U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

Safety Evaluation Report Addendum for Incorporation of Page Change 001a into the Waste Isolation Pilot Plant Documented Safety Analysis, DOE/WIPP-07-3372, Revision 8, and Technical Safety Requirements, DOE/WIPP-07-3373, Revision 8

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Revision 7

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SAFETY EVALUATION REPORT REVISION HISTORY

Revision Number	Description of Changes
0	• Initial issuance of the DOE Safety Evaluation Report (SER) to document the basis for DOE approving the DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis,* Revision 5a, and DOE/WIPP-07-3373*, Waste Isolation Pilot Plant Technical Safety Requirements,* Revision 5a (WIPP DSA/TSR Revision 5a)
1	• Complete rewrite of the initial Revision 0 document as an Addendum 1 of the SER to document the basis for approving the WIPP DSA/TSR Revision 6a – an annual update of the WIPP Documented Safety Basis
2	• Complete rewrite of the initial Revision 0 document as an Addendum 2 of the SER to document the basis for approving the WIPP DSA/TSR Revision 7a – an annual update of the WIPP Documented Safety Basis
3	• Complete rewrite of the Initial Revision 0 document as an Addendum 3 of the SER to document the basis for approving the Page Change 002 to the WIPP DSA/TSR Revision 7a, *Unfiltered Fan 700 Operation in the Underground.*
4	• Complete rewrite of the initial Revision 0 document as an Addendum 4 of the SER to document the basis for approving the WIPP DSA/TSR Revision 8 - an annual update of the WIPP Documented Safety Basis including acceptance of CCO-Ss and CCO-EDPs
5	• Complete rewrite of the initial Revision 0 as an addendum 5 of the SER to document the basis for approving the Page Change 004 to the WIPP DSA/TSR Revision 7a, SR 4.8.1.3 basis change for Waste Hoist brake system operability
6	• This addendum 6 of the SER revised the fourth sentence of the bases statement for SR 4.8.1.3 to clarify the brake pad thickness bases statement previously submitted and approved for Page Change 004 to the WIPP DSA/TSR Revision 7a, SR 4.8.1.3 basis change for Waste Hoist brake system operability.
7	• Addendum 7 of the SER documents the basis for approving Page Change 001a to the WIPP DSA/TSR, Revision 8, which clarifies the SR 4.8.1.3 bases for Waste Hoist brake system operability.

EXECUTIVE SUMMARY

This Safety Evaluation Report (SER) addendum documents the U.S. Department of Energy (DOE) Carlsbad Field Office (CBFO) technical review and approval of the Waste Isolation Pilot Plant (WIPP) Page Change 001a to DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis,* Revision 8, and DOE/WIPP-07-3373*, Waste Isolation Pilot Plant Technical Safety Requirements,* Revision 8 (DSA/TSR Revision 8). The DOE Safety Basis Review Team (SBRT) followed the requirements of CBFO management procedure (MP) 4.11, Revision 6, *Safety Basis Review Procedure*, to execute the DOE approval review of the WIPP DSA/TSR Revision 8 Page Change 001a, and produce this SER Addendum, Revision 7.

This SER Addendum was prepared in accordance with DOE-STD-1104-2016, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents,* and applies the standard to evaluate Page Changes to the Revision 8 Safety Basis documents submitted as Page Change 001a to the current DOE-approved DSA/TSR Revision 8 for compliance with DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*. This SER does not replace the previously approved SER for DSA/TSR Revision 8, but serves as an addendum to document the approval of changes proposed in Page Change 001a being added to DSA/TSR Revision 8.

DOE/CBFO Safety Basis Review Process Description

On September 9, 2022, Nuclear Waste Partnership LLC (NWP), the WIPP management and operating contractor, submitted for DOE review what became known as Page Change 001a to DSA/TSR Revision 8 (NWP Letter-CO:22:03137).

Substantial Changes Introduced by Page Change 001a

As part of the Page Change 001a submittal, the following proposed changes impacting the DSA/TSR control set will be implemented:

- DSA Section 4.4.7.4 Performance Evaluation tables changed to clarify brake force and when the system is required to engage during loss of power or overspeed conditions.
- DSA Section 5.5.8.2 Surveillance Requirements changed to add technical justifications for pressure ranges and piston travel distance. Description of verification activities required during the surveillance were correlated back to the technical justifications.
- Limiting Condition for Operation (LCO) 3.8.1 operability statement was changed to reflect the change in operability requirements as determined by the manufacturer’s specification for each brake component.
- Surveillance Requirement (SR) 4.8.1.3 was changed to incorporate the manufacturer’s specification for indication of reduction of brake force as indicated by a loss of 6% or greater of brake release pressure.

- LCO 3.8.1 basis was changed to mirror the changes to LCO 3.8.1 operability statements.
- SR 4.8.1.3 basis was changed to reflect the additional technical justifications for the surveillance requirements.

Restrictions

The following restrictions from DSA/TSR Revision 8 remain in place:

- Prohibition on receipt of all CCOs, with the exception of CCOs prepared using the Enhanced Dilution Process (CCO-EDP) and the CCO-S until issues discussed in SER to DSA/TSR Revision 5b, Section 3.3.5 are resolved.

- Prohibition on remote-handled (RH) waste receipt and emplacement.

Conclusions

The DSA/TSR Revision 8 Page Change 001a changes were developed primarily to allow for additional information specific to the waste hoist brake components and their ability to meet their performance criteria for operability. The hazard analysis events associated with the existing Documented Safety Analysis (DSA Rev 8) were re-examined and no additional events were identified. The technical justifications for each operability requirement were reviewed and determined to be sufficient to ensure the waste hoist brake system can meet its safety function.

Page Change 001a to DSA/TSR Revision 8 has undergone an appropriate review in accordance with DOE-STD-1104-2016, and the SER concludes Revision 8 as amended by Page Change 001a provides an acceptable basis for continued operation of the WIPP facility, ensuring the nuclear facility can be operated safely with respect to the workers, the public, and the environment.

Table of Contents

ACRONYM LIST

CBFO	Carlsbad Field Office
CFR	Code of Federal Regulations
CH	contact-handled
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
LCO	Limiting Condition for Operation
MP	management procedure
NWP	Nuclear Waste Partnership
RH	remote-handled
SAC	specific administrative control
SBAA	Safety Basis Approval Authority
SBRT	Safety Basis Review Team
SER	Safety Evaluation Report
SME	subject matter expert
SMP	safety management program
SR	Surveillance Requirement
SSC	structures, systems, and components
TRU	transuranic
TSR	Technical Safety Requirements
UG	underground
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 Purpose

As required by *Code of Federal Regulations* (CFR) Title 10, Part 830 (10 CFR 830), "Nuclear Safety Management," the purpose of this Safety Evaluation Report (SER) is for the U.S. Department of Energy (DOE) to document that (1) the safety basis has been developed in a manner that provides reasonable assurance of adequate protection of workers, the public, and the environment from adverse consequences, taking into account the work to be performed and the associated hazards for the Waste Isolation Pilot Plant (WIPP), a Hazard Category 2 DOE nonreactor nuclear facility, (2) the extent to which the contractor has satisfied the requirements of Subpart B of 10 CFR 830, and (3) the basis for approval by DOE of the safety basis for the facility, including any conditions for approval. The safety basis consists of Page Change 001a to DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis* (DSA), Revision 8, and DOE/WIPP-07-3373, *Waste Isolation Pilot Plant Technical Safety Requirements* (TSR), Revision 8 (hereafter, DSA/TSR Revision 8). Page Change 001a was formally transmitted to the DOE Carlsbad Field Office (CBFO) for approval via transmittal letter CO:22:03137 dated September 9, 2022, from Mr. R. E. Taylor, Sr. Staff Specialist, Nuclear Waste Partnership LLC, to Mr. K. Y. Craft, Contracting Officer Representative, Site Operations & Infrastructure Division, Carlsbad Field Office, Subject: Submittal of Revision 8, Page Change 001a to Documented Safety Analysis and Technical Safety Requirements for Approval Under Nuclear Waste Partnership LLC Prime Contract DE-EM0001971. The document revisions were prepared in accordance with 10 CFR 830 Subpart B requirements, applying the safe harbor methodology specified in DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*.

This SER Addendum documents the required review of the complete Page Change 001a submittal in accordance with DOE-STD-1104-2016, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*. This SER Addendum does not replace the previously approved SER for DSA/TSR Revision 8. It serves as the seventh addendum to the DOE SER, which documented the DOE's approval of Revision 5b. This SER Addendum focuses on the changes incorporated by the contractor in the high-quality draft of Page Change 001a. Thus, this SER Addendum provides the DOE Safety Basis Approval Authority (SBAA) with the documented bases for approving changes to those safety basis documents to support the Page Change 001a to the Safety Basis at the WIPP, ensuring the nuclear facility continues to be operated safely with respect to the workers, the public, and the environment.

2.0 REVIEW PROCESS

The review process tasked the Safety Basis Review Team (SBRT) to provide an in-process review during the management & operating contractor's DSA and TSR development, and thereby help ensure the final product met DOE expectations. The SBRT members and supporting subject matter experts (SMEs) were drawn from the

CBFO resources, in part, to ensure knowledgeable expertise, including working familiarity with the applicable requirements and the WIPP facility.

The review process was broken into three phases:

Phase 1 In-Process Review – As allowed by CBFO management procedure (MP) 4.11, *Safety Basis Review Procedure*, an informal review process was used during this phase. The in-process review was supported by the CBFO Safety Systems Oversight Division Director and supporting personnel. It provided the opportunity for the SBRT to have an early understanding of the changes proposed by the contractor and provided real-time resolution to any issues. Comments generated during this phase were informal. The in-process review of draft documents as they were developed allowed for early engagement of the SBRT, and provided an opportunity to resolve disagreements in a timely fashion.

Phase 2 Formal SBRT Review and Comment Resolution – This phase began with the submittal of the draft Page Change 001a. The formal DOE review consisted of verification that the document(s) met DOE requirements and standards. Phase 2 of the review produced issues/comments generated by the DOE SBRT. Those issues/comments are formalized and documented by the SBRT members in accordance with CBFO MP 4.11. The DOE would transmit those issues to Nuclear Waste Partnership LLC (NWP) as formal SBRT review comments for NWP to respond and resolve.

Phase 3 DOE Approval – Phase 3 begins with the NWP submittal of the high-quality draft. This phase included preparation of the DOE SER. The SBRT alone was responsible for the final development of the SER, based on review of the submitted documents with support from SMEs as needed. Phases 1 and 2 were planned to minimize the need for further comments in Phase 3, although some issue resolution continued into Phase 3.

The Safety Basis Document Review included features to maintain appropriate independence in the SER preparation process, beginning with NWP responsibility for preparing the documents and the chosen comment resolution approaches. Also, the associated final SER and NWP safety basis documents were presented to the DOE SBAA for approval.

Presented below is a summary descriptive listing of the specific changes resulting from incorporation of Page Change 001a into Revision 8.

Summary of Page Change 001a revisions

- DSA Section 4.4.7.4 Performance Evaluation tables changed to clarify brake force and when the system is required to engage during loss of power or overspeed conditions.

- DSA Section 5.5.8.2 Surveillance Requirements changed to add technical justifications for pressure ranges and piston travel distance. Description of verification activities required during the surveillance were correlated back to the technical justifications.
- Limiting Condition for Operation (LCO) 3.8.1 operability statement was changed to reflect the change in operability requirements as determined by the manufacturer's specification for each brake component.
- Surveillance Requirement (SR) 4.8.1.3 was changed to incorporate the manufacturer's specification for indication of reduction of brake force as indicated by a loss of 6% or greater of brake release pressure.
- LCO 3.8.1 basis was changed to mirror the changes to LCO 3.8.1 operability statements.
- SR 4.8.1.3 basis was changed to reflect the additional technical justifications for the surveillance requirements

The following DOE requirement and guideline documents constitute the principal regulatory/requirements bases framework under which NWP prepared Page Change 001a:

- 10 CFR 830, *Nuclear Safety Management*
- DOE Order 420.1C, *Facility Safety*
- DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*
- DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*
  DOE Guide 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements*

3.0 BASE INFORMATION

In accordance with DOE-STD-1104-2016, this section of the SER documents the bases of approving the adequacy of base information, including any conditions of approval imposed. The information provides a facility-specific context for bases of approval such that an elementary understanding of the operational envelope can be gleaned.

The SBRT concludes that DSA Chapters 1.0 and 2.0, as currently described in the approved Safety Basis (Revision 8), provide sufficient base information in terms of facility and waste operation descriptions to support identification of the hazards and the selection of controls relied upon for public, worker, and environmental protection. Adequate correlation is established between the physical facility and its description in the DSA, including the information specifically related to Page Change 001a. The information presented in Chapters 1.0 and 2.0, as previously approved, is sufficient to support both the safety analysis and the development of an effective set of TSR controls.

4.0 HAZARD AND ACCIDENT ANALYSIS

In accordance with DOE-STD-1104-2016, this SER Addendum section documents the bases for approving the hazard and accident analyses, including any conditions of approval imposed. Such documentation focuses on the completeness of the analysis and the consistency of the logic used throughout the analysis. In addition to bases of acceptance, this SER Addendum section provides the following information: evaluated the hazards identified, fundamental aspects of defense-in-depth, worker safety, and environmental protection, dominant accident potentials, accident consequences related to the Evaluation Guideline for safety class controls to protect the public, qualitative and/or semi-quantitative technique estimate of toxicological consequences relative to safety-significant control guidelines for the public, and qualitative and/or semi-quantitative technique estimate of facility and co-located worker radiological and/or toxicological consequences relative to safety-significant control guidelines.

The changes introduced by Page Change 001a of DSA Revision 8 have resulted in no proposed changes requiring the SBRT to only review potential impacts to the hazards analysis from the proposed changes in the TSR.

Upon review of Page Change 001a, the SBRT finds that no new hazards were identified and thus no changes to the accident analysis were proposed associated with the waste hoist brake system. The SBRT finds the only event crediting the waste hoist brake system for prevention is an uncontrolled descent resulting in loss of confinement in the underground (CH/RH-UG-10-004a). The SBRT concludes the previously approved hazards analysis and accident analysis remain valid and no new controls are required.

5.0 SAFETY STRUCTURES, SYSTEMS, AND COMPONENTS (SSCs)

5.1 Introduction

In accordance with DOE-STD-1104-2016, this section documents the bases for approving the designation of safety SSCs and their associated safety function, functional requirements, system evaluations, and potential TSR coverage in Page Change 001a. Focus is on the consistency of the logic developed in hazard and accident analyses being carried through to the identification of safety SSCs, and on the definitions and descriptions provided for these SSCs.

5.2 Safety Significant SSCs

In regards to safety significant SSCs, Page Change 001a proposed editorial changes to the Performance Evaluation Table in DSA Section 4.4.7.4 to clarify the braking force of at least 37,000 lbs-force, not the spring tension, is needed to meet the performance criteria, and to emphasize that the waste hoist brake system is required to engage during loss of power or overspeed conditions.

The SBRT finds there are no changes to the performance criteria as specified for the safety significant SSCs in DSA Revision 8 Page Change 001a.

The SBRT finds that the proposed editorial enhancements align with the event description and initiators in the hazard analysis. The SBRT also agrees with the clarification of the term “brake force” given that the braking force includes inherent losses due to friction. Setting spring tension would therefore overestimate the braking force applied to the disc, based on the SBRT’s review of the manufacturer’s specifications.

5.3 Specific Administrative Controls

The SBRT finds no proposed changes to specific administrative controls and that no changes are required based on the hazard analysis.

5.4 Conclusion

The SBRT concludes that the DSA/TSR Revision 8 with the proposed Page Change 001a modifications provides an adequate basis to demonstrate the capabilities and sufficiency of WIPP safety SSCs and specific administrative controls (SACs) credited in the evaluation of the hazards.

6.0 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS

6.1 TSR Derivations

This section documents the bases for approving the derivation of TSRs. The SBRT finds that the submitted documents demonstrated the proper flow down of controls to appropriate TSRs.

The information in Page Change 001a demonstrates the verification activities required to ensure waste hoist brake system SSC operability. The SBRT consulted DOE Guide 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements,* in evaluating the derivation of TSRs in Page Change 001a. The SBRT finds the changes proposed in DSA Section 5.5.8.2 Surveillance Requirements adds to the technical justifications for pressure ranges and piston travel distance. Description of verification activities required during the surveillance were correlated back to the technical justifications.

6.2 Conclusion

The SBRT finds the proposed changes to DSA Chapter 5.0 support and provide additional technical justifications for the derivation of the TSR document required by 10 CFR 830.205. The chapter provides sufficient basis to derive the waste hoist brake system TSR control for the credited SSCs from DSA Chapter 4.0, which are necessary to perform the required safety function. The SBRT determined that the control discussion was consistent with the accident analyses and supports the intent of the guidance in DOE-STD-3009-2014 for this chapter content. The bases for deriving TSRs are identified and described in the hazard analysis and safety SSC chapters (which

include SACs) and are consistent with the logic and assumptions presented in ETO-H-228. The SBRT concludes the derivation includes the appropriate technical justifications for deriving the operability for the waste hoist brake system LCO and surveillance requirements.

7.0 SAFETY MANAGEMENT PROGRAMS

In accordance with DOE-STD-1104-2016, this section documents the bases of approving safety management programs (SMPs), including any conditions of approval imposed. These bases relate to identification of the basic capability and awareness of fundamental provisions and performance expectations needed for maintaining the adequacy of the facility safety basis. This approval documents that the basic elements of the institutional SMPs depended on for ensuring facility safety basis are adequate, and that these elements were implemented. It is sufficient to provide a program list that notes basic program principles and relationships to defense-in-depth, worker safety, and/or dominant accident scenarios.

The SBRT review of Page Change 001a for information impacting DSA Chapters 6.0 through 18.0 finds no changes to SMPs are required. The SBRT concludes the DSA SMP chapters, as previously approved, continue to contain sufficient descriptions of program documents and program implementing procedures to provide for the safe operation of the facility.

8.0 TECHNICAL SAFETY REQUIREMENTS

In accordance with DOE-STD-1104-2016, this section documents the bases of approving the TSRs, including verification that the commitments for safety controls that are made in the DSA are carried through to TSR provisions. The technical bases for selection of specific types of controls should be documented as part of the review and summarized in this section. DOE Guide 423.1-1B establishes review criteria for TSRs.

8.1 LCO 3.8.1 Waste Hoist Brake System

Page Change 001a proposed changes to LCO 3.8.1 to reflect the change in operability requirements as determined by the manufacturer's specification for each brake component as derived in Chapter 5.0. The SBRT finds the operability statement for the LCO as follows:

LCO 3.8.1 The Waste Hoist Brakes SHALL be OPERABLE.
OPERABLE Waste Hoist Brakes consist of the following elements:

- *Four OPERABLE brake units composed of calipers, springs with brake release at 1882 psi or greater, a brake force as measured by the caliper piston travel distance of 0.137 to 0.157 inch at 2364 psi or greater, and brake pads greater than or equal to 0.47 inch thick.*
- *Two OPERABLE Emergency Dump Valves (SV-2 and SV-5).*

- *An OPERABLE Lilly Controller to include the fly-ball governor and associated contacts that will automatically set the brakes upon an over speed condition of less than or equal to 550 fpm.*

The SBRT reviewed the operability statement changes and finds that it is consistent with the manufacturer's technical specifications.

Changes to SR 4.8.1.3 were proposed to incorporate the manufacturer's specification for indication of reduction of brake force as indicated by a loss of 6% or greater of brake release pressure, and the hydraulic pressure at full retraction at which the caliper piston travel distance is measured to correspond with 37,000 pounds of brake force.

The SBRT finds that the proposed changes to the surveillance requirement appropriately determine the operability of the waste hoist brake system in accordance with manufacturer's specifications. The SBRT also finds the existing frequency of MONTHLY aligns with the recommended manufacturer's maintenance instructions.

8.2 TSR Bases Appendix A

Page Change 001a proposed changes to LCO 3.8.1 basis to mirror the changes to LCO 3.8.1 operability statements.

The SBRT reviewed the proposed changes to TSR Appendix A, Bases, and finds it provides sufficient details to adequately understand important information such as the reason for selected numeric values and ranges.

SR 4.8.1.3 was changed to reflect the additional technical justifications for the surveillance requirements. Additionally, the manufacturer's manual for the brake system recommends noting the brake pad wear at thinnest point on the visible edge of the pad. New brake pads are 25mm thick. Pads must be replaced when a thickness of less than 12mm (0.47 inch) is reached, according to the manufacturer.

The basis for replacing the pads when they are less than 0.47 inch thick is that, at less than 0.47 inch, the pads are not thick enough to ensure proper adjustment of the pad to allow the required piston travel of 0.137 to 0.157 inch. Travel of 0.157 inch is equivalent to the brake spring force of the disk brake for full retraction. Thus, requiring the brake pad measurement to be 0.47 inch or greater is sufficient to ensure the monthly surveillance requirement is adequate to meet this criterion.

The SBRT finds that the proposed change to the basis provides the technical justification for the selected numeric values of ranges based on manufacturer's specifications.

8.3 Conclusion

The SBRT concluded that TSRs adequately incorporate the proposed changes in Page Change 001a. The TSRs have sufficiently prescribed the limiting conditions of

operation and surveillance requirements to appropriately operate the facility in order to protect the worker, the public, and the environment.

9.0 DOE DIRECTED PAGE CHANGES

No DOE-directed page changes were identified in the review of proposed Page Change 001a to DSA/TSR Revision 8.

10.0 CONDITION OF APPROVAL

The SBRT identified no conditions of approval.

11.0 RECORDS

The DOE review of the Page Change 001a is a foundational component of the DOE's nuclear safety authorization basis focus on the contractor safe operation of the WIPP. Thus, the records resulting from the DOE review of Page Change 001a are identified and managed in accordance with CBFO MP 4.2, *Document Review and Approval.* Further, the SER is reviewed by management, in accordance with CBFO MP 4.2, because the SER is a controlled CBFO document. The purpose of the MP 4.2 review of the SER is to ensure the preparation of the document is consistent with established processes for producing CBFO controlled documents, and to consider aspects such as programmatic and strategic planning, regulatory compliance, cost, etc., impacts. References within the SER have been reviewed and determined to be complete and accurate enough to identify necessary information during future revision.