Safety Factor at 1.67 per room.	Satisfactory
8	Is DOE properly tracking the MgO backfill so that the MgO safety factor can be accurately calculated?	Yes. WWIS Version 5.1 Software Validation Test, MgO Emplacement Process and Safety Factor Calculation, Revision 0, March 2, 2005 verifies that the WWIS software works as expected. Dave Speed discussion (overview handout) and demonstrated how the safety factor is calculated as waste is emplaced and that the number of additional super sacks are recommended by the WWIS as waste emplacement proceeds. See WWIS screenshots below.	Satisfactory
9	Is DOE assuring that the 1.67 safety factor being maintained on a room basis?	Yes. Procedure WP 05-1011, Rev. 22, *CH Waste Processing* Section 5.0 states the requirement that the safety factor of 1.67 must be maintained. Inspector examined screenshots in Supplemental Instructions for MgO Emplacement in WWIS, verified as of March 14, 2005 (cob-emp-H-05). Dave Speed showed that the safety factor is calculated and tracked on a room basis to assure that adequate MgO is placed in each room.	Satisfactory

Attachment C
2005 MgO Emplacement Inspection Checklist

#	Question: Waste Emplacement	Comments and Objective Evidence	Results
10	Is DOE emplacing supersacks of MgO in such a way to assure that all sacks will break?	Yes. Post-inspection email (see below) from George Basabilvaso states that racks will fail at 3.3% of lithostatic pressure. Specification for Prepackaged MgO Backfill, D-0101, Revision 7–bags (MgO Super Sacks) need to maintain integrity for 2 years. With rack failure, pressure on bags will break the bags. Also additional super stacks will be emplaced in stacks of 5, therefore making it more likely that they will break.	Satisfactory
11	Is DOE maintaining records of waste shipments and emplacement properly?	Yes. WWIS adequately maintains records properly. Comparison of underground emplacement map and various WWIS reports are in agreement.	Satisfactory
12	Do the characterization module, certification module, shipping module, and inventory module adequately record the required information?	Yes. This was captured in computer screenshots of these various modules of the WWIS computer database system. See Waste Container Data Report (RP036_epa4_0024917.pdf), Shipment Summary Report (RP039_epa3_RL050028.pdf), Container Approval/Rejection Report (RP0510_epa6_Rejection_AcceptanceReport.pdf) for examples.	Satisfactory
13	Characterization Module - Review a WWIS Waste Container Data Report. Does this report adequately record the Waste Stream Profile Form information?	Yes. The Waste Container Data Report is comprehensive and adequately records the Waste Stream Profile information. See RP036_epa4_0024917.pdf for an example of a waste container report..	Satisfactory
14	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?	Yes. Mike Strum, database administrator conducts a review of waste to ensure that it has been approved by DOE/CBFO. He puts these approvals, e.g., assay methods, into WWIS (See RP0510_epa6_Rejection_AcceptanceReport.pdf). Follows WP08 NT.03, Rev. 6 (8/12/04). Documentation is in RF107_WWISDataBaseAdminReview.pdf (cob-emp-XX-05) of a waste stream profile form review.	Satisfactory
15	Certification Module - Examine an Acceptance/Rejection Report. Does this adequately record waste information?	Yes. Automated WWIS checking prior to this step has reduced rejections by the WIPP site. Approval is on a container basis. See RP0510_epa6_Rejection_AcceptanceReport.pdf for an example.	Satisfactory
16	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?	Yes. Users have different levels of authorization and privileges. We examined a shipper generator on WWIS FM0320 and saw an example. See (WWIS_SITE_USER_AUTH_SCREEN.pdf) screenshot of the example.	Satisfactory

Attachment C
2005 MgO Emplacement Inspection Checklist

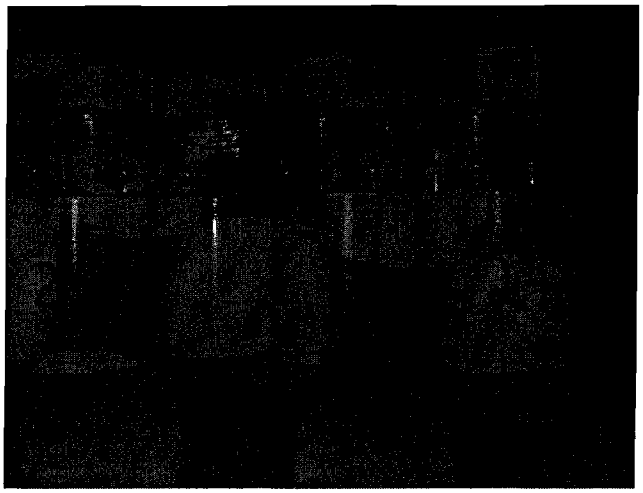
#	Question: Waste Emplacement	Comments and Objective Evidence	Results
17	Shipping Module - Review the Shipment Summary Report. Does the report correctly record the containers shipped?	Yes. We have copies of several reports that identify the containers shipped correctly and they cross-check with other reports. See RP039_epa3_RL050028.pdf for an example.	Satisfactory
18	Inventory Module - Review the Waste Emplacement Report. Does this report adequately record the date of receipt, and disposal locations of containers?	Yes. Dave Speed demonstrated this. Several reports were obtained. See RP0440_epa_7_SRSB00200.pdf for an example.	Satisfactory
19	Does the WWIS properly track MgO emplaced quantity and location? Where is this described?	Yes. WWIS estimated about 3.7 E5 kg of MgO have been emplaced (mat_parms_epa8.pdf). WO 05-WH1011, *CH Waste Processing*, Section 5.0 states that the required information is to be recorded in Attachment 6. Attachment 6 records the actual amount of MgO and its location in the waste room. This information is input by the waste handling engineer into the WWIS computer database in the Emplace Containers Underground screen. Inspectors verified that MgO quantity and location is properly done. However, the WWIS tracks MgO beginning with Panel 2, Room 1 and Panel 3, Room 7. The 3.7 E5 kg value therefore is only for two rooms and approximately 200 stacks of waste. DOE should identify the amount of MgO in the entire repository. Also, in future queries, the total MgO amount should be identified as to whether it is a total amount or for a select number of rooms.	Satisfactory With comment
20	Does the WWIS accurately calculate the 1.67 safety factor and recommend the proper amount of MgO to emplace? Where has this been verified?	Yes. WWIS Verstion 5.1 Software Validation Test, MgO Emplacement Process and Safety Factor Calculation, Revision 0, March 2, 2005 documents the testing of the new modules added to WWIS to track MgO and calculate the safety factor on an ongoing basis room by room. This activity was demonstration by Dave Speed. Inspectors verify that the safety factor is properly calculated and that the proper amount of MgO is recommended to the waste emplacement staff at the site on a room basis.	Satisfactory

Attachment C
2005 MgO Emplacement Inspection Checklist

#	Question: Waste Emplacement	Comments and Objective Evidence	Results
21	Is MgO implementation appropriately addressed in WWIS documentation? Where is it described?	No, Not in WWIS documentation. However, it is adequately addressed in training information for the waste handling engineers/managers at the WIIP site. Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05): Training essentially establishes another standard operating procedure. EPA inspectors believe that the training records provide an adequate framework for how MgO, additional MgO, should be emplaced, when to add additional MgO, and how to stack the MgO super sacks onto the racks, BRT. However, we believe that because of the importance of this activity that it should be captured in a site or WWIS Standard Operating Procedure (SOP) that is controlled.	Satisfactory
22	Is there documentation that describes how the site will use and implement the MgO module of the WWIS?	Yes. Training notes: Evaluation Criteria for Emplacement of Additional MgO, by Hardy Bellows, 5/11/05–WP 14-TR3005 (cob-emp-G-05) instructs the waste emplacement staff of how to interfaced with the WWIS Emplacement Container Underground module, how additional MgO is calculated, how the WWIS software recommends how much MgO to add, and how to stack the MgO Super Stacks on the racks, BRT.	Satisfactory

Checklist Pictures

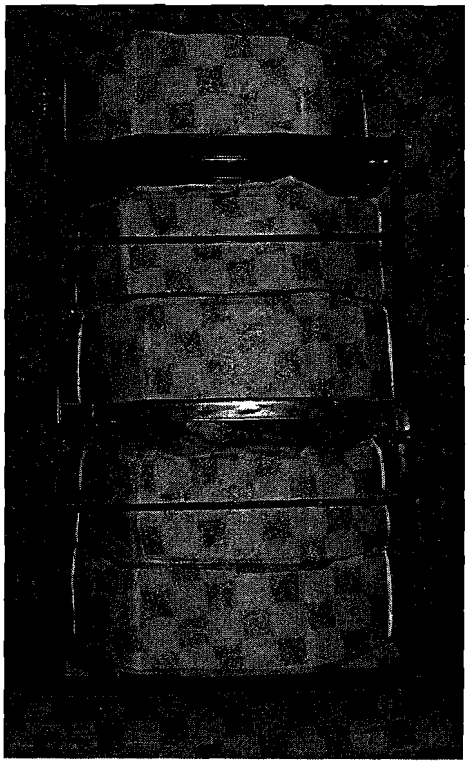
Checklist items 1 and 2. Picture in Panel 3, Room 7 of MgO Supersacks placed on top of empty dunnage drums, with TDOPs on the bottom.



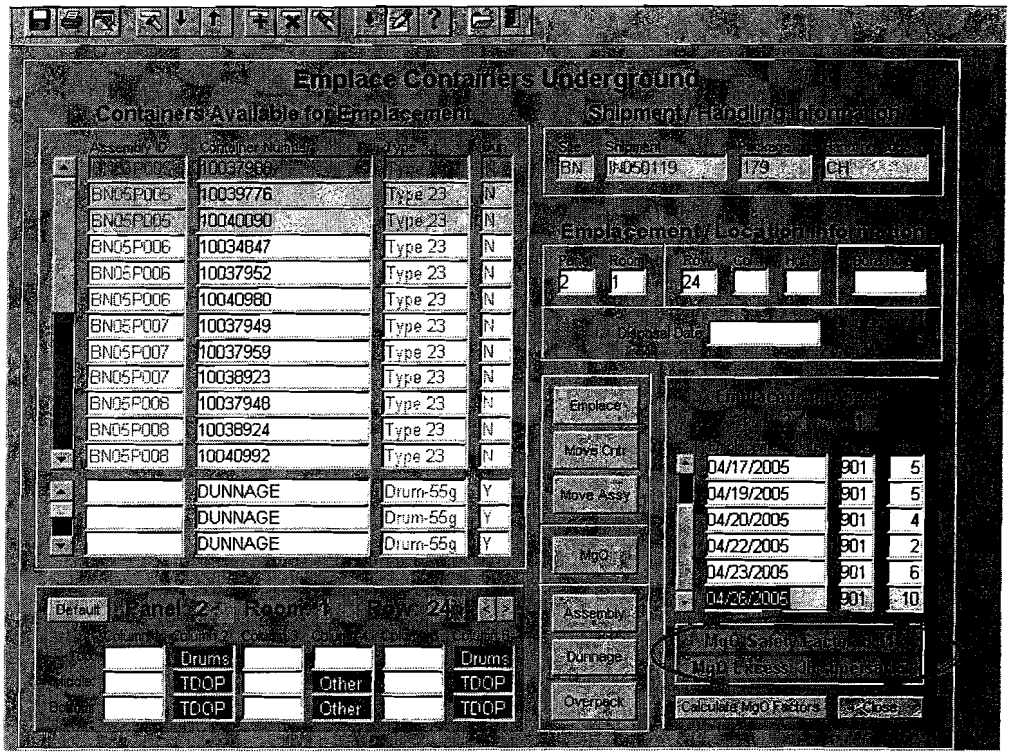
Checklist item 2. Forklift operator emplacing waste in the underground at waste row 41. Note the standard waste boxes on the ten drum overpack and the MgO supersacks on the top of the waste.

Checklist items 6 and 7. Picture in Panel 3, Room 7 of MgO Supersacks placed on top of empty dunnage drums, with TDOPs on the bottom.

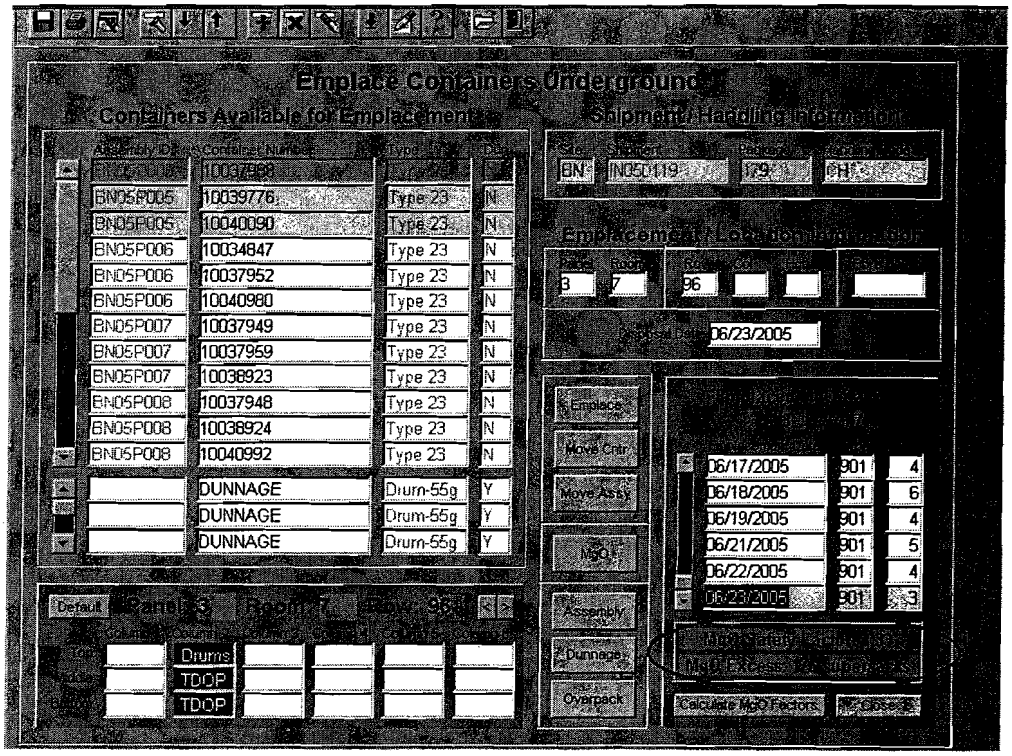
Checklist item 7d.
Supersacks are placed on racks,
called BRTs (Big Red Things),
for use if the safety factor is going to be below 1.67.



Checklist item 8. Screenshots of MgO Safety Factor calculation in two rooms.



Screen Capture of WWIS Module for Calculating MgO Safety Factor



Screen Capture (2) of WWIS Module for Calculating MgO Safety Factor

Attachment D Additional Information Reviewed for the Inspection

- Shipment Summary Report (RP039_epa3_RL050028_shipmentSummaryRpt.pdf)
- Waste Emplacement Report (RP0440_epa_7_SRSB00200.pdf)
- Waste Container Data Report (RP036_epa4_0024917.pdf)
- Waste Handling Manager's Training Course: Evaluation Criteria for Emplacement of Additional MgO (May 18 2005 Emplacement Inspection.pdf)
- WWIS output of waste component amounts (mat_parms_epa8.pdf)
- WWIS Data Administrator Review of Waste Stream Profile #RF107.01–Solidified Inorganics (RF107_WWISDataBaseAdminReview.pdf)

Attachment E Post Inspection Email From George Basabilvaso on the Five Supersack MgO Rack 5/27/2005

Tom,

I am responding to the question you had on the BRT. We have data on the compression test of the MgO rack (i.e., BRT). I know that you all understand the operations approach now, which ensures that the bags do not rupture during the emplacement of MgO, and after we get about three rows completed we do not monitor the integrity of the MgO bags/BRT. So our specification data is aimed at keeping the bags from rupturing. I would recommend you all cite Section 3.2 of the MgO specification document (WTS Specification D-0101) that requires that the bags be fabricated to not rupture under their own weight for a minimum of two years (approximate weight of MgO supersacks is 4200 lbs).

As we witnessed in the underground in Panel 3, Room 7 (i.e., the slightly tilted TDOP from floor heave) it is fairly obvious that there will be movement between the waste columns and the MgO rack as the floor heaves, therefore the thin polypropylene bags will be subject to abrasion/tearing/ripping and eventually rupture. Tom, I think you mentioned or maybe it was Chuck that the top bag will rupture as the roof expands and applies pressure (to the top bag) which will disperse MgO around the rack on the disposal room floor as the room begins to creep in and slowly encapsulate the waste and MgO.

I have included a page I got from WTS on the compression tests on the BRT conducted by the fabricator, Titan Tube Fabricators, Inc. (attached).

At the request of WTS, Titan Tube Fabricators, Inc conducted a compression test on several tube samples. The tube sample for the BRT is the middle entry, (0.115" X 2.500") on the table. The hand written note on the attachment regarding the "rack will collapse at 57,500 # of weight/pressure" might be a little confusing. The test was for one leg/tube. Therefore, the peak load under which ONE leg (i.e., tube/leg; I use leg and tube interchangeable) failed was 57,500 lbs. Below I provide a "little" math (I am sure you all can do the math better than I can):

* Rack (BRT) height is about 140 inches; same height as the other waste columns with MgO bag on top
* 57,500 lbs (failure) x 4 legs = 230,000 lbs
* Lithostatic pressure is approximately 2150 psi; when applied, it equates to approximately 6,900,000 lbs over the surface area of an MgO sack
* 230,000 lbs / 6,900,000 lbs = 0.033 or 3.3%

* Therefore, the rack legs will fail at approximately 3.3% of the lithostatic load. The thin polypropylene bags around the MgO will fail much sooner than the BRT and at a much smaller percent (maybe an order of magnitude smaller) of the lithostatic load.

I think SNL is working on something, but as Chuck indicated at one time during the week of May 9, we should revisit the "rigid pillars" after recertification. So, I think this is what you are looking for and you can probably include aspects of this and the attachment (and reference to Section 3.2 in D-0101) in your emplacement report.

Give me a call if you cannot open the attachment or if you need clarification on this topic.

Best regards,
George