

APPROVAL

**Safety Evaluation Report
of the
Waste Isolation Pilot Plant
Preliminary Safety Analysis Report for
Remote-Handled (RH) Transuranic (TRU) Waste**



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

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Approved: Chuan-Fu Wu for
Dr. Inés Triay, Manager

REVIEW TEAM APPROVAL

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1.0 INTRODUCTION

This Safety Evaluation Report (SER) documents the review of the draft Waste Isolation Pilot Plant (WIPP) Preliminary Safety Analysis Report for Remote-Handled (RH) Waste (DOE/WIPP-Draft 3174) (RH PSAR) by the Carlsbad Field Office (CBFO) Review Team and provides the CBFO Manager with the basis for its approval. Consistent with the Department of Energy (DOE) guidance on use of a graded approach, the detail included in this SER is consistent with that required for approval of a preliminary safety analysis report (SAR). This SER concludes that the safety basis documented in the RH PSAR is sufficient to protect workers, the public, and the environment from any hazards associated with the preparations and pre-operational activities necessary to obtain authorization to receive RH-TRU waste.

The current WIPP Hazardous Waste Facility Permit (HWFP) does not allow for the receipt or disposal of RH-TRU waste. A permit modification is underway that would allow for RH-TRU waste disposal. In the meantime, the RH waste handling facilities and processes have undergone modifications to make them more efficient while maintaining safety and reliability and to prepare them for operational readiness evaluations that must be successfully completed prior to the planned receipt of RH-TRU waste. The RH PSAR evaluated in this review provides the safety basis of the current RH waste handling process and will be converted into a final Documented Safety Analysis (DSA) for RH-TRU waste prior to the beginning of RH-TRU waste receipt, scheduled for the year 2005.

2.0 PSAR REVIEW PROCESS

Review of the RH PSAR was performed by a team that included two primary reviewers and the CBFO Safety Officer. The two CBFO Technical Assistance Contractor (CTAC) Safety and Operations Group professional staff who supported CBFO's review of the RH PSAR are technically qualified in the subject matter. These two individuals both have advanced degrees in the physical sciences or engineering and extensive experience in safety analysis methodology and applications. 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*, and DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830*.

The review process consisted of a thorough review of the appropriate chapters and appendices of the RH PSAR (see Section 4.0). CBFO provided comments based on the review to the Washington 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 designed for RH-TRU waste receipt and emplacement. This PSAR will be converted into a final RH DSA, with a first draft of the DSA due to CBFO by September 30, 2003.

3.0 APPROVAL BASES

DOE-STD-1104-96 lists five key bases upon which approval of a SAR should be assessed. 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. Although each of these was used during the review as a basis upon which to evaluate the adequacy of the document, a preliminary SAR is not required to contain the same amount of rigor with respect to these approval bases as would a final SAR. Therefore, the following specific criteria, obtained from DOE G 421.1-2, Section 4.1.1.3, were used to evaluate the PSAR against the above safety bases:

- All identified hazards and potential accidents have been addressed.
- Supporting analyses are sufficiently rigorous to justify the selection of safety SSCs and controls.
- The accepted hierarchy of controls includes passive engineering features, active engineering features, administrative controls, and personal protective equipment, in that order.
- Safety SSCs are identified and their performance requirements clearly described.
- A proposed list of controls and safety management programs has been developed to address operational safety considerations.

4.0 SCOPE OF REVIEW

The RH PSAR consists of ten chapters and five appendices and also includes the *Waste Isolation Pilot Plant Remote-Handled (RH) Preliminary Technical Safety Requirements*, DOE/WIPP-03-3178. Certain of these chapters and appendices have not changed significantly since past reviews, including some that are identical to portions of the Safety Analysis Report for Contact-Handled Waste (CH SAR), that was recently approved by CBFO. Those sections were not reviewed again in this review, except to the extent that they provided information necessary for review of the remaining chapters and appendices. This review therefore focused on the following chapters and appendices:

- Chapter 1, Executive Summary
- Chapter 4, Facility Design and Operation
- Chapter 5, Hazard and Accident Analysis
- Chapter 6, Derivation of Technical Safety Requirements
- Chapter 7, Radiological and Hazardous Material Protection
- Appendix A, Waste Container Inventory Calculations
- Appendix C, HAZOP Session Summary Tables
- Appendix D, Determination of Frequencies for Selected Accidents
- Appendix E, Source Term/Dose Calculations
- DOE/WIPP-DRAFT-3178, Waste Isolation Pilot Plant Remote-Handled (RH) Preliminary Technical Safety Requirements

5.0 RESULTS OF REVIEW

The review team is satisfied that this RH PSAR meets all of the criteria set out in Section 3.0 above. The hazard and accident analyses are comprehensive and allow for the designation of safety SSCs and the formulation of appropriate TSRs. Safety management programs are well-developed and effectively address operational safety considerations. However, the reviewers identified several minor concerns, the correction of which will aid the transition of this RH PSAR into a final RH DSA. The most significant of these concerns can be grouped into the following categories:

- Some of the values for variables used in the accident frequency calculations in Appendix D appear to be overly conservative and not based upon actual WIPP experience or current WIPP configuration.
- Anticipated throughput of RH 10-160B casks, drums, and canisters appears unrealistically high and not in accordance with current projections, thus resulting in overly conservative accident frequency results.
- Better explanations are needed of how container inventory for the various containers was determined and for how the Beyond the Design Basis accidents were selected.
- Some of the accident frequency calculations do not include a term for the probability of waste container failure given an impact, resulting in overly conservative frequency results.

Throughput of RH 10-160B casks, drums, and canisters was changed to reflect the latest projections and calculations dependent upon these throughput numbers were changed accordingly, thus alleviating this concern. Also, all comments with which WTS agreed and whose

incorporation did not unduly delay the release of the RH PSAR have also been incorporated. Since correcting the other concerns would result in less conservative (although more realistic) accident results or would have no effect on the accident results, the RH safety basis would not be compromised if comments reflecting these concerns were not incorporated prior to the release of this preliminary document (see also Section 6.0). However, they and the other comments not already incorporated should be addressed in the final RH DSA.

6.0 RECOMMENDATIONS

Although failure to correct the remaining concerns noted in Section 5.0 would not jeopardize the RH safety basis and therefore is not required, CBFO makes the following recommendation regarding their disposition as well as the disposition of the rest of the comments:

- These remaining concerns, together with any other comments not already addressed as noted in Section 5.0, may be deferred for resolution until after the release of the RH PSAR. CBFO and WTS should resolve these comments during the preparation of the final RH DSA and the resolved comments should be incorporated into the final RH DSA.

7.0 CONCLUSIONS AND APPROVAL

Based on the review team's assessment of the RH PSAR and CBFO's evaluation, it is concluded that RH-TRU waste operations will be safe as planned and that the preparations and pre-operational activities necessary for obtaining authorization to receive and dispose of RH-TRU mixed waste will pose no threat to workers, the public, or the environment if conducted within the documented safety basis. CBFO thus approves this RH PSAR, with the recommendation provided in Section 6.0 and on the condition that the final RH DSA will be completed and approved by CBFO prior to the initiation of receipt of RH TRU waste.