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DA:02:01109
UFC:5400.00

June 15, 2002

**Subject: WASTE ISOLATION PILOT PLANT CONTACT HANDLED WASTE SAFETY
ANALYSIS REPORT**


To Whom It May Concern:

The attached Compact Disc (CD) contains DOE/WIPP-95-2065 Revision 6, Waste Isolation Pilot Plant (WIPP) Contact Handled (CH) Waste Safety Analysis Report (SAR); DOE/WIPP-95-2125 Revision 6, WIPP CH Technical Safety Requirements (TSR); and DOE/CBFO-97-1224 Revision 1, Addendum I, Department of Energy/Carlsbad Field Office Safety Evaluation Report (SER) Revision 1 approving the CH SAR. The CH SAR and TSR Revision 6 supersede Revision 5. The CH SAR is being distributed electronically to eliminate the substantial annual cost of publishing and distributing hard copies. You are welcome to produce your own hard copies. Controlled copies of the CH SAR will be maintained at the WIPP site operating stations and in the site and town libraries. The CH SAR Revision 6, TSR Revision 6, and the SER Revision 1, Addendum I, may also be found on the WIPP Internet page at (<http://www.wipp.carlsbad.nm.us/library/CHsar/CHsar.htm>).

The file titled 'CHSAR_index' includes the Table of Contents, Acronyms, Glossary of Terms, and the Change History. The remaining file names are self descriptive with respect to Chapter and Appendix. The format is Adobe Acrobat Document/pdf file and is searchable.

Should you have any questions concerning the content of the CD, please contact me at (505) 234-8636 or Mr. M. Carter at (505) 234-8584.

Sincerely,


A. E. Strait, Manager
Authorization Basis

MAC:arr

Attachment

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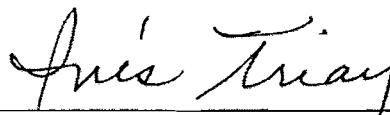
APPROVAL

**Addendum I
to the
Safety Evaluation Report
of the
Waste Isolation Pilot Plant
Safety Analysis Report
Contact-Handled Transuranic Waste Disposal Operations**

**U. S. Department of Energy
Carlsbad Field Office**

Date: July 11, 2002
Revision Number: DOE/CBFO-97-1224, Rev. 1, Addendum I

Approved:


Dr. Inés Triay, Manager

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REVIEW TEAM APPROVAL

**Addendum I
to the
Safety Evaluation Report
of the
Waste Isolation Pilot Plant
Safety Analysis Report
Contact-Handled Transuranic Waste Disposal Operations**

**U. S. Department of Energy
Carlsbad Field Office**

Senior Advisor

Chuan-Fu Wu

7/11/2002

Chuan-Fu Wu

Date

Authorization Basis Senior Technical Advisor

Review Team
Leader

Richard H. Farrell

11 July 2002

Richard Farrell

Date

Safety Officer

ADDENDUM I

1.0 INTRODUCTION

This addendum to DOE/CBFO-97-1224, Rev. 1, *Safety Evaluation Report of the Waste Isolation Pilot Plant Safety Analysis Report, Contact-Handled Transuranic Waste Disposal Operations* (May 2001) documents the review of Revision 6 of the WIPP CH-TRU Waste SAR (DOE/WIPP-95-2065) (CH SAR) by the Carlsbad Field Office (CBFO) Review Team and provides the CBFO Manager with the basis for its approval. It concludes that the safety basis documented in Revision 6 of the CH SAR is sufficient to protect workers, the general public, and the environment from the hazards associated with CH-TRU waste disposal operations.

The SER was revised in May 2001 (Revision 1) because of major changes to the CH SAR that appeared in Revision 5 of that document. The most comprehensive of those changes was the change from probabilistic to deterministic analyses of accident consequences in order to conform to 10 CFR 830, Subpart B, *Safety Basis Requirements*; and DOE-STD-3009-94 (Change 1, January 2000), *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*. Changes to the CH SAR in Revision 6 are minor in comparison and were not deemed to require another revision to the SER. They are reflected in this addendum. This addendum contains information pertinent to the review by CBFO of Revision 6 of the CH SAR and does not repeat information from the SER, Rev. 1 that has not changed.

2.0 SAR REVIEW PROCESS

Review of Revision 6 of the CH SAR was performed by a team including four individuals from the CBFO Technical Assistance Contractor (CTAC) who are technically qualified in the subject matter and whose collective expertise, in addition to safety basis documentation, includes radiation safety, industrial safety, industrial hygiene, mining safety, and conduct of operations. The CBFO Safety Officer served as the review team leader. The CBFO Authorization Basis Senior Technical Advisor served as senior advisor for the review. The review was conducted in accordance with the guidance provided in DOE-STD-1104-96, *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports*.

The review process consisted of three stages. First, the review team provided initial comments to the Westinghouse TRU Solutions (WTS) Safety Analysis Team. These comments were based on review of the draft text, discussions with WTS management and staff, observation of operations, and physical inspection of systems, equipment, and hardware related to Revision 6 changes. This was followed by a series of formal and informal comment resolution meetings between members of the review team and the WTS Safety Analysis Team. Review team members' concerns still

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remaining after these comment resolution meetings were documented in a Document Review Record (DRR) and formally transmitted from CBFO to WTS, to which WTS provided formal responses. Finally, changes to the draft Revision 6 prompted by the reviewer comments were incorporated into the document, verified by the reviewers, and the final version of Revision 6 of the CH SAR was then transmitted to CBFO for final approval via this SER Addendum.

3.0 APPROVAL BASES

DOE-STD-1104-96 lists five key bases upon which approval of a SAR should be based. These are base information, hazard and accident analysis, safety structures, systems, and components (SSCs), derivation of technical safety requirements (TSRs), and safety management program characteristics. Revision 1 of the SER examined each of these bases in detail to support its approval of Revision 5 of the CH SAR. Since Revision 6 of the CH SAR contained only minor changes to the previous revision, this review focused on those approval bases within which these changes were made. Other bases were reviewed only to the extent that they were affected by the current changes and to ensure consistency throughout the document. Therefore, discussion of the five approval bases in this Addendum is restricted to those affected by the changes.

In addition to the various editorial corrections to keep the CH SAR current with facility progress, the major changes incorporated into Revision 6 of the CH SAR include the following:

- Updated safety analyses;
- Inclusion of 100 gallon containers, S100 neutron shielded pipe overpacks, S200 gamma shielded pipe overpacks, and the HalfPACT shipping package;
- Deletion of the requirement for installation of magnesium oxide (MgO) mini-sacks in the disposal configuration;
- Changes to radiation effluent monitoring systems; and
- Associated changes to the TSR document and Chapter 6 of the CH SAR necessitated by the above changes.

These changes are discussed in more detail in the following paragraphs, which also contain a reference to the pertinent Unreviewed Safety Question (USQ) safety evaluations.

3.1 UPDATED SAFETY ANALYSES

The safety analyses have been updated to show the likelihood of occurrence of accidents CH4 (Drop of Waste Containers by Forklift in the WHB) and CH9 (Drop of Waste Containers by Forklift in the Underground) to be in the anticipated range rather than in the unlikely range as they were previously reported. This change in estimated frequency range was necessary to correct an error carried over from the previous revision of the CH SAR. CBFO concurs with this

change and agrees that the analysis supports the placement of these two accidents into the anticipated frequency range.

Additionally, two of the accident consequence analysis parameters have been updated to provide more realistic results. The damage ratio (DR) for spontaneous ignition accidents has been decreased to 0.163 and the leak path factor (LPF) for mercury has been changed to 0.5. These changes are supported by USQ Safety Evaluation No. 00-038. CBFO concurs with these changes.

A further update to the safety analyses was evaluation of the CH5 waste hoist drop accident with respect to drum overpacks and solidified/vitrified or pipe overpack containers. The results indicated that these accidents are bounded by the direct loaded drum evaluation for CH5 (see also USQ Safety Evaluation No. 00-054). CBFO concurs with this evaluation, subject to the exceptions noted in Section 4.0 of this Addendum.

3.2 INCLUSION OF NEW CONTAINERS AND SHIPPING PACKAGE

Revision 6 of the CH SAR includes three new waste containers and one new shipping package, use of which has been approved since the release of Revision 5. The 100 gallon drum may now be used in addition to the 55 gallon and 80 gallon drums and the standard waste box (USQ Safety Evaluation No. 01-019; Change 1 to TSR Document, Rev. 5). In addition, two new shielded pipe overpack containers are approved. The S100 pipe overpack is used for waste with a high neutron dose rate (USQ Safety Evaluation No. 01-021) and the S200 pipe overpack is used for waste with a high gamma dose rate (USQ Safety Evaluation No. 01-022). These pipe overpacks contain internal shielding for neutron and gamma radiation respectively. The HalfPACT has been approved as an alternative shipping package to the TRUPACT-II (USQ Safety Evaluation No. 01-028). CBFO has no concerns with the way that these additional containers and the additional shipping cask have been incorporated into the safety basis through Revision 6 of the CH SAR.

3.3 DELETION OF REQUIREMENT FOR MgO MINISACKS

The decision has been made to discontinue the use of the MgO "mini-sacks" surrounding the waste stacks. This action was driven by worker industrial and radiation safety (chiefly ALARA) considerations and supported by USQ Safety Evaluation No. 01-011. All references to the use of such mini-sacks has been removed in Revision 6. CBFO concurs with and approves of this operational change. Use of the large "super-sacks" that are placed on top of the top layer of containers in each stack is not affected by this change and continues.

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3.4 CHANGES TO RADIATION EFFLUENT MONITORING SYSTEMS

Changes were made to CH SAR text and tables to reflect changes in the radiation effluent monitoring systems. References to Station A and C continuous air monitors (CAMs) were removed to reflect the current configuration of these stations with fixed air samplers (FASs) only (USQ Safety Evaluation No. 96-019). In addition, Sampling Station D1 was added to the system description to document its implementation (USQ Safety Evaluation No. 01-009). CBFO has been closely involved with the planning and execution of these changes and approves of them. Descriptions of the automatic shift to filtration function of various components of the radiation effluent monitoring system have been changed to be consistent with these changes in configuration.

4.0 RECOMMENDATIONS

While CBFO is generally in agreement with, and approves of, the major changes incorporated into Revision 6 of the CH SAR, the review supporting this SER Addendum resulted in a comment expressing concerns associated with the waste hoist failure accident (CH5). The accident scenario description needs to be re-evaluated. Section 5.2.3.5 describes the postulated scenario as follows: "During transportation to the underground, it is postulated that a simultaneous break of the hoisting cables (six) or loss of power event occurs and, a failure in the hoist braking system." This section also states that loss of power to the hoist motor is assumed to be the initiating event.

The CH5 scenario describes two very different accidents that could have very different consequences. First, if all six of the hoist cables were to simultaneously break, the result would be that the hoist cage and the waste containers it carried would drop to the bottom of the shaft with the likely result of the breach of all waste containers. If in fact it is assumed that the cage and its contents fall to the bottom of the shaft, the DRs of 0.25 for drums and SWBs and 0.025 for overpack containers may have been underestimated due to the forces involved and should be re-evaluated. However, there is nothing in the hazard and accident analyses to indicate an accident initiator that would result in the simultaneous breakage of all six cables that, in turn, would result in the hoist cage and its contents falling to the bottom of the waste shaft. Second, if the power to the hoist motor failed, coupled with a failure of the hoist brake system, the hoist cage containing the waste containers would be carried upward because of the difference in weight between the hoist counterweight system and the loaded hoist. The hoist cage subsequently would crash into the head frame and retarding timbers, potentially resulting in different waste container involvement and damage results than for the cable break scenario. Although the entire accident discussion (with the exception of the single initial mention of hoist cable break) assumes a power loss and brake failure scenario, the number of containers damaged is based on all containers falling to the bottom of the shaft. The loss of power scenario as

analyzed also takes no credit for passive safety features that would survive the accident conditions, as allowed by DOE-STD-3009-94, Appendix A, such as, for example, the wooden crash beams in the top of the waste hoist head frame.

CBFO recognizes that the waste hoist and all of its components are currently being operated and maintained in accordance with all Mine Safety and Health Administration (MSHA) requirements, and that in addition the waste hoist brake system is being operated and maintained as a safety-significant SSC. This fact, when combined with the conservatism in each of the parameters that are used in the calculation of the source term for the accident analysis, indicates that the concerns raised in the comment do not compromise the safety basis of the facility and do not require the implementation of additional controls. However, in the interest of removing any ambiguities in the accident scenario description and ensuring that the most appropriate values for DR and the other analysis parameters have been used in the calculations, CBFO requests WTS to perform a re-evaluation of the waste hoist accident and associated parameters.

In light of these considerations, CBFO requests that WTS complete the following actions with respect to accident CH5 by February 28, 2003:

- **Reformulation of the accident scenario** - WTS should reconsider the accident scenario and re-write it in such a way as to clarify the initiating event(s). The revised scenario should be based on a plausible accident initiator for which technical justification is provided, should be internally consistent, should take credit for any passive safety features that survive the accident conditions, and should include a complete description of the anticipated sequence of events following the initiating event(s).
- **Re-evaluation of damage ratios and other analysis parameters** - WTS should re-evaluate the values used for DRs and other parameters used in the calculation of consequences for this accident to ensure that such values are consistent with the re-formulated accident scenario and are neither over nor under-conservative. The accident consequence analysis should be revised to accommodate any necessary changes in the DRs or other parameters.

Any changes indicated as a result of these actions shall be incorporated into the next CH SAR update.

5.0 CONCLUSIONS

Based on the review team's assessment of Revision 6 of the CH SAR and CBFO's evaluation, it is concluded that CH TRU waste operations are safe and pose no threat to workers, the public, or the environment if conducted within the documented safety basis. CBFO thus approves Revision 6 of the CH SAR.

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