DOE F 1325.8

United States Government **Department of Energy**

memorandum

Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: November 10, 2020

REPLY TO ATTN OF: CBFO:OWIPP:CN:TS:20-0510:UFC 1410.00

SUBJECT: Interim Change Notice #1 to DOE/WIPP-16-3565, Revision 2, *Safety Evaluation Report Addendum for Annual Update of Waste Isolation Pilot Plant Document Safety Analysis DOE/WIPP-07-3372, Revision 7, and Waste Isolation Pilot Plant Technical Safety Requirements DOE/WIPP-07-3373, Revision 7*

TO: All CBFO Staff

Interim Change Notice (ICN) #1 to DOE/WIPP-16-3565, Revision 2, *Safety Evaluation Report Addendum for Annual Update of Waste Isolation Pilot Plant Document Safety Analysis DOE/WIPP-07-3372, Revision 7, and Waste Isolation Pilot Plant Technical Safety Requirements DOE/WIPP-07-3373, Revision 7,* is effective immediately. This ICN is necessary to address the following editorial revisions:

- Page 1 (cover page): Change “DOE/WIPP 07-3732” to “DOE/WIPP-07-3372” in the title of the document.
- Page 1 (cover page): Change “DOE/WIPP 07-3733” to “DOE/WIPP-07-3373” in the title of the document.
- Page 2 (approval page): Change “DOE/WIPP 07-3732” to “DOE/WIPP-07-3372” in the title of the document.
- Page 2 (approval page): Change “DOE/WIPP 07-3733” to “DOE/WIPP-07-3373” in the title of the document.
- Page 43: Change the word “Waist” to “Waste” in the title of section 8.3.12. so that it now reads, “8.3.12. LCO 8.3.1 Waste Hoist Brakes”.

If you have any questions, please contact me via email at Charles.Neill@cbfo.doe.gov.

/signature on file/

Charles Neill, Director
CBFO Safety Programs Division

cc:

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DOE/WIPP-16-3565, Rev. 2	
CBFO M&RC	

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U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

Safety Evaluation Report Addendum for Annual Update of

Waste Isolation Pilot Plant Documented Safety Analysis DOE/WIPP-07-3372, Revision 7

And

Waste Isolation Pilot Plant Technical Safety Requirements DOE/WIPP-07-3373, Revision 7

DOE/WIPP-16-3565
Revision 2

Effective: August 14, 2020

This document implements the WIPP DSA.

U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

Safety Evaluation Report Addendum for
Annual Update of
Waste Isolation Pilot Plant Documented Safety Analysis
DOE/WIPP-07-3372, Revision 7
and
Waste Isolation Pilot Plant Technical Safety Requirements
DOE/WIPP-07-3373, Revision 7

DOE/WIPP-16-3565
Revision 2

Effective: August 14, 2020

Authority Approval

Prepared by:

/signature on file/ 07/22/2020
Richard Farrell, Nuclear Safety Specialist, Team Leader Date
Safety Programs Division

Concurrence by:

/signature on file/ 07/22/2020
Charles Neill, Acting Safety Programs Division Director Date
Carlsbad Field Office

Concurrence by:

/signature on file/ 07/31/2020
Reinhard Knerr, Manager, Carlsbad Field Office Date

Approved by:

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Gregory Sosson, P.E., Date
Deputy Assistant Secretary for Safety, Security, and Quality Assurance
Carlsbad Field Office SBAA

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

EXECUTIVE SUMMARY

This Safety Evaluation Report (SER) addendum documents the U. S. Department of Energy (DOE) Carlsbad Field Office (CBFO) and Office of Environmental Management technical review and approval of the Waste Isolation Pilot Plant (WIPP) annual update to the Safety Basis (SB) consisting of DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis,* Revision 7, and DOE/WIPP-07-3373*, Waste Isolation Pilot Plant Technical Safety Requirements,* Revision 7 (DSA/TSR Revision 7)*.* 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 7, and produce this SER Addendum Revision 2.

The SER addendum was prepared in accordance with DOE-STD-1104-2016, *Review and Approval of Nuclear Facility Safety Basis and Design Safety Basis Documents,* and applies that standard to evaluate the Revision 7 SB documents as an annual update to the current DOE-approved DSA/TSR Revision 6a 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 5b, but serves as an addendum to document the approval of changes proposed in DSA/TSR Revision 7.

To initiate this DOE annual update of the WIPP SB documents, and in accordance with CBFO MP 4.11, the DOE Safety Program Division Acting Manager executed the DOE review of the DSA/TSR Revision 7, on April 4, 2019, with an In-Process Review of a preliminary March 2019 Draft Revision 7. The In-Process Review provided the SBRT an opportunity for early input on the revisions to the approved DSA/TSR Revision 6a being proposed by the contractor. Utilizing the contractor March 2019 preliminary draft of Revision 7, the SBRT Leader and members, through their participation in the In-Process Review, learned of the substantial proposed modifications versus the numerous editorial changes (minor in nature) that were later introduced into the DRAFT DSA/TSR by Revision 7 submitted by the contractor on August 23, 2019. This Addendum does not assess or identify the numerous (non-substantial) editorial changes introduced by Revision 7.

On August 23, 2019, Nuclear Waste Partnership LLC (NWP), the WIPP management and operating contractor, submitted for DOE review the DRAFT DSA/TSR Revision 7 (NWP Letter-CO:19:02990). The submitted DRAFT Revision 7 included DOE SBRT input resulting from the CBFO In-Process Review. Upon formal resolution of written SBRT comments focused on the August 23 DRAFT Revision 7 document provided to the contractor by letter (CBFO:OWIPP:RF:TS:19-0545), NWP submitted the FINAL HIGH QUALITY DSA/TSR Revision 7 on April 14, 2020 (NWP Letter-CO:20:02938).

As part of the annual update submittal, the following significant proposed changes impacting the DSA/TSR control set were implemented:

- Fire barrier protective coating on steel support columns in the Remote-Handled Bay as a Waste Handling Building design feature.
- The use of battery-powered vehicles powered by lithium phosphate batteries in the WIPP underground was added to Chapter 2, and a statement of hazards is incorporated into Chapter 3 as an initial assumption.
- Initial Assumptions (Section 3.3.2.3) were added to 1) document the bases for the bounding assumptions for collisions involving two or more vehicles, 2) state that waste

container MAR is protected from fires, vehicle impacts, and explosions when Waste Containers are behind approved permanent or interim isolation structures, and 3) to document that substantial leaks occurring simultaneously from randomly collocated vehicles are not considered to be credible.

- Liquid Combustible Storage was incorporated in the DSA and TSRs (LCO 3.4.3) to allow temporary liquid combustible storage locations south of the S-90 drift. (Eliminates the Evaluation of Safety Situation, ESS-2017-02, *Combustible Liquids Temporarily Stored in Proximity to Waste Containers in the Underground.*)
- Dispersion Modeling Protocol (*WIPP-054, WIPP Dispersion Modeling Protocol,* Revision 1) was updated, which incorporated the use of the preferred Eimutis and Konicek dispersion coefficients in place of the Tadmor-Gur dispersion coefficients.
- The source term and consequence analyses for all quantitatively evaluated events were updated with the dispersion modeling updates; updates to the five-year meteorological database; and MAR statistics were revised based on WIPP Waste Data System (WDS) input. The new MAR statistical values are reflected in Tables 3.4-1 and 3.4-2, and include a 20% margin.
- The following calculations required revision to support Revision 7 of the DSA:
  - WIPP-001, Revision 12 (***Fires***);
  - WIPP-002, Revision 5 (***MACCS Runs***);
  - WIPP-010, Revision 2 (**MACCS2 Input data**);
  - WIPP-021, Revision 9 (***Hazard Analysis for the WIPP***);
  - WIPP-007, Revision 7 (***Hazard Identification***);
  - WIPP-017, Revision 10 (***Loss of Confinement***);
  - WIPP-018, Revision 10 (***Explosions***);
  - WIPP-019, Revision 11 (***NPH***);
  - WIPP-023, Revision 8 **(Fire Hazards Analysis)**
  - WIPP-058, Revision 4 (***Fire Analysis Supporting Analyses***);
  - WIPP-051, Revision 5 (***Noncompliant Container Over-Pressurizations***).
  - WIPP-067, Revision 0 (***Updated Statistical Parameters for Bounding MAR Limits at the WIPP***) replaced WIPP-057, Revision 5 (***Statistical Parameters for Bounding MAR Limits at the WIPP***).
- The number of events increased by one to 642, and the number of unique and representative radiological events increased to 170 as described below. The number of Risk Class I or II events increased to 50 by the splitting of previous event CH-WHB-02-001a (combustible fire in WHB following electric vehicle collision) into events CH-WHB-02-001a1 and CH-WHB-001a2 (combustible fires in the Conveyance Loading Room [CLR] and contact-handled [CH] Bay) and the splitting of previous event CH-UG-01-001a (pool fire in Transport Path) into events on the Transporter and events on other vehicles). The addition of the new/changed event numbers results in editorial changes throughout. Two events were deleted since the personnel decontamination skids involved are no longer present as an initiator.
- The Battery Exhaust System includes two HEPA filter units (41-B-834 and 41-B-979) with two in series exhaust fans (41-B-835 and 41-B-836). LCO 3.2.5 was revised to allow the flexibility to align a fan with either filter unit.

- The non-safety significant Central Monitoring Room (CMR) alarms were removed from the TSR operability requirements. This change removed Condition A from LCOs 3.2.1, 3.2.4, 3.2.5, and Condition B from LCO 3.2.3.
- LCO 3.1.1 Condition D was added to address fire hydrant flow tests.
- Section 3.6 was updated to better reflect the current understanding of potential operational improvements.
- LCO 3.7.1 Condition B completion time was changed to provide time to stage overpacks.

Restrictions

The following restrictions from DSA/TSR Revision 6a remain in place:

- Prohibition on receipt of all CCOs until issues discussed in SER Revision 5b section 3.3.5 are resolved.
- Prohibition on RH waste receipt and emplacement.

Conditions of Approval

The SBRT prepared one condition of approval that includes 12 separate directed page changes affecting various sections of the DSA/TSR Revision 7 and WIPP-021, Revision 9, *Hazards Analysis for the Waste Isolation Pilot Plant*. The directed changes, as identified in Enclosure 1 of SER Addendum Revision 2, shall be made to the WIPP DSA/TSR Revision 7 and WIPP-021 Revision 9. The 12 DOE-Directed Page Changes are identified in Section 10 of this SER Addendum by documenting the specific change(s) for each of the 12 directed changes, and each Directed Page Change is identified as to the SB document it applies to. The directed changes are individually identified and listed in the SER Addendum Section 10, and are included in Enclosure 1 of this SER Addendum to be provide to the WIPP contractor.

COA 1) DSA/TSR Revision 7a and WIPP-021 Revision 9a, incorporating the direct changes and the editorial corrections identified in the NRB meeting minutes from July 21st, 2020 (NRB-20-009), will be re-transmitted to the CBFO for information as approved for implementation.

Conclusions

In summary, the DSA/TSR Revision 7 annual update adequately addresses required SB changes stemming from the Unreviewed Safety Question process, operational efficiencies, and Retained for Future Revision comments from DSA/TSR Revision 6a conditions of approval. The DSA/TSR annual update has undergone an appropriate review in accordance with DOE-STD-1104-2016, and is concluded to provide 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

AC	administrative control
acfm	actual cubic feet per minute
AFSS	automatic fire suppression system
ARF	airborne release fraction
BEBA	Beyond Evaluation Basis Accident
BEU	beyond extremely unlikely
CAM	continuous air monitor
CBFO	Carlsbad Field Office
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CH	contact-handled
CLR	Conveyance Loading Room
CMR	Central Monitoring Room
CMS	Central Monitoring System
COA	Condition of Approval
CVS	Confinement Ventilation System
CW	co-located worker
DF	design feature
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE-EM	U. S. Department of Energy - Environmental Management
DSA	Documented Safety Analysis
ECN	engineer change notice
EG	evaluation guidelines
ERT	Emergency Response Team
EST	Emergency Services Technician
EU	extremely unlikely
EXO	Enriched Xenon Observatory
FSS	fire suppression system
FW	facility worker
H_2O	water
HA	hazards analysis
Hazmat	hazardous material
HA	hazards analysis
HEM	Horizontal Emplacement Machine
HEPA	High Efficiency Particulate Air
HERE	Horizontal Emplacement and Retrieval Equipment
IC	initial condition
KA	key attribute
KE	key element
LCOs	Limiting Condition for Operation
LPF	leak path factor
M&O	management and operating
MAR	material at risk
MOI	maximally-exposed offsite individual
MP	management procedure
mrem	millirem
NPH	Natural Phenomena Hazard
NTP	National TRU Program
NWP	Nuclear Waste Partnership
PE-Ci	plutonium equivalent curie
POC	pipe overpack container
rem	roentgen equivalent man
RF	respirable fraction
RFR	retained for future revision
RH	remote-handled
SAC	specific administrative control
SB	safety basis
SBAA	Safety Basis Approval Authority
SBRT	Safety Basis Review Team
SER	Safety Evaluation Report
SLB2	Standard Large Box 2
SME	subject matter expert
SMP	safety management program
SPD	Safety Programs Division
SR	Surveillance
SRS	Savannah River Site
SS	safety significant
SSC	structures, systems, and components
SSCVS	Safety Significant Confinement Ventilation System
SVS	Supplemental Ventilation System
SWB	Standard Waste Box
SWB-OP	Standard Waste Box Overpack
TED	total effective dose
TRU	transuranic
TSR	Technical Safety Requirements
UG	underground
UL	Underwriter's Laboratory
USQ	unreviewed safety question
USQD	USQ determination
WAC	Waste Acceptance Criteria
WH	waste handling
WHB	Waste Handling building
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 Purpose

As required by *Code of Federal Regulations* 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 DOE/WIPP-07-3372, Revision 7, *WIPP Documented Safety Analysis* (DSA), and DOE/WIPP-07-3373, Revision 7, *WIPP Technical Safety Requirements* (TSR) (hereafter, DSA/TSR Revision 7). DSA/TSR Revision 7 was formally transmitted to the DOE Carlsbad Field Office (CBFO) for approval via transmittal letter CO:20:02938 dated April 14, 2020, from Mr. R. E. Taylor, Business Assurance and Compliance, Nuclear Waste Partnership LLC, to Mr. D. C. Gadbury, Contracting Officer Representative, Office of Program Management, Carlsbad Field Office, Subject: TRANSMITTAL OF REVISION 7 OF THE WIPP DOCUMENTED SAFETY ANALYSIS AND TECHNICAL SAFETY REQUIREMENTS FOR APPROVAL UNDER NUCLEAR WASTE PARTNERSHIP LLC PRIME CONTRACT DE-EM0001971. The results of the hazard analysis and the supporting scoping calculations are presented in supporting documents that are incorporated into the DSA by reference and are thus also considered to be a part of the safety basis. 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 documents the required review of the complete DSA/TSR Revision 7 annual update 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 5b. It serves as the second 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 FINAL HIGH QUALITY DSA/TSR Revision 7. 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 annual update of 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.

1.2 WIPP Documented Safety Analysis History and Approach

The DSA/TSR Revision 5b was developed to support the restart of waste receipt and emplacement at the WIPP and approved by the DOE following suspension of those activities following the February 2014 accident events. The WIPP management and operating (M&O) contractor, Nuclear Waste Partnership LLC (NWP), completed a DOE Readiness Assessment and all subsequent pre-start activities successfully and resumed waste emplacement operations on April 7, 2017.

DSA/TSR Revision 6a, documented as an annual update to the WIPP safety basis, incorporated into the approved WIPP Documented Safety Basis updated hazard and accident analyses and

changes to the control set in the TSR based on operations experiences under DSA/TSR Revision 5b. Following the implementation of Revision 6a at the WIPP, PAGE CHANGES 1, 2, and 3 to WIPP DSA/TSR Revision 6a were approved by the DOE SBAA. The DOE approval, incorporation into Revision 6a, and implementation of those page changes spanned the period between implementation of Revision 6a at the WIPP and the August 23, 2019, submittal of the DRAFT DSA/TSR Revision 7 to the CBFO.

- Page Change 1 allowed combustibles in Pipe Overpack Containers (POCs) provided the UltraTech 9424S filter was installed in the 55-gallon drum 3/4-inch lid opening per manufacturer's specifications.
- Page Change 2a removed SAC 5.5.8, Real-Time Monitoring for Exothermic Chemical Reaction of Non-Compliant Containers in Panel 6 and/or Panel 7, Room 7, and Design Feature 6.11, Isolation Structures for Segregating Non-compliant Containers in Panel 6 and Panel 7, Room 7.
- Page Change 3 was incorporated to support the resumption of TRUPACT-III operations at WIPP.

The modifications to the approved DSA/TSR Revision 6a by Page Changes 1, 2, and 3 were approved by the DOE SBAA in accordance with CBFO Management Procedure (MP) 4.11, Revision 6, *Safety Basis Review Procedure*, and were incorporated in Revision 6a during CY 2019.

2.0 REVIEW PROCESS

The DOE safety document review process is documented in the U.S. DOE Carlsbad Field Office Safety Basis Document Review Plan for: Waste Isolation Pilot Plant Revision 7 of Documented Safety Analysis/Technical Safety Requirement (DSA/TSR) DOE/WIPP 07-3372/07-3373, Revision 7 USDOE Contract DE-EM0001971 Waste Isolation Pilot Plant. The review plan was transmitted by email dated September 12, 2019, from the SBRT Leader to all team members. The plan implements applicable requirements of CBFO MP 4.11.

The same review process was utilized from DSA/TSR Revision 6a. The intent was for the SBRT to provide in-process review during the M&O contractor's DSA and TSR development, and thereby help ensure the final product meets DOE expectations. The SBRT members and supporting subject matter experts (SMEs) identified in the plan were drawn from the CBFO and the DOE Office of Environmental Management (DOE-EM) resources, in part, to ensure knowledgeable expertise, including working familiarity with the applicable requirements and the WIPP facility. The review process was again broken into three phases:

Phase 1 In-Process Review - To initiate this DOE annual update of the WIPP Safety Basis (SB) documents, and in accordance with CBFO MP 4.11, the DOE Safety Program Division (SPD) Acting Manager executed the DOE review of DSA/TSR Revision 7 on April 4, 2019, with an In-Process Review of a preliminary draft of DSA/TSR Revision 7 dated March 2019. The In-Process Review was supported by the CBFO SPD Acting Manager, SBRT Leader, and a team member, as well as by NWP staff and contracted nuclear safety consultants. The In-Process Review provided the opportunity for the SBRT to have an early understanding of the changes proposed by the contractor to be incorporated into Revision 6a for the annual revision of the WIPP DSA/TSR. Also, the SBRT had early

opportunities to understand the annual revisions being proposed by the contractor. In the In-Process Review, as each DSA/TSR chapter/section was reviewed, the CBFO SBRT meeting participants engaged with NWP to provide real-time comments/resolution. The SBRT meeting participants provided real-time resolution to any issues. Comments generated during this phase were informal. The DOE internally tracked issues to resolution, but NWP was not expected to formally respond to comments. The In-Process Review comments that were resolved in the current DSA/TSR Revision 6a were agreed upon by the CBFO and NWP, and resolution of those comments was included in NWP's revision submittal. After NWP and the DOE concurred on resolution of DOE In-Process Review comments, NWP included the resolutions in the DRAFT DSA/TSR Revision 7 and submitted the document to the CBFO on August 23, 2019. (See NWP Letter CO:19:02990 dated August 13, 2019, from M. P. Gonzales, Manager, Contracts, to D. Gadbury, Contractor's Representative, CBFO, Subject: Transmittal of WIPP DSA/TSR Revision 7 Under NWP Contract No. DE-EM0001971.)

Note: Importantly, and because of the CBFO In-Process Review, the August 23, 2019, submitted DRAFT DSA/TSR Revision 7 included DOE SBRT input. Also, the SBRT Leader and members were already apprised of the substantial modifications versus the numerous editorial changes (minor in nature) introduced into the August 23, 2019, submitted DRAFT DSA/TSR by Revision 7. Finally, other than to document/explain the SBRT's knowledge of, and opportunity to review, minor editorial changes introduced into Revision 6a, this Addendum does not focus on or report the numerous editorial changes introduced by Revision 7.

Phase 2 Formal SBRT Review and Comment Resolution – This phase began with the NWP August 23, 2019 submittal of the annual update of the current WIPP DSA/TSR Revision 6a as DRAFT Revision 7. The formal DOE review consisted of verification of the following: the document(s) met DOE requirements and standards, Unreviewed Safety Question Determinations (USQDs) requiring SB updates were addressed, and the committed changes agreed upon with the CBFO during the previous DSA/TSR Revision 6a approval had been incorporated. Those committed changes are documented in the approval letter for DSA/TSR Revision 6a as "RFR" (Retained for Future Revision) and were further refined by the CBFO for inclusion into this annual update. Finally, Phase 2 of the review produced issues/comments generated by the DOE SBRT. Those issues/comments were formalized and documented by the SBRT members in accordance with CBFO MP 4.11. The DOE transmitted those issues to NWP as formal SBRT review comments. NWP tracked, resolved, and formally responded to comments (NWP Letter – CO:19:03070, December 18, 2019). Phase 2 ended upon formal resolution of all SBRT comments.

Phase 3 DOE Approval – Final comment resolutions of the SBRT review comments resulted in the contractor's submittal of the contractor-FINAL DSA/TSR Revision 7 on April 14, 2020 (CO:20:02938). Phase 3 began with the NWP document submittal on April 14, 2020, and this phase includes preparation of the DOE SER, which began in parallel with Phase 2, and was finalized after the FINAL DSA/TSR Revision 7 was formally transmitted by NWP. The SBRT alone was responsible for the final development of the SER, based on review of the submitted documents, again with support from SMEs as needed. Phases 1 and 2 were

planned to minimize the need for further comments in Phase 3, although some issues not fully resolved in Phase 2 were continued for resolution in Phase 3.

Checklists provided in the Safety Basis Document Review Plan helped ensure both the completeness of the review and the appropriate focus on applicable DOE requirements for the DSA and TSRs aligning with the "shall" statements from DOE-STD-3009-2014, and with the SER Addendum for DSA/TSR Revision 7.

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. The final DSA and TSR documents reflect the results of extensive comment dispositions and interactions between NWP and the DOE.

The Safety Basis Document Review Plan 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. The associated final SER and NWP safety basis documents were also presented to the CBFO SBAA for approval.

3.0 BASE INFORMATION

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

The following DOE requirement and guideline documents constitute the principal regulatory/requirements bases framework under which NWP prepared the WIPP DSA/TSR, Revision 6:

- 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-STD-1104-2016, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*
- DOE-STD-1186-2016, *Specific Administrative Controls*
- DOE-STD-1027-92, Change Notice 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*
- DOE Guide 420.1-1A, *Nonreactor Nuclear Safety Design Guide for use with DOE O 420.1C, Facility Safety*
- DOE Guide 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements*

The base information is presented in Chapters 1.0 and 2.0 of the DSA document.

3.1 Site Characteristics

The SBRT review of DSA Chapter 1.0 finds that no changes to facility and/or program descriptions were proposed in Revision 7 that would change the site characteristics of the WIPP facility.

3.2 Facility Description

The SBRT reviewed the specific proposed changes to DRAFT WIPP DSA Revision 7, Section 2.4.1.2.1, revised to accommodate the description of the new protective fire barrier, which provides a minimum 1-hour fire resistance rating, installed to a minimum height of 25 feet on each of the four Waste Handling Building (WHB) steel support columns. The fire barriers follow the guidance of the Underwriter's Laboratory (UL) white paper, "The Protection of Structural Steel in Hydrocarbon Fires." The barrier provided is a thin film intumescent coating that is listed in the UL Certification Directory, and the barrier design has been proven by testing in accordance with UL Standard 1709 Edition 5, "Standard for Rapid Rise Fire Tests of Protection Materials for Structural Steel."

Because the proposed change is to accommodate the use of the new protective fire barrier coating (UL Certified) on four WHB steel support columns, and the barrier is proven by testing, the proposed change to Section 2.4.1.2.1 is judged to be acceptable by the SBRT. Thus, this change was appropriate since it eliminates the need for an ATTENDANT due to the fact it is a more robust control than a Specific Administrative Control (SAC).

The SBRT commented on text in Section 2.4.4.1.1, which includes the designation of the Air Intake Shaft Conveyance for emergency egress, but omits the Waste Shaft Conveyance and Salt Shaft Conveyance serving as emergency egress paths. DSA Revision 7 incorporated designation of the Waste Shaft Conveyance and Salt Shaft Conveyance as emergency egress paths in accordance with the *WIPP Underground Escape and Evacuation Plan.*

The SBRT comment CH-2 focused on Section 2.4.4.2.2, which contains descriptions of scientific experiments conducted in the WIPP underground in the Experimental Facilities Area, including the Enriched Xenon Observatory (EXO) and Low Background Radiation Experiment. The EXO Experiment is completed and in the decommissioning phase. The submitted FINAL HIGH QUALITY DSA Revision 7 does not accurately describe the status of the EXO Experiment; thus, the DOE approval of DSA Revision 7 includes a Directed Page Change to correct the deficiency in Section 2.4.4.2.2.

The SBRT commented on text in Section 2.4.4.2.4, which discusses Mined Material, and noted that mined salt should be accurately described as mined material. DSA Revision 7 was revised to clarify that the terms "mined material" and "mined salt" are equivalent, in order to ensure that the questioned description terminology is appropriately and clearly described.

The SBRT commented on text in Section 2.4.4.3, which describes the Ground Control Program, but seemingly omitted information on the new resin bolts being used. DSA Revision 7 was updated appropriately. Text was added to Section 2.4.4.3 explaining that the new components being used are cable bolts that are a different type of resin bolt.

The SBRT commented on text in Section 2.4.4.4, and indicated that the characterization of Panel 9 as part of the main four entries for future waste disposal is not accurate. The text of Section 2.4.4.4 was modified to indicate that Panel 9 is no longer accessible and reflects the

appropriate configuration of Panel 9. Panel 9 of the main entries (North to South) between S-2750 and S-2520 have been closed. This closes the south end of the mine beyond S-2520, removing it from the ventilation circuit.

The SBRT commented on text in Section 2.4.4.6, which needs the Panel Closure description updated to reflect current Panel Closure design. DSA Revision 7 was updated appropriately.

The SBRT commented on text in Section 2.5.4.6.1 and Section 2.5.4.6.15 which discusses the Horizontal Emplacement and Retrieval Equipment (HERE). The HERE is currently abandoned in Panel 7, Room 6, and therefore replaced with Horizontal Emplacement Machine (HEM) in DSA Revision 7.

The SBRT commented on Figure 2.4-15 regarding the underground (UG) ventilation flow paths when the Supplemental Ventilation System (SVS) is not operating. The figure was updated in DSA Revision 7 to adequately reflect the existing ventilation flow paths in the UG. Text was added providing explanation of the utilization the ventilation flow path operation of the SVS.

The SBRT reviewed the specific proposed changes to Section 2.6.3.2.4, revised to accommodate the description of the battery-powered vehicles using either lead-acid or lithium-ion battery chemistries. These vehicles are typically used for UG activities such as transportation and salt mining. USQD D19-0145, *Engineering Change Notice 14358 Battery-Powered Load-Haul-Dump,* evaluated the use of the new UG load haul dump vehicles powered by lithium-iron phosphate batteries. This is the first vehicle at the WIPP to utilize this technology. The USQD compared the hazards associated with lithium-iron phosphate battery-powered vehicles with those of traditional acid-filled lead battery-powered vehicles and diesel-powered vehicles. The USQD concluded the new lithium-iron phosphate battery-powered load haul dump vehicle hazards are bound by the hazards of vehicles commonly used in the UG. In addition, USQD D19-0145 evaluated the gases that may be generated by chemical reactions, and determined that the WIPP Facility Section evaluated explosive materials such as hydrogen associated with facility equipment batteries and the generation of hydrogen associated with battery-charging stations.

Battery-powered vehicles are not directly used for handling and/or emplacement of waste, but may be operated in proximity of waste (e.g., waste shaft station, transport path, waste face), and the vehicles are not used to handle waste containers. Thus the use in the UG of the vehicles as described in Section 2.6.3.4 is acceptable. The revisions to Section 2.6.3.2.4 were appropriately analyzed and incorporated in the WIPP Facility Description of the DSA Revision 7.

Section 2.7.3.8.3 indicates that the SVS provides additional ventilation airflow to the UG and minimizes the deposition of salt on the filter assemblies during construction activities by discharging a portion of salt-laden, uncontaminated exhaust through the Salt Shaft, bypassing the filter assemblies. USQD D18-118, *WP-04-VU 3001 Revision 6 UG Ventilation SVS Operation*, evaluated a proposed change to the SVS setpoint from 130,000 actual cubic feet per minute (acfm) to 150,000 cfm proposed by Engineering Change Notice (ECN) 14298. Based on the horsepower output of the SVS fan motor, an additional 20,000 cfm is achievable. Based on modeling, the ECN concluded the increased airflow in the UG would provide significant benefit to ventilating the north end of the facility. It also determined the increased differential pressure would not have any adverse impact on the UG bulkheads.

The SBRT reviewed the specific proposed change to Section 2.7.3.8.3, revised to adjust the nominal airflow rate in the UG from 130,000 to 150,000 actual cubic feet per minute (acfm) [130,000 acfm value was deleted]. That SBRT review found that DSA Revision 7 was revised to accurately describe the operations of the facility, and concluded, based on the outcome of USQD D18-118, the change was acceptable.

The SBRT commented that Figure 2.7-7 did not accurately describe the disposal and construction circuits under SVS Operations. Text of DSA Revision 7, Section 2.7.3.8, Underground Ventilation System, was revised to accurately describe the existing UG operations relative to those operations being conducted during times the SVS is operating.

The SBRT commented on text in Section 2.8.1, which includes a description of Continuous Air Monitor (CAM) installations at each TRUDOCK in the Contact-Handled (CH) Bay and at the Payload Transfer Station in Room 108, but omits the CAM at the Bolting Station in Room 108. DSA Revision 7 incorporated a description of a CAM at the Payload Bolting Station in Room 108 for standard large box 2 (SLB2) processing.

The SBRT verified the DSA Chapter 2.0 WIPP system/equipment descriptions accurately portray current facility operations and equipment. With the inclusion of a DOE Directed Page Change involving 2.4.4.2.2, *Experiments in the Experimental Facilities Area* (see Section 8.6 of this DOE SER Addendum), the SBRT concludes that Revision 7, Chapter 2.0, is acceptable upon the NWP submittal to the DOE/CBFO for informational purposes Revision 7a of the WIPP DSA/TSR.

3.3 Conclusion

The SBRT concludes that DSA Chapters 1.0 and 2.0 provide sufficient base information in terms of facility and waste operation descriptions to support identification of the hazards and the selection of controls relied on for public, worker, and environmental protection. Specifically, adequate correlation is established between the physical facility and its description in the DSA, and the information presented is sufficient to support both the safety analysis and the development of an effective set of TSR controls.

4.0 HAZARD AND ACCIDENT ANALYSIS

4.1 Introduction

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 (EG) 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 into Chapter 3.0, *Hazard and Accident Analysis, and Control Selection*, of DSA Revision 7 by the revising process has resulted in substantial proposed changes requiring focused SBRT attention to meet DOE review requirements and support approval of the DSA document.

4.2 Hazard Analysis

The SBRT review of the Hazard Analysis in DSA Section 3.3 found that many of the changes are minor in nature (i.e., editorial, renaming for consistency with Chapter 2.0, and/or clarifying text), requiring little attention by the SBRT. The significant changes were evaluated by the SBRT and are reported in detail below.

The SBRT review finds the specific proposed changes to Section 3.3.2.3 increased the total number of events from 641 to 642 and the total number of Risk Class I or II events from 49 to 50. Those changes are appropriate as supported by the latest SBRT-reviewed revision of WIPP-021. In the revised WIPP-021, *Hazard Analysis for the Waste Isolation Pilot Plant*, Revision 9, section 6.0, the number of radiological events increased from 169 to 170. The revised WIPP-021 identifies 170 unique and representative radiological events, 50 of which are Risk Class I or II. Representative event CH/RH-UG-10-004a, uncontrolled rapid descent of loaded Waste Hoist and impact with Waste Shaft Station floor resulting in waste container breach, added two sub-events to address uncontrolled ascent of the conveyance during waste retrieval and during routine downloading, accounting for the increase in total number of events.

The SBRT reviewed the specific proposed changes to Section 3.3.2.3, revised to delete event number CH-WHB-02-001a1 from further evaluation. The event was removed as there is insufficient space to accumulate solid combustible materials in the Conveyance Loading Room (CLR) during waste downloads/uploads to result in significant consequences. The change was determined to be appropriate by the SBRT since WIPP-021 *(Hazards Analysis for WIPP*) identifies CH-WHB-001a1 as a Risk Bin III event for the co-located worker (CW) under Mitigated and Unmitigated evaluation. The physical space limitations on the quantity of combustibles that could exist in the CLR during downloading of waste ensures that there would be insufficient material available to result in a large fire affecting the CH waste atop of the Conveyance Loading Car; thereby removing the need to reduce the event to Risk Class III or IV.

Per DOE-STD-3009-2014, Section 3.2.2, the SBRT finds the below added assumptions (11-14) to DSA Section 3.3.2.3 are necessary to define meaningful accident scenarios, and the assumptions also affect the magnitude of the resultant consequences:

- Assumption # 11: Simultaneous substantial leaks from randomly co-located vehicles with subsequent ignition of those liquid combustibles is not considered to be credible. Per DOE-STD-3009-2014, Section 3.2.2: the added assumption may be necessary in order to define a meaningful accident scenario, and such assumptions may also affect the magnitude of the resultant consequences. The SBRT agrees that the added assumption helps in defining a meaningful accident scenario.

- Assumption # 12: Collisions of vehicles without automatic fire suppression systems are analyzed as an immediate release of the contained combustible liquids. The USQD D18-008 (negative) Summary of Change required “Adding a sub-event to WIPP-021 (*Hazards Analysis for WIPP*) for a collision of two or more vehicles that are exempt from the automatic fire suppression system (AFSS) requirement. Add discussion of this sub-event to Chapter 3 of the DSA.” Thus, the following quoted language was added to

Chapter 3.0, "With the vehicles being of substantial construction and operating at low speeds (due to the confines of the UG and rough floor surfaces), a collision of two or more vehicles resulting in the simultaneous rupture of all combustible liquid volumes of all involved vehicles with subsequent ignition of the disbursed combustible liquids is not considered to be credible." Only the vehicle having the largest contained volume of combustible liquid contributes to the release of liquid fuel. The bases of approval for this Assumption is consistent with USQD D18-009, *Use of Multiple Liquid Fueled Vehicles, Exempt from Having Automatic Fire Suppression, Near a Waste Face.*

- Assumption # 13: Lithium-iron phosphate batteries have the potential for release of hazardous chemicals when the electrolyte is exposed to water. A release requires the rupture of one or more battery cells coincident with infiltration of H_2O into the ruptured cells permitting a chemical reaction to occur that generates hazardous gases. The release of hazardous gases would be a slow-evolving occurrence, limited by the number of ruptured cells and exposure of electrolyte to H_2O. Review of battery composition presented in WIPP-058, *WIPP Fire Hazard Calculation*, led to the SBRT finding that the applicable chemical concentrations are within the allowances of the Hazardous Materials Program. The SBRT finds the assumption to be realistic, appropriately constructed, and useful in defining meaningful accident scenarios.
- Assumption # 14: In standard and defined WIPP UG operations processes, waste containers in permanent or interim closed panels are protected from fires, explosion and/or vehicles/equipment impacts that could occur in the active-operations portion of the UG. In accordance with DOE-STD-3009-2014, Section 3.2.2, the added assumption adds important information in order to define a meaningful and realistic accident scenario. The assumption indicates the magnitude of the resultant consequences would be lowered by the process defined by Assumption # 14. Finally, the Material-at-Risk (MAR) behind the closed panels is not impacted by arc or explosion, and the SBRT finds that the added assumption leads to an accurate and useful accident scenario.

The SBRT review of the specific proposed changes to revise Table 3.3-9 follows:

- Added CH-UG-01-004a which is consistent with Table 3.3-6. The SBRT found that addition of this event allows for the protection against a potential vehicle collision with liquid combustible storage containers in temporary storage locations in contaminated Waste Disposal areas of the UG.
- For Event number CH/RH-WHB-04-001a, *Fire external to WHB propagates to Waste handling areas affecting the CH and remote-handled (RH) Waste resulting in release of radiological material*, upon examination of the event description (as presented in WIPP-021), which provides additional conservatism in the Unmitigated Consequence for a fire external to the WHB that propagates to the Waste Handling areas, the SBRT finds: the CW Unmitigated Consequences were changed from Moderate to High and the CW Unmitigated Risk from Risk Class III to I; the Mitigated Frequency decreases from Extremely Unlikely (EU) to Beyond Extremely Unlikely (BEU), resulting in a change in the Unmitigated Risk Bin but no change in the Mitigated Risk Bin. That change is consistent with DOE Directed Change to WIPP-021, *Hazards Analysis for WIPP* (see Section 8.6 of this SER Addendum). The changes are acceptable due to the following SBRT findings: 1) the WHB non-combustible construction and curbing initial condition (IC) has been added as a credited IC. This passive design feature of the WHB structure reduces the unmitigated frequency to EU.

- Event number CH/RH-WHB-04-002a CW Unmitigated and Mitigated Consequences are increased from Moderate to High and the CW Unmitigated Risk from Risk Class III to I, with the Mitigated Risk dropping from IV to III. These changes are consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*, for these events as they provide additional conservatism in the Unmitigated and Mitigated Consequence, in addition to a more conservative Risk Class. The SBRT agrees with the additional level of conservatism, although no change in controls were made.
- Included event number CH-WHB-02-001a1 in Table 3.3-9, *Hazard Evaluation Events Requiring Further Evaluation*. Out of the 170 unique and representative events, 50 events are identified as being an Unmitigated Risk Class I or II hazard to one or more receptors. These 50 events are listed in Table 3.3-9. Events not classified as Unmitigated Risk Class I or II due to judgment of sequence of actions and/or physical parameters, calculation demonstrating the event to be implausible, incredible (i.e., criticality), or the application of ICs or assumptions, are discussed immediately following Table 3.3-9. In DSA Revision 7, event number CH-WHB-02-001a1 was removed from the listing of the four events below, and was added in the listing of events in Table 3.3-9. Controls identified as ICs are described in Section 3.3.2.3, *Results of Hazard Evaluation*. The Risk Classification of each unique and representative event was reduced to a Risk Class III or IV for all receptors by the application of controls except for the following events:

  CH/RH-WHB-25-001a

  CH-WHB-01-001a1

  RH-WHB-01-006a

  RH-WHB-03-001a

  Additionally, WIPP-021, Revision 9, *Hazards Analysis for WIPP*, identifies CH-WHB-02-001a1 as a Risk Bin III for the CW under Mitigated and Unmitigated due to the fact the quantity of combustibles that could exist in the CLR during downloading of waste ensures that there would be insufficient combustible materials that could result in a fire affecting CH waste located on a facility pallet atop the conveyance loading car; thereby removing the need to reduce the Risk Bin to Risk Class III or IV and not requiring further evaluation. The SBRT reviewed WIPP-021 characterization of combustible quantities that could exist in the CLR during downloading of waste and found that there would be insufficient physical space to accumulate large quantities of combustible materials that could result in a large fire, as described in the previous sentence. The SBRT agrees with the deletion of event number CH-WHB-02-001a1.

  Thirdly, WIPP-021, Revision 9 removed two subevents from evaluation as these events pertained to initiation of combustible fire and pressurized container scenarios involving the old decontamination trailer previously located in the Parking Area Unit (PAU). This trailer was removed in 2016 and a new trailer purchased and installed behind the surface salt haul truck shed. The new location precludes any impact to MAR as it is located well outside the PAU. The SBRT agrees with the deletion of sub events CH/RH-OA-02-002b and CH/RH-OA-10-002b.The SBRT found no change to the DSA was required as these events were bounded by their associated unique representative event.

- Changed event number CH/RH-UG-06-001a CW Unmitigated Consequences from Low to Moderate and CW Unmitigated Risk Class from III to II. These changes are consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*, for this event as the changes provide additional conservatism in the Unmitigated Consequence resulting in a more conservative Unmitigated Risk Class. The SBRT agrees with the additional level of conservatism, although no change in controls were made. The existing Mitigated Features prescribed were able to reduce the Mitigated Consequence to Low, resulting in the same Mitigated Risk. The CBFO agrees that because no changes were made to identified controls, the controls currently featured in WIPP-021 for this event are adequate to mitigate consequences to Low.

- The addition of event number CH-WHB-10-001a, which is consistent with Table 3.3-6, results in an increase in the Unmitigated Risk Class from III to II due to a change of the CW Unmitigated Consequence level from Low to Moderate. The Mitigated Risk Class remained the same because of the addition of the CH Waste Handling Confinement Ventilation System (CVS) as a Credited Mitigation Control. For those reasons, the SBRT agrees with addition of event number CH-WHB-10-001a.

- In event number CH/RH-WHB-25-001a the Unmitigated and Mitigated Frequency changed from Unlikely to EU, and the CW Unmitigated and Mitigated Consequence from Moderate to High. Through review of DOE-overseen changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*, the SBRT finds that the event is modeled as unrestrained equipment falling onto waste with subsequent ordinary combustible fire. The entire WHB inventory involved in the earthquake, 1 waste assembly involved in small fire and judged that the resulting fire would be no greater than the ordinary combustible fires (i.e., small fires). As an Initial Condition, the WHB is considered to be a Safety Significant (SS) preventive control for this event. Time at risk for the facility worker (FW) is limited due to opportunity for the FW to observe the upset condition and to exit the area, which limits exposure. The SBRT agrees with this change because it is consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, and with the additional conservatism for Unmitigated and Mitigated Consequence incorporated into the event.

The SBRT determined the specific proposed changes to Section 3.3.2.3.1 increase the number of fire hazard evaluation events requiring further evaluation to reduce risk to the FW or CW from 39 to 40. This change is consistent with the SBRT-reviewed changes made to WIPP-021 for this hazardous event type.

The SBRT found that the specific proposed changes to Section 3.3.2.3.1 add the description for Temporary Liquid Combustible Storage - Capacity Limit as a control for new event number CH-UG-01-004a. WIPP-021, Revision 9, *Hazards Analysis for WIPP*, identifies the addition of Event CH-UG-01-004a with the Temporary Liquid Combustible Storage - Capacity Limit as a SS Credited Preventer, which established the limit of 534 gallons of total liquid combustibles in contaminated areas of the UG. The capacity limit is based on the analysis of events involving the Lube Truck, which has a liquid-combustible capacity of 534 gallons. The storage of liquid combustibles may be divided into two separate locations; however, the combined capacity remains limited to 534 gallons. The changes are consistent with the SBRT-reviewed changes to WIPP-021; thus, the SBRT agrees the proposed changes to Section 3.3.2.3.1.

The SBRT found the specific proposed changes to Section 3.3.2.3.1 add the description for Temporary Liquid Combustible Storage - Separation Distance as a control for event CH-UG-01-004a. WIPP-021, Revision 9, *Hazards Analysis for WIPP*, identifies the addition of Event CH-

UG-01-004a with the Temporary Liquid-Combustible Storage - Separation Distance as an SS Credited Preventer, which establishes a minimum 200-foot buffer zone between each temporary liquid-combustible storage location(s) and Transport Path(s) and/or Waste Face. Due to analysis, the Lube Truck is prohibited from being within 200 feet of a Waste Face and, therefore, temporary liquid-combustible storage locations are limited to the same capacity with the same separation distance from waste. This change is consistent with the SBRT-reviewed changes in WIPP-021, Revision 9.

The SBRT reviewed specific proposed changes to Section 3.3.2.3.1, revised to add the description of a Vehicle Collision with Pool Fire at Temporary Liquid-combustible Storage Location Event CH-UG-01-004a and to be consistent with changes made to WIPP-021, *Hazards Analysis for WIPP*. That event is the representative event for a collision pool fire at a Temporary Liquid-combustible Storage location positioned in the Waste disposal area of the UG. The MAR involved is the CH Disposal Array and/or CH Waste in the Transport Path. The WIPP Waste Acceptance Criteria (WAC) IC ensures the waste constituency and its confinement within a metal container of sound integrity. A collision event with subsequent pool formation and ignition results in an unmitigated frequency of Unlikely with High radiological dose consequences to the FW and CW due to the CH waste, and Low for the maximally-exposed offsite individual (MOI). Therefore, this unmitigated event is Risk Class I for the FW and CW, and III for the MOI. No preventive engineered features were selected for risk reduction. The administrative controls (ACs) for limiting the liquid-combustible capacity within the temporary storage location and the separation of the temporary storage location(s) from the CH Waste Face and the Transport Path reduces the likelihood for the event to BEU (1 frequency bin each). Limiting the quantity of liquid-combustibles that may be contained in a given location defines the maximum distance that a pool fire could spread. Requiring placement of a temporary liquid-combustible storage location to be greater than the maximum reach of fuel pool ensures that the heat generated by the fuel pool cannot affect CH Waste in the Transport Path and/or the CH Waste Face. Implementation of these ACs results in a physical (i.e., engineered) location that prevents involvement of radiological waste in any pool fire that could result from a collision with the temporarily stored liquid-combustibles. Thus, the event consequences remain High to the FW and CW, and Low to the MOI, and the suite of controls reduces the risk classification for the FW and CW to III, and IV for the MOI. Because, the mitigated frequency of this event is BEU, and no engineered or administrative controls were necessary for risk reduction, the SBRT finds the FW, CW, and MOI are adequately protected for this new event.

The SBRT found the specific proposed changes to Section 3.3.2.3.1 were revised to adjust the Consequence from Moderate to High for the CW for the design of the WHB design and construction of noncombustible material. This change is consistent with the SBRT-reviewed changes to supporting calculations made to WIPP-021. Revision 9, *Hazards Analysis for WIPP*.

The SBRT found the specific proposed changes to Section 3.3.2.3.1 were revised to add the description of the preventive engineering feature of the substantial barrier at a minimum of 25 feet from the Southwest CH Bay exterior wall and the WHB fire suppression system to reduce the event frequency to BEU. This lowers the Risk Class for the CW to III. The preventive administrative feature of prohibiting fuel tankers from entering the WHB Parking Area unit is credited, although no additional mitigated frequency reduction is taken, resulting in the mitigated frequency of this event to be BEU. This change is consistent with the SBRT reviewed changes made to the WIPP-021, Revision 9, *Hazards Analysis for WIPP*.

The SBRT reviewed the specific proposed changes to Section 3.3.2.3.1, involving changing the Consequence from Moderate to High for the CW for a collision event with subsequent pool

formation and ignition. This change is consistent with the SBRT-reviewed changes to supporting calculations made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*.

The SBRT found the specific proposed change to Section 3.3.2.3.1 was revised to remove the description of event number CH-WHB-02-001a1. This event is consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*. Those changes result in CH-WHB-02-001a1 being identified as a Risk Bin III for the CW under Mitigated and Unmitigated cases due to the insufficient space to accumulate the quantity of combustibles available that could exist in the CLR during downloading of waste. This ensures that there would be insufficient solid combustible materials available to result in a large fire affecting CH waste located atop the conveyance loading car; thereby removing the need to reduce the Risk Bin to Risk Class III or IV.

The SBRT found the specific proposed changes to Section 3.3.2.3.1 revised the Consequence from Moderate to High for the CW for a collision event with subsequent pool formation and ignition. The changes are acceptable and consistent with the SBRT-reviewed changes to supporting calculations made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*.

The SBRT found the specific proposed changes to Section 3.3.2.3.3 added the description of the CH Waste Handling CVS to provide a confinement barrier with the High Efficiency Particulate Air (HEPA) filters, providing the capability to limit releases of airborne radioactive contaminants from the CH Bay or Room 108. These features reduce the consequences to the CW and MOI for event number CH-WHB-10-001a. The SBRT-reviewed WIPP-021, Revision 9, *Hazards Analysis for WIPP*, for this event identifies a Risk Bin II event for the CW under Unmitigated due to the fact that the Consequence was increased to Moderate.

The SBRT reviewed the specific proposed changes to Section 3.3.2.3.3 that added the description of the Pressurized Container impacts to CH Waste Containers for event number CH-WHB-10-001a. This change is consistent with the SBRT-reviewed changes to supporting calculations made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*.

The SBRT found the specific proposed changes to Section 3.3.2.3.6 revised the Consequence from Moderate to High for the CW. This change is consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*, for this event.

The SBRT reviewed the specific proposed changes to Table 3.3-10 that resulted in the following:

- Added the description of the Temporary Liquid Combustible Storage - Capacity Limit. This change is consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9, *Hazards Analysis for WIPP*.
- Added the description of the WHB design for support column passive fire protection coating. This change is consistent with the SBRT-reviewed changes made to WIPP-021, Revision 9.

The SBRT reviewed the specific proposed changes to Section 3.3.2.3.6, revised in accordance to the SBRT-reviewed modification made to WIPP-019, Revision 11, *Natural Phenomena Hazard* (*NPH*). The subject changes added additional conservatism to the Seismic event, which includes Subsequent Fire in WHB. The proposed content of the revised Section 3.3.2.3.6, *Externally Initiated, Natural Phenomena Hazard, and Other Hazard Events,* was found to be consistent with modifications made to WIPP-019, also reviewed by the SBRT. Those changes

included revision of the Seismic event. The event revision includes a Subsequent Fire in the WHB involving a SWB at average loading of 21.5 plutonium equivalent curie (PE-Ci). The dose to the CW increases from 5.1 roentgen equivalent man (rem) to 23 rem for a standard waste box (SWB) at 95th percentile loading of 160 PE-Ci. WIPP-019 was revised to state, "The unmitigated frequency is Extremely Unlikely with Low radiological dose consequences to the facility worker, High for the co-located worker, and Low for the MOI." For Section 3.3.2.3.6, the EU frequency with Low radiological dose for the CW having been changed from Low to High in the revised WIPP-019, the SBRT finds that the above-stated increased dose to the CW [5.1 rem to 23 rem] for a SWB at 95th percentile loading of 160 PE-Ci is acceptable and supported by the SBRT-reviewed documented WIPP-019 calculation.

The above event descriptions and consequences are consistent with the SBRT-reviewed changes made to WIPP-019. Additionally, the SBRT finds that the following explanatory text added to Section 3.3.2.3.6 regarding CW dose is supported by the dose increase presented in the prior paragraph: "The dose to the co-located worker would be lower than 97 rem if more than two SWBs are involved because DOE-STD-5506 allows a use of DR of 0.5 for more than two SWBs. The impacted SWB at an average or 95th percentile loading gives a co-located worker dose which is Low in Consequence Threshold, according to DOE-STD-3009-2014."

4.3 Accident Analysis

The SBRT review of the accident analysis in DSA Section 3.4 finds many of the changes are minor (i.e., editorial, renaming for consistency with Chapter 2.0, and/or clarifying text) in nature, requiring less attention by the SBRT. The below reported significant changes were evaluated by the SBRT and found to implement the relevant requirements of DOE-STD-5506-94. The changes were also found to be consistent with the SBRT-reviewed changes made to WIPP-019, *NPH*.

The SBRT identified specific proposed changes to Table 3.4-1, *Material at Risk Limits Based on Entire Waste Container Population*, for all listed Waste Container Types, resulting in the following:

- Change to the Mean/Container PE-CI, 95th Percentile Container, PE-Ci, and Total Containers Emplaced at WIPP, Certified Not Shipped.
- A 20% allowance was applied to the Mean and 95th Percentile values to account for High PE-Ci shipments.
- Changes to the Mean/Container PE-Ci, 95th Percentile Container PE-Ci, and Total Containers Emplaced at WIPP, Certified Not Shipped, and Ten-Drum Overpack Direct.
- Add a description under the situation for any Waste Container Type when the Savannah River Site (SRS) MAR limits in Table 3.4-2 are lower than the values in Table 3.4-1; then, Table 3.4-1 values are to be used for the Waste Container Type in the analysis.

Note: The SBRT determined the generator limits on the radiological inventory of each individual Waste Container as given in Table 3.4-1 are properly based on the type of material being packaged and the Waste Container type.

The SBRT reviewed the values presented in table 3.4-1 and found them to be consistent with WIPP-067.

The SBRT identified specific proposed changes to Table 3.4-2, *Material at Risk Limits Based on SRS Waste Container Population,* and found the 20 percent allowance was similarly added to account for high PE-Ci shipments.

The SBRT found the 20 percent allowance added to the MAR values of the tables (3.4-1 and 3.4-2) is acceptable because the accident analysis calculations showed the resulting change in consequence did not challenge the evaluation guidelines for the unique representative events. The higher MAR limits will reduce the number of high MAR evaluations as required by KE 18-5 for certified TRU waste of future shipments to WIPP. The reasoning behind this is the higher MAR will already have been evaluated in the DSA due to the 20 percent allowance which has been included and evaluated in the accident analysis.

The SBRT reviewed the specific proposed changes to Section 3.4.1.6, revised to change the calculated maximum resultant Total Equivalent Dose (TED) incurred at the 95th percentile level rem per curie for a 3-minute release from 630 to 767, a 20-minute release from 430 to 528, a 1-hour release from 360 to 420, a 2-hour release from 260 to 303, and an 8-hour release from 84 to 211. The changes are consistent with the SBRT-reviewed values identified in the revised WIPP-002, Revision 5, *MACCS Runs*.

The SBRT reviewed the specific proposed changes to Section 3.4.3.1.2, revised to adjust the 95th percentile value from 603 to 929 PE-Ci, while the rest of the containers involved are at the average MAR, which was changed from 154 to 292 PE-Ci. The SBRT found that change, and the specific proposed changes in Section 3.4.3.1.2, revised to update the Source Term Calculation, are consistent with SBRT-reviewed relevant calculations identified in WIPP-019, *NPH*.

The SBRT reviewed the specific proposed changes in Section 3.4.3.1.2, which revised the 20-minute total effective dose (TED) release from 2.0 to 1.4 rem per curie. The frequency of this event is qualitatively determined to be EU primarily due to the Waste Shaft Access Configuration IC which prevents direct access to the Waste Shaft as supported by other considerations described in the hazard evaluation for this event in Section 3.3.2.3., Process deviations which may result in this event would consist of a sequence of many unlikely human actions or errors for which there is no reason or motive. This change is consistent with the SBRT-reviewed values identified in WIPP-002, *MACCS Runs*, for the On-Site Worker at 100 meters and MOI 95th Percentile Unit TED from 1 Curie Pu-239 release. The changes are also consistent with the SBRT-reviewed values reported in WIPP-001, Revision 12, *Fires*, for Postulated Fire Accident Resultant TEDs with 20% MAR.

The SBRT reviewed the specific proposed modification of Section 3.4.3.1.3, revised to change the MOI dose from 7.3 to 6.6 rem. This change is consistent with the SBRT-reviewed values identified in WIPP-001, *Fires*. The scenario development for this event considers that a facility pallet of waste assemblies is sitting on the waste conveyance at the bottom of the Waste Shaft waiting to be transported for its final emplacement in the UG. The bounding scenario for a fire in the Waste Shaft is dropping a forklift with a 300-gallon fuel tank on a waste pallet sitting on the waste conveyance at the bottom of the Waste Shaft. The waste is subjected to a high-speed crush and breach followed by the burning of fuel and waste.

The SBRT reviewed the specific proposed changes to Section 3.4.3.1.2, revised to change the second container, a Standard Waste Box Overpack (SWB-OP), 95th percentile value from 603 to 929 rem, and the rest of the containers involved average MAR value from 154 to 292 PE-Ci

relative Large Pool Fire in the Shaft. The change is consistent with SBRT-reviewed corresponding values identified in WIPP-019, *NPH*.

The SBRT reviewed the specific proposed modifications to Section 3.4.3.2.2, revised to update the Source Term Calculations. The changes were found to be consistent with SBRT-reviewed corresponding values identified in WIPP-019, *NPH*.

The SBRT reviewed the specific proposed modifications to Section 3.4.3.2.3, revised to change the unmitigated inhalation radiological doses to the CW and MOI from 1.32E+03 to 2.0E+03 rem and from 5.36 to 6.1 rem, respectively. The modifications are consistent with the SBRT-reviewed values identified in WIPP-002, *MACCS Runs*, and also consistent with the values in WIPP-001, *Fires*, both calculations reviewed by the SBRT.

The SBRT reviewed the specific proposed modifications to Section 3.4.3.3.3, revised to change the 2-hour TED release value from 1.1 to 0.93 rem per curie, the dispersion value of 260 to 303 rem per curie for the CW, and the unmitigated inhalation radiological doses to the CW and MOI from 1.66E+03 to 1.93E+03 rem and from 7.0 to 5.9 rem, respectively. Also changed are the reasonably conservative unmitigated inhalation radiological doses to the CW and MOI from 1.17E+03 to 1.34E+03 and 4.97E+03 to 4.14E+03 rem, respectively. These changes are consistent with the SBRT-reviewed values identified in WIPP-002, *MACCS Runs,* and are also consistent with the values in WIPP-001, *Fires*.

4.4 Beyond Design/Evaluation Basis Accidents

The SBRT review of the accident analysis in DSA Section 3.5 finds many of the changes are minor (i.e., editorial, renaming for consistency with Chapter 2.0, and/or clarifying text) in nature, requiring less attention by the SBRT. The significant changes were evaluated and reported in detail below.

The SBRT reviewed the specific proposed changes to Section 3.5.1, revised to change the mean MOI TED for a 3-minute release from 0.95 to 0.76 rem per PE-Ci and the mean 2-hour release from 0.38 to 0.30 rem per PE-Ci. The change is consistent with the SBRT-reviewed corresponding values identified in WIPP-002, *MACCS Runs*, On-Site Worker at 100 m and MOI TED from 0.38 to 0.30 rem per PE-Ci. Additionally, those numeric changes resulted in the minor adjustment to the unmitigated TED incurred by the MOI being acceptably decreased from 1.8 to 1.7 rem using mean TED (WIPP-019, *NPH*).

For Section 3.5.2, the Beyond Evaluation Basis Accident (BEBA) event assumes that the WIPP WAC control is violated and a container undergoes an exothermic reaction and a follow-on fire occurs with adjacent drums experiencing seal failure in the UG, WHB (bounding event), or during transport. The WHB scenario gave the bounding consequences due to differences in MOI χ/Q calculations. WIPP-058, *Fire Analysis Supporting Analyses*, determined that a maximum of 5 drums are involved in the follow-on fire while staged in the WHB or during transport, or 59 drums if emplaced in an open or closed panel in the UG. The WIPP WAC and National TRU Program (NTP) has been improved to prevent the future shipments of waste streams that can cause this exothermic reaction (e.g., nitrate bearing waste as described in Chapter 18.0, “WIPP Waste Acceptance Criteria Compliance Program”). While DOE-STD-3009-2014 states that “Realistic analysis may be used to understand the impact of the accident,” this BEBA assumes bounding values for MAR, and Airborne Release Fraction times the Respirable Fraction (ARF x RF) for determining source term in accordance with DOE STD-5506. No credit is taken for the isolation structures for closed panels in calculating source term. However, to

provide a more realistic analysis, a 0.5 leak path factor (LPF) for deposition within the WHB prior to filtration (WIPP-018, *Explosions*) and mean MOI TED for radiological dose calculations (WIPP-002) are used in analyzing this event.

The SBRT reviewed the specific proposed changes to Section 3.5.2, revised to (1) adjust the mean 1-hour MOI TED from 0.5 to 0.42 rem per PE-Ci and the mean 2-hour MOI TED from 0.38 to 0.30 rem per PE-Ci, and (2) adjust the unmitigated TED incurred by a release in the WHB by the MOI from 4.3E+00 to 3.5E+0 rem, the reduction in dose from 43 to 35 millirem (mrem), the unmitigated TED incurred by a release in the UG by the MOI from 3.1E+0 to 2.5E+0 rem, and the reduction in dose from 31 to 25 mrem.

Because of appropriate SBRT-reviewed input from WIPP-018, *Explosions*, and WIPP-058, *Fire Analysis Supporting Analyses*, the BEBA – Exothermic Reaction Analysis properly supports Section 3.5.2; the SBRT finds that the methodology utilized by the contractor to calculate the MOI mitigated dose for this event properly reduced the dose from 35 to 25 mrem. Also, the emergency management program, in coordination with outside agencies, would assist in mitigating the MOI doses. The change is consistent with the SBRT-reviewed values identified in WIPP-002, *MACCS Runs*, and in WIPP-018, *Explosions*, for the TED under BEBA postulated events.

The SBRT reviewed the specific proposed changes to Section 3.5.3, finding the 95th percentile value was revised from 160 to 494 PE-Ci, and the specific proposed changes to Section 3.5.3 adjusted to update the Source Term Calculations. Those changes are consistent with the SBRT-reviewed values identified in WIPP-019, *NPH*.

Finally, the SBRT reviewed the specific proposed changes to Section 3.5.3, revised to change the MOI unit TED 1-hour release from 0.52 to 42 rem per PE-Ci, the unmitigated TED incurred by the MOI from 7.7E-1 to 9.1E-1 rem, and the increase dose from 8 to 9 mrem. This change is consistent with the SBRT-reviewed values identified in WIPP-002, *MACCS Runs*.

The SBRT reviewed the Planned Design and Operational Safety Improvements documented in DSA Section 3.6, finding one of two planned Operational Safety Improvements were appropriately deleted from the text of Section 3.6. The deleted planned improvements “Upgrading of differential pressure instrument loops reporting to the Central Monitoring Room (CMR)” and “Installation of protective fire barriers for WHB steel support columns” were deleted from the text of Section 3.6. The deletion of the fire barrier planned improvement resulted from resolution of SBRT comments and was subsequently correctly removed, as the fire barrier installation project was completed previously. The upgrade of the differential pressure instrument loops reporting to the CMR was removed as a DOE directed change, as the upgrade is included in the SSCVS project preliminary documented safety analysis, and will be incorporated into the DSA and TSR prior to startup of the system.

4.5 Conclusion

The SBRT found that the mitigated hazard evaluation and accident analysis were performed by first evaluating the hazard evaluation event (which is a hazard analysis event with the bounding risk ranking) for control selection. The controls were selected by first examining the applicability of the preferred and alternate controls listed in DOE-STD-5506-2007 for the event category.

The contractor collected hazard analysis and hazard evaluation events and organized those events into the *Hazards Analysis for the Waste Isolation Pilot Plant Transuranic Waste Handling*

Safety Basis (WIPP-021) that represents both the CH and RH waste handling processes as well as the four facility sections. The SBRT found that the contractor's current hazard evaluation comprehensively identified events associated with HAZMAT (hazardous material) and energy sources associated with normal, abnormal, and accident conditions involving TRU waste handling and disposal operations at the WIPP. The results of these activities are documented in the *Hazards Analysis for the Waste Isolation Pilot Plant Transuranic Waste Handling Safety Basis* (WIPP-021, Revision 9), which was reviewed by the SBRT and found to satisfactorily provide postulated events associated with the hazard sources and an evaluation of each event in terms of frequency and consequence. The results of the hazard analysis are described in Table 3.3-6, *Listing of Unique and Representative Hazard Evaluation Events*, identifying a total of 642 events in the hazards analysis. The SBRT review observed that the events were grouped into a set of 170 unique and representative radiological events, which are listed in Table 3.3-6 of the WIPP DSA.

The mitigative features listed in the hazard evaluation table are a listing of the potential controls that the accident analysis and control selection process may later credit. These features represent a potential set of controls that could offer reduction in the mitigated event consequence, but whose appropriateness must be demonstrated through the control selection process. The SBRT found the evaluation focused on (1) reducing the risk ranking by reducing the frequency and/or consequence level, or (2) eliminating the hazard or hazardous condition. The resulting identified controls were selected by the contractor by first examining the applicability of the preferred and alternate controls listed in DOE-STD-5506-2007 for the event category. The SBRT found that when those controls were not available or did not result in an acceptable risk ranking, additional controls were evaluated for the further reduction of frequency or consequence level. And, the SBRT found that those controls were selected using the DOE-STD-3009-2014 methodology of structures, systems, and components over AC, and preventive over mitigative.

Through a comprehensive review of hazard and accident analysis presented in DSA Revision 7, the SBRT finds that the safety basis of Revision 7, with the DOE directed changes, remains comprehensive relative to hazards presented, and is based on a consistent, substantiated logic. The proposed DSA Revision 7 adequately identifies the hazards of the facility, and includes the fundamental aspects of defense-in-depth, worker safety, and environmental protection. Additionally, the postulated accident potentials were adequately identified and the consequences were evaluated.

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, including any conditions of approval imposed. 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

The SBRT reviewed the specific proposed changes relative to the Functional Requirement, *the WHB shall maintain its structural integrity during credible fire scenarios*, in Table 4.4.1-2, revised

to remove SBRT-identified descriptive text though incorporation of a SAC to Section 4.5.1 that requires vehicle/equipment with liquid combustible capacity in the RH Bay to be attended whenever CH waste is present in the CH Bay outside of a closed Type-B shipping package. This change is consistent with the SBRT-reviewed IC identified in Chapter 3.0 supporting the WHB design to include support column passive fire protection coating that provides protection as an SS control.

The SBRT found that WIPP-021, Revision 9, *Hazard Analysis for the WIPP*, includes a review of the possibility of fire-induced roof collapse occurring in the WHB. That review draws on the current pool fire analysis methodology (specifically designed to maximize postulated container damage by maximizing pool diameter) to show that WHB roof failure would not occur.

Pool fires occurring in the RH Bay, as analyzed in WIPP-058, have the potential to weaken structural steel columns, which could result in the collapse of the WHB roof onto CH waste located in the CH Bay. This vulnerability is addressed by insulating four WHB steel support columns (E.3-10, E.7-10, E.3-11, and E.7-11) that are located near the CH/RH Bay roll-up door. The fire-retardant insulation has a minimum 1-hour fire resistance rating and is installed to a minimum height of 25 feet on each steel support column described above. The fire barriers follow the guidance of the UL white paper, “The Protection of Structural Steel in Hydrocarbon Fires.” The barriers provided are a thin film intumescent coating that has been tested and verified by testing in accordance with UL 1709, “Standard for Rapid Rise Fire Tests of Protection Materials for Structural Steel.” The selected barrier is listed in the UL Certification Directory as design number XR620.

5.3 Specific Administrative Controls

The basis for acceptance of SACs is similar to that for safety SSCs, except that the discussion in the safety analysis for SACs should justify the use of the SACs over engineered safety features. The safety function of the SAC is clearly defined so that the decision to use a SAC rather than a safety SSC can be evaluated. Because the SBRT found that this section documents the bases for approving the SACs, as well as their associated safety functions, functional requirements, system evaluations, and potential TSR coverage in accordance with DOE-STD-1104-2016, the SBRT finds the SAC acceptance process is valid.

The SBRT reviewed the specific proposed changes in Table 4.5.13, *Justification for Specific Administrative Control versus Structures, Systems, and Components for Temporary Liquid-combustible Storage Capacity Limit,* incorporated into the DSA Revision 7 to add the description of the Temporary Liquid Combustible Storage. This requires limiting the quantity of liquid-combustibles and therefore the size of the maximum fuel pool to ensure the potential maximum spill cannot reach areas where CH waste may be present. Table 4.5.13 presents: 1) the justification for using in the WIPP UG Temporary Liquid Combustible Storage being “no current engineered means to prevent the maximum potential fuel pool resulting from a release of the complete inventory of temporarily stored liquid-combustibles to reach areas where CH Waste may be present,” 2) the Administrative Action being “visual confirmation that the quantity of temporarily stored liquid-combustibles is limited and the location is sufficiently separated from locations where CH Waste may be present” (i.e., Transport Path, CH Waste Face), and 3) Functional Requirements being visual confirmation that the quantity of temporarily stored liquid-combustibles is limited and the location is sufficiently separated from locations where CH waste may be present (i.e., Transport Path, CH Waste Face). Upon review of the above supporting text of Table 5.5.13 and because this change is consistent with the SBRT-reviewed credited

controls identified in Chapter 3.0, the SBRT finds the subject changes to Table 4.5.13 and the associated Administrative Action acceptable.

The SBRT reviewed the specific proposed changes to Section 4.5.12, revised to delete the requirement for attending vehicles/equipment with liquid-combustible capacity in the RH Bay due to the fact that the CH Bay support columns will have a fire retardant insulation coating. This change is consistent with DOE-STD-3009, which preferences engineered over administrative relative to control selection methodology. Because the SBRT determined: 1) the incorporated SAC into Section 4.5.1 required vehicle/equipment with liquid-combustible capacity in the RH Bay to be attended whenever CH waste was present in the CH Bay outside of a closed Type-B shipping package, and 2) that change is consistent with the SBRT-reviewed IC identified in Chapter 3.0 supporting the WHB Design to include support column passive fire protection coating that requires protection as an SS control, the engineered control taking the place of the SAC is consistent with the SBRT-reviewed IC identified in Chapter 3.0 supporting the WHB Design to include support column passive fire protection coating. Thus, the SBRT finds the changes to Section 4.5.12 are adequate and acceptable.

The SBRT reviewed the specific proposed changes in Section 4.5.13, revised to add the control for Temporary Liquid-Combustible Storage. The Temporary Liquid-Combustible Storage control is established to reduce the likelihood of pool fires originating from a temporary liquid-combustible storage location spreading to and involving CH waste. This is accomplished by ensuring that temporary storage locations contain 534 gallons total of liquid-combustibles or less, and that the temporary storage locations are 200 feet or greater from the Transport Path and/or a CH Waste Face. The liquid capacity limit and separation distance requirement is based on analysis for the Lube Truck event. The Lube Truck can contain up to 534 gallons of liquid-combustibles and is therefore required to be 200 feet or greater from a CH Waste Face. The temporary liquid-combustible storage control is selected as an SS control. This change is consistent with the SBRT-reviewed addition of (1) event number CH-UG-01-004a and (2) the Section 4.5.13 Justification for Specific Administrative Control versus Structures, Systems, and Components for Temporary Liquid-combustible Storage Capacity Limit.

5.4 Conclusion

The SBRT concludes that the DSA with the proposed changes continues to provide an adequate basis to demonstrate the capabilities and sufficiency of WIPP safety SSCs credited in the hazards evaluation.

The SBRT found the DSA provides adequate detail on those SSCs designated as Safety Significant for the WIPP CH and RH waste handling processes. The purpose of selecting Safety Significant SSCs is to provide protection to the public and workers, respectively, by identifying those SSCs that serve to prevent and/or mitigate postulated events. The selections of Safety Significant SSCs are based on the preventive and mitigative features identified in the hazard and accident analyses in Chapter 3.0 of the DSA. SACs are also identified in Chapter 4.0.

The SBRT identified SACs and ACs that provide preventive and/or mitigative functions for specific postulated accident scenarios that have safety importance equivalent to engineered controls classified as SS if the engineered controls were available. SS SSCs are discussed in Section 5.2, and SACs are discussed in Section 5.3. The SBRT found the scope of Chapter 4.0 includes the following:

- The description of the SC SS SSCs and SACs for the WIPP facility, including the required safety functions.
- The functional requirements included in the DSA that support the safety SSCs and SACs in performing their safety functions, and the general conditions caused by postulated accidents under which the safety SSCs or SACs must operate.
- The performance criteria necessary to provide reasonable assurance that the functional requirements will be met and the assumptions needing TSR coverage.

The SBRT found the DSA addresses the safety SSCs and programs specifically credited in the hazard and accident analyses. Although the *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis* (DOE-STD-3009-2014) anticipates a discussion on safety support systems in Chapter 4.0, only support systems required or relied on for the safety SSCs to carry out their safety functions are required. The SBRT finds that the WIPP has no credited support systems.

6.0 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS

6.1 TSR Derivations

In accordance with DOE-STD-1104-2016, this section documents the bases for approving the derivation of TSRs, including any conditions of approval imposed. Such documentation focuses on the consistency of the logic developed in the DSA hazard and accident analyses, and the DSA description of SSCs and SACs being carried through to the derivation of TSRs. The TSRs required by 10 CFR 830.205 are not specified in the DSA, which is only required to provide the basis of their derivation. In addition to bases of acceptance, this section provides a synopsis of the derivation of TSRs as a function of the hazard and accident analysis.

The SBRT reviewed the specific proposed changes in Table 5.3-1, revised to add the control of the Temporary Liquid-Combustible Storage. This change is consistent with the SAC identified in Chapter 4.0.

The SBRT reviewed the specific proposed changes to Section 5.5.3, Section 5.5.5, Section 5.5.6, and Section 5.5.7, which were revised to remove the CMR differential pressure transmitters and associated alarm setpoints which provides a signal to the Central Monitoring System (CMS) via an instrument loop which then provides a signal to the CMR where the differential pressure is displayed for the various HEPA filter banks for the CH Waste Handling CVS, the Underground Ventilation Filtration System/Interim Ventilation System, the 309 Bulkhead, and the Battery Exhaust System. Instrument reporting to the CMR was an operational convenience with an original intent to provide relief to Operators doing constant rounds; however, this developed operational confusion upon entering Limiting Condition for Operation (LCO) Condition A for the applicable LCOs. The safety functions of the system are assured by the surveillances that remain in place. The SBRT verified that the applicable LCOs still have the appropriate surveillances in place. Local differential pressure gauges are provided to ensure that negative differential pressures are maintained within the CH Bay and Room 108 with respect to outside ambient air pressure. When Door 140 is open, the CLR becomes an area that is included in the CH Bay Operability requirements. The differential pressure with respect to outside ambient air pressure is measured by a differential pressure gauge located in the CH Bay and another differential pressure located in Room 108. Pressure is measured across each HEPA filter bank of the In Service HEPA filter units to ensure that exhaust air is being drawn through the HEPA filter units prior to release to the environment. The differential

pressure across each HEPA filter bank is read by a local gauge. The gauges are directly connected to the manifold and read the actual pressure values of the system. The safety analysis values that are to be protected in the safety basis are adjusted to support the specific instrument loop uncertainties. Therefore, the actual Operability values used in the LCO may be different for readings in two different locations, but are established from the same safety analysis value.

Verification of differential pressure across each In Service HEPA filter bank of each HEPA filter unit is performed daily by visual observation of the HEPA filter bank pressure differential local gauges as specified in Table 5.5.3-1, "CH WH CVS, Local Differential Pressure Instrumentation." Verification of differential pressure in the CH Bay and Room 108 with respect to outside atmospheric air pressure is performed daily by visual observation of the CH Bay and Room 108 Process Areas differential pressure local gauges as specified in Table 5.5.3-1, "CH WH CVS, Local Differential Pressure Instrumentation." Those verifications are performed daily to confirm that a CH Waste Handling CVS exhaust fan and operable HEPA filter unit are in service, by visual observation of the exhaust fan and HEPA filter unit operational status and alignment as indicated on the CMR monitor.

The SBRT reviewed the specific proposed changes to Section 5.5.13, revised to delete the requirement for attending vehicles/equipment with liquid-combustible capacity in the RH Bay due to the fact that the CH Bay support columns were required to have a fire retardant insulation coating. This change is adequate because the engineered control takes the place of the SAC in the Hazard Analysis.

The SBRT reviewed the specific proposed changes to Section 5.5.13.1, revised to remove the language that waste may be present in the CH Bay during Waste Handling Mode and Waste Storage Mode. This change is adequate due to the fact that the LCO is now only applicable in the UG with the removal of the liquid-combustible control in the RH Bay.

The SBRT reviewed the specific proposed changes to Section 5.5.21, revised to add the control for the Temporary Liquid Combustible Storage Locations. The temporary liquid-combustible storage control is established to reduce the likelihood of pool fires originating from a temporary liquid-combustible storage location spreading to and involving CH waste. This is accomplished by ensuring that temporary storage locations contain 534 gallons total of liquid-combustibles or less, and that the temporary storage locations are 200 feet or greater from the Transport Path and/or a CH Waste Face. The liquid capacity limit and separation distance requirement is based on analysis for the Lube Truck event. The Lube Truck can contain up to 534 gallons of liquid-combustibles and is therefore required to be 200 feet or greater from a CH Waste Face. The temporary liquid-combustible storage control is selected as an SS control. Temporary liquid combustible storage controls apply to locations south of S-90. The designated repository of UG fuel and oil are located in areas north of S-90 and are addressed in Section 4.4.8.

The Safety Function of the temporary liquid-combustible storage control is to prevent the spread of any potential fuel pool from a temporary liquid-combustible storage location to a location where CH waste may be present (i.e., Transport Path, CH Waste Face), thereby reducing the likelihood of a pool fire involving radiological waste.

Temporary storage of liquid-combustibles in the UG is required until such time as a means of disposition is determined. Used liquid-combustibles (e.g., diesel, lube oil) extracted from vehicles/equipment located in the contaminated area of the UG, for example, are considered contaminated and therefore cannot be immediately removed to a clean area for disposal.

Temporary storage of liquid-combustibles presents an opportunity for radiological material release due to collisions with the stored liquid-combustibles. However, storage of these liquid-combustibles can be limited in volume such that a collision with the liquid-combustible storage containers resulting in the maximum pool size could not reach areas where CH waste may be present in the Transport Path and/or a CH Waste Face. Therefore, the temporary liquid-combustible storage control is designated as a SAC since engineered controls are not available to prevent occurrence of events requiring SS protection.

The control, Temporary Liquid-combustible Storage, includes the elements listed in Table 4.5.13-1. The table provides a justification for why an SSC was not selected and identifies the administrative action to accomplish the element.

The SBRT reviewed the specific proposed changes to Section 5.5.21, revised to add the control for the temporary liquid-combustible storage locations. This change is consistent with the SAC identified in Chapter 4.0 as demonstrated by the above presented analysis of relevant text of Chapter 4.0.

The information in DSA Revision 7 Chapter 5.0 demonstrates that the selected controls comply with 10 CFR 830.205. The SBRT also consulted DOE Guide 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements,* in evaluating the derivation of TSRs in DSA Revision 7. The SBRT finds the presentation of the chapter in the WIPP DSA is in accordance with the outline in DOE-STD-3009-2014.

6.2 Conclusions

The SBRT finds DSA Chapter 5.0 continues to support and provide the information necessary for the derivation of the TSR document required by 10 CFR 830.205. The chapter provides sufficient basis to derive the TSR controls for credited SSCs (active and passive), SACs, and administrative programs from Chapter 4.0 necessary to perform the required safety functions. The SBRT determined that the control discussion was consistent with the accident analyses and supports the intent of the guidance in DOE-STD-3009 for this chapter content. The TSRs are identified that ensure adequate protection of workers, the public, and the environment, and are available as detailed in the hazard analysis. 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 the analysis. The bases for deriving LCOs, surveillance requirements, and SACs are provided as appropriate. The facility modes are defined and those associated with TSRs are consistent with the hazard analysis and accident analysis.

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 is adequate, and that these elements were implemented. It is sufficient to provide a program list which notes basic program principles and relationship to defense-in-depth, worker safety, and/or dominant accident scenarios.

The SBRT review of DSA Chapter 6.0 through Chapter 18.0 finds many of the changes are minor (i.e., editorial, renaming for consistency with Chapter 2.0, and/or clarifying text) in nature, requiring less attention by the SBRT. The significant changes were evaluated and reported in detail below.

7.1 DSA SMP, Chapter 6.0 – Prevention of Inadvertent Criticality

The SBRT review of DSA Chapter 6.0 finds no technical or substantive proposed changes to SMP description or Key Attributes (KAs) or Key Elements (KEs).

7.2 DSA SMP, Chapter 7.0 – Radiation Protection

The SBRT review of DSA Chapter 7.0 finds the following proposed changes to SMP description or KAs or KEs.

The SBRT commented on the text in Chapter 7.0 for the following items:

- The description of KE 7-4, which is the emplacement of Isolation Structures East of the air intake and exhaust closure barriers of Room 7, Panel 7. These require inspection where physical access is possible. However, Mine Operations performs the inspections of the isolation structures and therefore the applicability of KE 7-4 under the Radiation Protection SMP was reviewed and, in addition, a KE was modified in Chapter 11.0 to resolve Comment HC-13.
- The description of Portable Air Samplers and portable CAMs; Portable Air Samplers do not provide equivalent functions as does the CAM when CAM communication with the CMR becomes inoperable. This text was revised to reflect that when the CAM communication is Inoperable, portable CAMs will be in use.
- The description in Table 7.5-1 and Section 7-8 for the Radiological Control and Dosimetry Manager is an obsolete title and was revised to reflect the current organizational structure.

7.3 DSA SMP, Chapter 8.0 – Hazardous Material Protection

The SBRT review of DSA Chapter 8.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

The SBRT commented on the text in Section 8.1, which describes KE 8-1 that is only inclusive of provisions for monitoring and controlling air quality for UG workers, but does not address the CH Bay TRUDOCK concerns. The KE 8-1 was revised globally to accommodate the FW through a DOE directed change.

7.4 DSA SMP, Chapter 9.0 – Radioactive and Hazardous Waste Management

The SBRT review of DSA Chapter 9.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.5 DSA SMP, Chapter 10.0 – Initial Testing, In Service Surveillance, and Maintenance

The SBRT review of DSA Chapter 10.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.6 DSA SMP, Chapter 11.0 – Operational Safety Program

The SBRT review of DSA Chapter 11.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

The SBRT commented on text in Section 11.4.2 for the following items:

- Due to the fact that the Emergency Response personnel are not responsible for inspections of Fire Suppression Systems (FSSs). The text ensures that it is clear that Fire Protection Engineering is responsible for these specific inspections.
- The Fire Brigade no longer exists under the current text due to the fact that the Emergency Response Team (ERT) no longer exists, Protective Force is managed through Operations, and Emergency Service Technicians (ESTs) are managed through Safety. The text ensures that it is clear as to what makes up the Fire Brigade and that the ERT functionality is removed.
- KE 11-10 was modified to accurately portray the role of the SMP in the inspections of isolation barriers through a DOE directed change.

7.7 DSA SMP, Chapter 12.0 – Procedures and Training

The SBRT review of DSA Chapter 12.0 finds no technical or substantive changes made in Revision 6a.

7.8 DSA SMP, Chapter 13.0 – Human Factors – Deleted

The SBRT review of DSA Chapter 13.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.9 DSA SMP, Chapter 14.0 – Quality Assurance

The SBRT review of DSA Chapter 14.0 finds no technical or substantive changes made in Revision 6a.

7.10 DSA SMP, Chapter 15.0 – Emergency Preparedness Program

The SBRT review of DSA Chapter 15.0 finds no technical or substantive changes in Revision 6a, aside from numerous procedure reference updates.

7.11 DSA SMP, Chapter 16.0 – Provisions for Decontamination and Decommissioning - Deleted

The SBRT review of DSA Chapter 16.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.12 DSA SMP, Chapter 17.0 – Management, Organization, and Institutional Safety Provisions

The SBRT review of DSA Chapter 17.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.13 DSA SMP, Chapter 18.0 – Waste Acceptance Criteria Compliance

The SBRT review of DSA Chapter 18.0 finds no technical or substantive proposed changes to SMP description or KAs or KEs.

7.14 Conclusions

The SBRT concludes the DSA SMP Chapters with the proposed changes 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 Definitions

The SBRT review of the substantial changes to the definitions, TSR Section 1.1, finds the additional description of an ATTEND(ED)/ATTENDANT to include: An ATTENDANT assigned to a stationary liquid-fueled vehicle/equipment or liquid-combustible storage location is responsible for alerting the operator of any vehicle/equipment moving in their proximity. The added text is adequate as it provides additional rigor to communications by the ATTENDANT.

8.2 Frequency

The SBRT review of the specific proposed changes to Table 1.3-1 for Surveillance Requirement Frequency revised to change Note 2 denoted as EACH SHIFT to provide more clarity in regards to the shift of the performing organization unless stated in a specific LCO. This change provides operational convenience to the performing organization.

8.3 Limiting Conditions of Operations (LCOs) and Surveillance Requirements (SRs)

8.3.1 LCO 3.1.1 WHB Fire Suppression System

The SBRT review of LCO 3.1.1 identified three proposed changes in the LCO Actions, Surveillances (SRs), and bases in Revision 7.

- Note 2: During the Surveillance testing of the fire pumps, the FSS is considered OPERABLE when one fire pump (45-G-601 or 45-G-602) is OPERABLE.

This Note allows the FSS to remain in OPERABLE status during SR 4.1.1.2 with only one fire pump OPERABLE. Each of the two fire pumps is capable of supplying the required flow and pressure to the risers. Therefore, the risk of having only one OPERABLE fire pump available during the surveillance testing period is acceptable. The SBRT found this addition to be satisfactory as it allows for operational flexibility while still ensuring the safety function is met.

- The text of LCO 3.1.1 *WHB Fire Suppression System;* Condition C REQUIRED ACTION C.3 was deleted. The deleted REQUIRED ACTION C.3 read - "Establish a FIRE WATCH at the WASTE HANDLING ACTIVITY locations in the AFFECTED PROCESS AREA(S)." The prior C.4 was renumbered to C.3 and [the resulting C.4] REQUIRED ACTION C.4 was revised to read

  –"Establish a ROVING FIRE WATCH ~~at the WASTE HANDLING ACTVITY locations~~ in AFFECTED PROCESS AREA(S)."

  [Note: the strike\thru text was deleted from C.4]

All modifications to support the above changes were made to B3/4.1 Fire Suppression System - B 3.1.1 WHB Fire Suppression System bases of information.

During the SBRT subsequent evaluation of the FINAL HIGH QUALITY TSR Revision 7 (April 2020), the SBRT determined that the contractor modifications to the LCO 3.1.1 Condition C were not conservative. Removal of the FIRE WATCH while WHB FSS is inoperable while conducting waste handling activities presents an unacceptable risk. The SBRT is utilizing DOE Directed Page Changes to reinstate CONDITION C REQUIRED ACTION C.3 and supporting bases text to LCO 3.1.1. The SBRT agrees that removal of the ROVING FIRE WATCH at WASTE HANDLING ACTIVITIES is appropriate as this would be a redundant FIRE WATCH to C.3, but would retain the 2-hour watches in the affected process area to minimize propagating fire risks.

- The text of LCO 3.1.1 WHB Fire Suppression System; Condition D: The FSS for the WHB is NOT OPERABLE in a PROCESS AREA(S) due to a hydrant flow test.

The WHB FSS becomes inoperable when the credited flow path from the Fire Water Storage Tank to the applicable PROCESS AREA sprinklers is diverted through a hydrant as a result of testing. Only one hydrant is allowed to be open at a time for testing. Multiple hydrants may be sequentially tested. The SBRT found the risk in conducting a hydrant test is acceptable when a firefighter is present at the hydrant during the short duration flow test and has the capability of immediately securing the hydrant upon indication of a fire. The SBRT found the system restoration completion time of 4 hours acceptable, as this provides ample time to conduct hydrant testing during a shift while minimizing the time the flow is diverted. The SBRT also found entry into Condition C if Condition D times are not met to be appropriately conservative.

The SBRT concludes the above identified changes are appropriate as they incorporate proposed changes from Chapters 3.0, 4.0, and 5.0 of Revision 7.

8.3.2 LCO 3.1.2 Underground Vehicles and Equipment with a Fire Suppression System

The SBRT review of LCO 3.1.2 identified no changes in the LCO REQUIRED ACTIONS, Surveillances, and bases in Revision 7.

8.3.3 LCO 3.2.1 CH Waste Handling (WH) Confinement Ventilation System

The SBRT review of LCO 3.2.1 identified three proposed editorial/clarification changes in the LCO Actions, Surveillances, and bases in Revision 7 that were non-impactive, but judged by the SBRT to provide positive clarification.

- Deletion/Removal of CONDITION A: CMR alarm indication for differential pressure across IN SERVICE HEPA filter bank NOT OPERABLE OR CMR alarm indication for differential pressure in CH BAY is NOT OPERABLE OR CMR alarm indication for differential pressure in ROOM 108 NOT OPERABLE.

- Condition B was replaced as CONDITION A, resulting REQUIRED ACTIONS being re-numbered from B.1, B.2, B.3, B.4, B.5.1, and B.5.2 to A.1, A.2, A.3, A.4 A.5.1, and A.5.2.

The SBRT concludes the above identified changes are appropriate as they incorporate the removal of the non-safety significant CMR alarm indication from Chapters 3.0, 4.0, and 5.0 of Revision 7.

- To resolve SBRT comments, the SBRT utilized DOE Directed Page Change to modify LCO 3.2.1 CH WH Confinement Ventilation System; CONDITION A REQUIRED ACTION A.3 Fire Watch and A.4.1/A.4.2. Thus, see Section 8.6, *DOE Directed Page Change to WIPP TSR Revision 7*, to see the proposed DOE Directed Page Change text determined by the SBRT for reaching a satisfactory resolution.

All needed modifications to support the above changes were made to B3/4.2 Confinement Ventilation System - B 3.2.1. CH WASTE Handling Confinement Ventilation System bases of information were made to the FINAL HIGH QUALITY Revision 7 (April 2020).

8.3.4 LCO 3.2.3 Underground Ventilation Filtration System/Interim Ventilation System

The SBRT review of LCO 3.2.3 identified three proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

- Bulkhead 308 was added to the OPERABILITY Statement for CMR alarm indications.
- Removal of Condition B: CMR alarm indication for differential pressure across IN SERVICE HEPA filter bank NOT OPERABLE.
- Removal of CMR Differential Pressure across HEPA Banks from Table 3.3.3-2.

The SBRT concludes the above identified changes are appropriate as they incorporate proposed changes from Chapters 3.0, 4.0, and 5.0 of Revision 7.

8.3.5 LCO 3.2.4 309 Bulkhead Operability During Download of Waste Containers

The SBRT review of LCO 3.2.4 identified five proposed changes in the LCO Actions, Surveillances and bases in Revision 7.

- Removal of Condition A: CMR alarm indication for differential pressure across 309 Bulkhead NOT Operable.
- Removal of Condition B statement: Required Actions and Completion Times of Condition A not met.
- Removal of SR 4.2.4.4 statement: removed transmitter and instrumentation for the instrument loop listed in Table 3.2.4-1.

- Removal of SR 4.2.4.5: Perform a FUNCTIONAL TEST on the differential pressure alarm instrument loop listed in Table 3.2.4-1
- Removal of Table 3.2.4-1: 309 Bulkhead, CMR Differential Pressure Instrumentation.

The SBRT concludes the above identified changes are appropriate as they incorporate proposed changes from Chapters 3.0, 4.0, and 5.0 of Revision 7.

8.3.6 LCO 3.2.5 Battery Exhaust Filtration System

The SBRT review of LCO 3.2.5 identified five proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

- CMR Alarm indication was removed from OPERABILITY Statement.
- Removal of Condition A: CMR Alarm indication for differential pressure across IN SERVICE HEPA filter bank NOT OPERABLE.
- Removal of SR 4.2.5.3 statement: transmitters and instrumentation for the instrument loop and gauges listed in Table 3.2.5.2.
- Removal of SR 4.2.5.4: Perform FUNCTIONAL TEST on the differential pressure alarm instrument loops listed in Table 3.2.5.1.
- Removal of Table 3.2.5-1: Battery Exhaust System, CMR Differential Pressure Instrumentation.

The SBRT concludes the above identified changes are appropriate as they incorporate proposed changes from Chapters 3.0, 4.0, and 5.0 of Revision 7.

8.3.7 LCO 3.3.2 Aboveground Liquid-fueled Vehicle/Equipment Prohibition

The SBRT review of LCO 3.3.2 identified no proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

8.3.8 LCO 3.3.5 Underground Lube Trucks Operation

The SBRT review of LCO 3.3.5 identified no proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

8.3.9 LCO 3.3.8 Vehicle/Equipment Control

The SBRT review of LCO 3.3.8 identified three proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

- Removal of Vehicles/Equipment with liquid-combustible capacity greater than or equal to 25 gallons ATTENDED in the RH Bay when CH WASTE is present in the CH BAY from the OPERABILITY statement.
- Removal of Condition E: Vehicle(s)/Equipment with liquid-combustible capacity greater than or equal to 25 gallons are not ATTENDED in the RH BAY when CH WASTE is present in the CH BAY.

- Removal of SR 4.3.8.5: VERIFY vehicles/equipment with liquid-combustible capacity greater than or equal to 25 gallons are ATTENDED in the RH BAY.

The above is supported by the following text, "The SBRT review of the specific proposed changes to Section 5.5.13, revised to delete the requirement for attending vehicles/equipment with liquid-combustible capacity in the RH Bay due to the fact that the CH Bay support columns were required to have a fire retardant insulation coating. This change is adequate because the engineered control takes the place of the SAC in the Hazard Analysis," found in the above Section 6.1.

The SBRT concludes the above identified changes are appropriate as they incorporate proposed changes from Chapters 3.0, 4.0, and 5.0 of Revision 7.

8.3.10 LCO 3.4.3 Temporary Liquid Combustible Storage

The SBRT review of LCO 3.4.3 identified it as a newly introduced LCO in the LCO Actions, Surveillances, and bases in Revision 7.

- LCO 3.4.3: Temporary Liquid Combustible Storage locations south of S-90 SHALL:
  - Be located at least 200 feet from the TRANSPORT PATH.
  - Be located at least 200 feet from each CH WASTE FACE in an ACTIVE PANEL.
  - Be limited to two (2) locations separated by at least 300 feet.
  - Be limited to a maximum of 534 gallons of total liquid combustibles.

MODE Applicability: WASTE HANDLING, DISPOSAL

NOTE 1: Temporary storage of liquid combustibles less than 200 feet from the TRANSPORT PATH or less than 200 feet from a CH WASTE FACE in an ACTIVE PANEL is allowed when the liquid is placed behind an approved isolation structure (such as bulkheads and barriers).

PROCESS AREA Applicability: UNDERGROUND, South of S-90

The Action Tables include the following Conditions:

- Condition A: A Temporary liquid combustible storage locations is less than 200 feet from a CH WASTE FACE in an ACTIVE PANEL OR A temporary liquid combustible storage location is less than 200 feet from the TRANSPORT Path.

- Condition B: The temporary liquid combustible locations are not separated by at least 300 feet.

- Condition C: The number of temporary liquid combustible locations is greater than 2.

- Condition D: The total contained volume of temporarily stored liquid combustibles exceeds 534 gallons.

- Condition E: Required Actions and Completion Times of Conditions A, B, C, or D are not met.

Following the contractor submittal of the FINAL HIGH QUALITY WIPP DSA/TSR Revision 7 (APRIL 2020) to the CBFO, and pursuant to further discussion between the DOE SBRT and NWP NS Engineering, text of the DOE Directed Page Changes was prepared to incorporate additional needed input into the REQUIRED ACTION text and the COMPLETION TIME text for CONDITION E of LCO 3.4.3. The purpose of the DOE Directed Changes to be incorporated into LCO 3.4.3 and the identified corresponding changed text is explained/identified as follows:

> REQUIRED ACTION E.1 will be changed as follows per DOE Direction: ATTEND each non-compliant temporary liquid-combustible storage location when the ACTIVE PANEL is manned ~~or during WASTE Transport~~. The removal of the struck-out text is necessary because REQUIRED ACTIONs E.1 and E.2 are connected with an "**AND**" connector and E.2 states, "SUSPEND WASTE HANDLING ACTIVITIES in the UNDERGROUND other than those related to re-establishing compliance of temporary liquid-combustible storage locations." Additionally DOE Directed Page Changes are provided to change the REQUIRED ACTION E.2 COMPLETION TIME from 14 DAYS to IMMEDIATELY. Lastly, the REQUIRED ACTION E.3 "Restore compliance with the LCO" and the COMPLETION TIME of 14 days for REQUIRED ACTION E.3 are being added to CONDITION E of LCO 3.4.3 by the DOE Directed Page Changes. The DOE Directed Page Changes for CONDITION E of LCO 3.4.3, described above, are consistent with and supportive of the preceding REQUIRED ACTIONs and COMPLETION TIMEs for the four preceding CONDITIONs A, B, C, and D of LCO 3.4.3; and additionally are consistent with other LCOs of TSR Revision 7 relative to SUSPENSION of WASTE HANDLING activities. All of the modifications, additions, and deletions to text of LCO 3.4.3 of TSR Revision 7 resulting from DOE Directed Page Changes will be incorporated into TSR Revision 7a, which will be provided to CBFO as an information copy.

The following items were identified as Surveillance Requirements:

- 4.4.3.1: VERIFY that each temporary liquid-combustible storage location is either 200 feet or greater from the TRANSPORT PATH, or is placed behind an installed isolation structure.

- 4.4.3.2: VERIFY that each temporary liquid-combustible storage location is either 200 feet or greater from a CH WASTE FACE in an ACTIVE PANEL, or is placed behind an installed isolation structure.

- 4.4.3.3: VERIFY that temporary liquid-combustible storage locations are limited to 2 and, if 2 locations exist, that the locations are separated by 300 feet or greater.

- 4.4.3.4: VERIFY that the combined total of temporarily stored liquid-combustibles is no greater than 534 gallons.

The FREQUENCY is MONTHLY for all four of the above Surveillances.

The SBRT evaluation of LCO 3.4.3 concludes the above identified changes are appropriate, as they incorporate proposed changes regarding the controls identified in Chapter 5.0 for

Temporary Liquid Combustible Storage. The purpose of LCO 3.4.3 is to prevent the spread of any potential fuel pool from a temporary liquid combustible storage location where CH waste may be present, thereby reducing the likelihood of a pool fire involving radiological waste.

The following explanatory text provides reasoning and supporting documentation for such attributes of the LCO as Surveillance Frequency and Required Action Completion Times involved with LCO 3.4.3, *Temporary Liquid Combustible Storage*. Also, the SBRT analysis of proposed changes to Section 3.3.2.3.1, adding the description for Temporary Liquid Combustible Storage - Separation Distance as a control for event CH-UG-01-004a, is discussed below as background information.

> Temporary liquid combustible storage controls apply to locations south of S-90. The designated repositories of UG fuel and oil are located in areas north of S-90 and are addressed as a Design Feature in Section 5.5.7.
>
> Liquid-Combustible Storage was incorporated in the DSA and TSRs (LCO 3.4.3) to allow temporary liquid-combustible storage locations south of the S-90 drift. (Eliminates the Evaluation of Safety Situation, ESS-2017-02, *Combustible Liquids Temporarily Stored in Proximity to Waste Containers in the Underground.*)
>
> The SBRT found the specific proposed changes to Section 3.3.2.3.1 add the description for Temporary Liquid-Combustible Storage - Separation Distance as a control for event CH-UG-01-004a. WIPP-021, Revision 9, *Hazards Analysis for WIPP*, identifies the addition of Event CH-UG-01-004a with the Temporary Liquid-Combustible Storage - Separation Distance as an SS Credited Preventer, which establishes a minimum 200-foot buffer zone between each temporary liquid-combustible storage location(s) and Transport Path(s) and/or Waste Face. Due to analysis, the Lube Truck is prohibited from being within 200 feet of a Waste Face, and therefore, temporary liquid-combustible storage locations are limited to the same capacity with the same separation distance from waste. This change is consistent with the SBRT-reviewed changes in WIPP-021, Revision 9, *Hazards Analysis for WIPP*.
>
> Temporary storage of liquid-combustibles presents an opportunity for radiological material release due to collisions with the stored liquid-combustibles. However, storage of these liquid-combustibles can be limited in volume such that a collision with the liquid-combustible storage containers resulting in the maximum pool size could not reach areas where CH waste may be present in the TRANSPORT PATH and/or a CH WASTE FACE in an ACTIVE PANEL.
>
> The temporary liquid-combustible storage controls are established to reduce the likelihood of pool fires involving CH waste originating from a temporary liquid-combustible storage location. This is accomplished by ensuring that 534 gallons total of liquid-combustibles or less are contained in temporary storage locations, and that the temporary storage locations are 200 feet or greater from the TRANSPORT PATH and/or a CH WASTE FACE in an ACTIVE PANEL. The liquid capacity limit and separation distance requirement is based on analysis for the Lube Truck (LCO 3.3.5). The Lube Truck can contain up to 534 gallons of liquid-combustibles, and is therefore required to be 200 feet or greater from a CH Waste Face.
>
> The intent of this control is to prevent unlimited temporary liquid combustible storage near a TRANSPORT PATH and/or a CH WASTE FACE in an ACTIVE PANEL. However, as this is an AC, it is vulnerable to human error. Limits on the total quantity of liquid combustibles, separation requirements, and the allowable number of storage

locations may be unheeded. However, any such failures (single or multiple control failures) do not independently create a collision or a combustible-liquid spill and an ignition source to initiate the fire.

Re-establishing operation within these control boundaries as rapidly as possible is required to ensure that a fire involving temporary liquid-combustible storage does not occur, and to restore compliance with the LCO.

This LCO addresses the requirement to prohibit temporary liquid-combustible storage from exceeding a total of 534 gallons at two locations combined. The LCO prohibits each storage location from being less than 200 feet from a CH WASTE FACE in an ACTIVE PANEL, and prohibits each storage location from being less than 200 feet from the TRANSPORT PATH. The LCO limits the number of temporary liquid-combustible storage locations to two, separated by no less than 300 feet. Specifically, the LCO addresses the following elements:

Temporary Liquid-combustible Storage south of S-90 shall be:

- Located at least 200 feet from the TRANSPORT PATH.
- Located at least 200 feet from each CH WASTE FACE in an ACTIVE PANEL.
- Limited to two locations separated by at least 300 feet.
- Limited to a maximum of 534 gallons of total liquid-combustibles.

Prohibiting the combined volume of liquid-combustibles in temporary liquid-combustible storage locations to 534 gallons or less ensures that the maximum size of a fuel pool resulting from a liquid-combustible storage location will not affect CH WASTE in the TRANSPORT PATH and/or any CH WASTE FACE in an ACTIVE PANEL. WIPP-058, *DSA Supporting Calculations, Fuel Spill, HEPA Filter Plugging, and Compartment Over Pressurization*, concludes that a 534-gallon fuel spill in a 16-foot drift extends approximately 108 feet on either side of the spill. This is significantly less than the required 200-foot separation distance. To ensure the total fuel volume assumption used in WIPP-058 is protected, the combined liquid-combustible inventory of temporary liquid-combustible storage locations is established as 534 gallons. Based on this evaluation in combination with the 200-foot separation distance requirement, CH waste cannot be affected by a pool fire when protected by the SAC restrictions.

8.3.11 LCO 3.7.1 Waste Acceptance Control

In the FINAL HIGH QUALITY DSA/TSR Revision 7 (APRIL 2020) for **3/4.7 Suspect Container Response; 3.7.1 Waste Acceptability Control; LCO 3.7.1. CONDITION** B; **REQUIRED ACTION** B.2 *Place accessible WASTE CONTAINER(S) in a WIPP WAC compliant over container,* the **COMPLETION TIME** was changed from 48 hours to 7 days.

In *discussions* with NWP NS Engineering, the SBRT learned that the contractor's reasoning for the above change resulted from operating experience ascertained by the NWP during two recent (late 2019 through first half of 2020) WIPP waste handling situations. Those waste handling situations involved the receipt of suspect waste containers at the WIPP, observed to be noncompliant relative to the descriptive text of LCO 3.7.1 **CONDITION** B. The contractor response to those waste handling experiences was closely monitored to compliant end-points by CBFO Nuclear Safety and Waste Handling Operations personnel. Following those two WIPP waste handling situations, NWP NS Engineering and CBFO Safety Programs Division (SPD)

personnel examined the contractor's demonstrated ability to complete **REQUIRED ACTION** B.2 within the required **COMPLETION TIME** of 48 Hours for **CONDITION** B. NWP's determination that resulted from those discussions was to lengthen the **COMPLETION TIME** of 48 hours to 7 days in the HIGH QUALITY DRAFT WIPP DSA/TSR Revision 7 for **LCO 3.7.1 CONDITION** B; **REQUIRED ACTION** B.2. That change was determined to be unacceptable by the SBRT Lead in consultation with the CBFO Acting SPD Director. Thus, incorporation of DOE DIRECTED PAGE CHANGES into the DSA/TSR Revision 7 will result in the time span of 7 days to be reduced to 4 days for the **COMPLETION TIME** for **REQUIRED ACTION** B.2 for LCO 3.7.1.

8.3.12 LCO 3.8.1 Waist Hoist Brakes

The SBRT review of LCO 3.8.1 identified no proposed changes in the LCO Actions, Surveillances, and bases in Revision 7.

8.4 Administrative Controls

The SBRT review of Section 5 of the TSR revealed the TSR contains no substantial proposed changes to the administrative controls for the Facility. The administrative controls described in this section are consistent with DSA Chapter 5 and those provided in DOE guidance.

8.5 Design Features

The SBRT review of Design Features (DFs) finds the following propose change to Section 6.1 of the TSRs, *Waste Handling Building Structure*:

- The WHB structure contains a description of the four WHB Steel Support Columns located near the CH/ RH Bay roll-up door protected by fire retardant coating insulation.

- Four WHB steel support columns (E.3-10, E.7-10, E.3-11, and E.7-11), located near the CH/RH Bay roll-up door, are protected by a fire retardant coating insulation. As described in Section 2.4.1.2.1, the WHB is protected from a pool fire in this area having the potential to weaken structural steel columns and collapse the WHB roof onto CH waste located in the CH Bay.

As part of the annual update submittal, the following significant proposed change, *fire barrier protective coating on steel support columns in the Remote-Handled Bay as a Waste Handling Building a design feature*, impacting the DSA/TSR control set was implemented. That change is supported by the following text, "The SBRT review of the specific proposed changes to Section 5.5.13, revised to delete the requirement for attending vehicles/equipment with liquid-combustible capacity in the RH Bay due to the fact that the CH Bay support columns were required to have a fire retardant insulation coating. This change is adequate because the engineered control takes the place of the SAC in the Hazard Analysis," found in the above Section 6.1.

The SBRT Review found the description of the fire barrier on the RH-Bay column was not included in the derivation of the Design Feature of Section 5.7.1 of the DSA. This omission was corrected with a DOE directed page change.

The SBRT concluded these changes are appropriate as they are consistent with other proposed changes in the DSA Chapter 2.0 description, and the proposed changes do not impact the DF's safety function or how the safety function was provided.

8.6 DOE Directed Page Changes

Enclosure 1 of this SER Addendum presents the completed text of all 12 DOE Directed Page Changes to the April 2020 submitted FINAL HIGH QUALITY WIPP DSA/TSR Revision 7, and WIPP-021, *Hazard Analysis for the Waste Isolation Pilot Plant*. This Section 8.6 supplements Enclosure 1 by identifying each DOE Directed Page Change and presenting explanatory and background information for each of the 12 DOE Directed Page Changes. Also, references are given below to identify sections of this SER Addendum where more detailed explanatory information regarding the Directed Page Changes is presented.

DOE Directed Page Change 1

The Enriched Xenon Observatory (EXO) and Low Background Radiation Experiment is included in the WIPP experiments. The EXO experiment is completed and in the decommissioning phase. The submitted FINAL HIGH QUALITY DSA Revision 7 does not accurately describe the status of the EXO experiment; thus, the DOE approval of DSA Revision 7 includes a Directed Page Change to correct the deficiency in Section 2.4.4.2.2.

DOE Directed Page Changes 2

Page 3-86:
External-, Natural Phenomena Hazard- and Other-Initiated Event Descriptions
Seismic event with Subsequent Fire in WHB
Changed ~~0.075~~ g to 0.06 g to agree with cited reference SAND 78-1596 (corrected editorial error)

DOE Directed Page Change 3

Page 5-83:
5.7.1 Waste Handling Building Structure DF 6.1
Descriptive text was added to the derivation of the design feature for the fire protective coating to be consistent with the changes in Chapters 2 and 4 of the DSA.

Page 5-89:
5.7.6 Waste Hoist Support System (DF 6.6)
Changed ~~0.01~~ g to 0.1 g to agree with Chapter 4.0 performance criteria (corrected editorial error)

DOE Directed Page Change 4

Section 3.6 Planned Design and Operational Safety Improvements
Removed: ~~Upgrading of differential pressure instrument loops reporting to the CMR to address vulnerabilities identified during the back-fit analysis.~~
This text removal resulted from DOE/CBFO discussions with Defense Nuclear Facilities Safety Board (DNFSB), the Facility upgraded the BH 308 differential pressure loop and alarm to safety significant. The remaining differential pressures and alarm upgrades were removed from the scope because the Safety Significant Confinement Ventilation System (SSCVS) Project will be providing these safety significant functions as identified in the project Preliminary Documented Safety Analysis.

DOE Directed Page Change 5

Ultimately, the document changes to address SBRT Comment CH-8 added by the FINAL

HIGH QUALITY WIPP TSR Revision 7 (APRIL 2020) and the DOE Directed Page Change to the Revision 7 (APRIL 2020) focused on LCO 3.1.1 and LCO 3.2.1 and their supporting bases information. Together, these two revisions remove the requirement for the Fire Watch (Required Action A.3) since a Roving Fire Watch is sufficient to protect the CH Waste Handling CVS given the WHB Fire Suppression System is Operable. Hot work activities are allowed to restore the CH WH CVS to Operable status. These specific hot work activities are allowed to continue with an established Fire Watch in accordance with the Fire Protection Program.

To fully follow the changes executed by both (1) the modified text introduced by the FINAL HIGH QUALITY TSR Revision 7 (April 2020) and (2) this DOE Directed Page Change to LCOs 3.1.1 and 3.2.1, see above subsection 8.3.1, *LCO 3.1.1 WHB Fire Suppression System,* and subsection 8.3.3, *LCO 3.2.1 CH WASTE Handling (WH) Confinement Ventilation System,* of this SER Addendum.

DOE Directed Page Change 6
KE 7-4 is put forth in Radiation Protection Program SMP. The Revision 7 KE text does not clearly communicate which NWP Organization Section (Radiation Protection or UG Ground Control) is responsible for the inspection and maintenance of the identified isolation structures and areas around those structures. Splitting the KE into two parts accurately conveys each organization's role and responsibility.

KE 7-4: Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7, are monitored for airborne radioactivity ~~inspected~~, where physical access is possible. ~~The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.~~

Further, KE 11-10 of the Operational Safety SMP (Chapter 11.0 of the DSA) required text changes are presented below in another DOE Directed Page Change.

DOE Directed Page Change 7
A SBRT comment resolution regarding KE 7-5 in Chapter 7 was not carried through the rest of the document (DSA Chapter 3.0 and TSR Section 5.6.1). KE 7-5 text still incorrectly allows portable air-samplers to be used when the CAM communication with the CMR becomes inoperable. The below DOE Directed Page Change for the text in Chapter 3.0 and TSR is required.

KE 7-5: When the active panel including the exhaust drift is occupied, at least one CAM communicating with the CMR is required in the exhaust drift of the Disposal Panel. Portable ~~air samplers or portable~~ CAMs are used when the CAM communication with the CMR becomes inoperable. The temporary use of portable devices and the return to service of CMR communications are managed under the Radiation Protection Program.

DOE Directed Page Change 8
Chapter 8.0, *Hazardous Material Protection*, pertains to both the WIPP surface and UG; however, the current KE 8-1 text applies only to the UG. Thus the following DOE Directed Page is established:

KE 8-1: Establish provisions to monitor and control air quality to ensure underground workers are protected from ~~volatile organic compounds (~~VOCs~~)~~; protective measures include posting hazardous areas, establishing monitoring requirements, ensuring local ventilation, and requiring ~~personnel~~ personal protective equipment such as respiratory equipment as needed.

DOE Directed Page Change 9
KE 11-10 was modified to highlight the inspection role for UG ground control of Panel 7 isolation barriers within the SMP.

KE 11-10: Ground control inspections are conducted routinely, and remedial actions performed for unstable ground conditions by qualified personnel. Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B, as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.

DOE Directed Page Change 10
A DOE Directed Page Change was prepared to incorporate additional needed text into the REQUIRED ACTION text and the COMPLETION TIME text for CONDITION E of LCO 3.4.3. REQUIRED ACTION E.1 will be changed as follows per DOE Direction: ATTEND each non-compliant temporary liquid-combustible storage location when the ACTIVE PANEL is manned ~~or during WASTE Transport~~. Additionally DOE Directed Page Changes are provided to change the REQUIRED ACTION E.2 COMPLETION TIME from 14 DAYS to IMMEDIATELY. Lastly, the REQUIRED ACTION E.3 “Restore compliance with the LCO” and the COMPLETION TIME of 14 days for REQUIRED ACTION E.3 are being added to CONDITION E of LCO 3.4.3 by the DOE Directed Page Changes.

DOE Directed Page Change 11
SBRT review of two recent (late 2019 through first half of 2020) WIPP waste handling **i**terations involving the receipt of suspect waste containers at the WIPP, which were observed to be noncompliant relative to the descriptive text of LCO 3.7.1 CONDITION B, resulted in the SBRT to produce Page Change 11. NWP NS Engineering and the SBRT examined the contractor’s demonstrated ability to complete REQUIRED ACTION B.2 within the required COMPLETION TIME of 48 hours for CONDITION B. NWP’s determination that resulted from those discussions was found to be unacceptable by the SBRT Lead in consultation with the CBFO Acting SPD Director. Thus, incorporation of DOE Directed Page Changes into the DSA/TSR Revision 7 will result in the time span of 7 days to be reduced to 4 days for the COMPLETION TIME for REQUIRED ACTION B.2.1 OR in a 10-day limit for the COMPLETION TIME for REQUIRED ACTION B.2.2 for LCO 3.7.1.

DOE Directed Page Change 12
Hazards Analysis for the Waste Isolation Pilot Plant Transuranic Waste Handling Safety Basis WIPP-021, *Hazards Analysis for WIPP,* Revision 9.

1) Resolution of DNFSB comments on CH/RH-UG-01-005a regarding waste containers dropped down the shaft onto the 300 gallons of diesel fuel not being an identified scenario in the WIPP Hazard Analysis (HA) required an evaluation to determine if the scenario raised could have potentially higher consequence than the bounding event. A new calculation was added to

include this scenario in WIPP-001, *Fire*, Revision 13. The calculation for the bounding event already included dropping the 300 gallons of diesel on the waste containers and remains the bounding scenario having a higher consequence.

A sub-event is to be added to representative event CH/RH-UG-01-005a1, *Vehicle containing liquid fuel (e.g., forklift, forklift with 300-gallon diesel tank*) *enters open Waste Shaft (i.e., conveyance not present) and drops onto loaded waste conveyance resulting in large pool fire in the Waste Shaft with a release of radiological material.* The added sub-event enables the evaluation of waste containers dropped from Waste Shaft Collar onto Waste Conveyance carrying diesel fuel tank (~300 gallons) positioned at Waste Shaft Station. The representative event remained unchanged as presented in WIPP-021, Revision 9, *Hazards Analysis for WIPP*.

2) Representative event CH/RH-WHB-04-001a, *Fire External to WHB, propagates to Waste handling areas affecting the CH and RH Waste resulting in release of radiological material*, is to be changed to show the unmitigated frequency is EU from Unlikely in WIPP-021, *Hazards Analysis for WIPP*, by crediting the previously uncredited Initial Condition of WHB noncombustible construction and curbing. Fire suppression is then credited to reduce the mitigated event frequency to BEU. Prior to this change, the noncombustible construction and curbing to reduce the unmitigated frequency of the event was listed as a credit IC, but not credited. The change more accurately depicts the event in WIPP-021, *Hazards Analysis for WIPP*.

3) Two sub-events are to be added to the representative event CH/RH-UG-10-004a, *Uncontrolled rapid descent of loaded Waste Hoist and impact with Waste Shaft Station floor resulting in waste container breach resulting in release of radiological material*, to address uncontrolled ascent of the conveyance during waste retrieval and during routine downloading. The representative event remained unchanged. The HA had already included a bounding event for the failure of the waste hoist conveyance resulting in a drop down the shaft. Since the hoist is counterbalanced, the conveyance could be propelled upward into the crash beams. Although the bounding event was previously included, these lesser events involving uncontrolled ascent are to be included in WIPP-021, Revision 9, *Hazards Analysis for WIPP*, as sub-events in response to DNFSB comments on the DSA.

In addition, the unmitigated frequency of sub-event CH/RH-UG-10-004b is to be revised to BEU from EU in WIPP-021, *Hazards Analysis for WIPP*, by acknowledging that both redundant hoist brake systems have to fail for the event to occur.

4) A sub-event is to be added to representative event CH/RH-UG-30-001a1, *Roof collapse in a filled disposal panel (closed) or partially filled disposal panel (open) resulting in release of radiological material*, in WIPP-021, *Hazards Analysis for WIPP*, which evaluates a total roof fall of a filled active room. WIPP-019, *NPH*, *WIPP DSA External Event and Natural Hazard Phenomena (NHP) Event Hazard Analysis (HA) and Accident Analysis (AA) Calculations*, was revised to include the total roof fall and an evaluation of kinetic energy required to release contents of waste containers. The representative and bounding event remained unchanged.

8.7 Conclusion

The SBRT concluded that TSRs adequately incorporate the proposed changes in Chapters 3.0, 4.0, and 5.0 of DSA Revision 7, and have verified the commitment for safety controls made in the DSA to be carried through the TSR provisions. The TSRs have sufficiently prescribed the

limiting conditions of operation, surveillance requirements, administrative controls, and design features to appropriately operate the facility in order to protect the worker, public, and the environment.

9.0 DSA REVISION 7 RETAIN FOR FUTURE REVISION (RFR) COMMENTS AND USQDs

9.1 RFR Comments

The SBRT review of the following DSA Revision 5b RFR comments finds all have been incorporated and considered closed within the NWP and the CBFO agreed upon scope of DSA Revision 7. The NWP-submitted FINAL HIGH QUALITY DSA/TSR Revision 7 (April 2020) concludes the resolving of all DSA Revision 5b RFR comments, leaving no remaining RFR comments to be addressed in future WIPP DSA revisions. The resolution to all the comments have been included in attached Enclosure 2.

132	768	1152
648	769	1153
763	771	
764	772	
765	818	
766	922	
767	1051	

9.2 USQ Determination Incorporation

The SBRT review of the USQD annual report submittal finds all post DSA Revision 6a USQDs requiring safety basis change were incorporated into Revision 7. The USQDs requiring safety basis changes are identified in the Executive Summary of the DSA. The SBRT concludes that the WIPP Safety Basis documents continue to be sufficiently updated with identified required changes from the USQ process to provide reasonable assurance of adequate protection of workers, the public, and the environment.

However, two of the USQDs requiring safety basis change will not be incorporated into DSA Revision 7 due to the fact that they were developed for the ECNs on Trailers 918 and 918A, which need to be removed from the site. Those trailers have yet to be removed, and therefore, the DSA cannot be updated appropriately until this activity occurs.

10.0 CONDITION OF APPROVAL

The SBRT identified one condition of approval (COA) that includes DOE Directed Page Changes affecting 10 sections of, and/or locations in, the DSA/TSR Revision 7 and WIPP-021, Revision 9, *Hazards Analysis for the Waste Isolation Pilot Plant*. In Section 8.6, *DOE Directed Page Changes*, of this document, identifications and explanatory description of each of the individual DOE Directed Page Changes are presented. Also, the text of Directed Page Changes is provided in Enclosure 1 of this SER Addendum, and upon receipt of this document by the WIPP contractor, those DOE directed text changes shall be incorporated by the WIPP contractor into the approved WIPP DSA/TSR Revision 7 and WIPP-021, Revision 9, *Hazards Analysis for WIPP*. The 12 DOE Directed Page Changes are listed below, and for each of the specific individual directed changes, brief descriptions are also provided. Additionally, the

document (either the DSA, TSR, or WIPP-021) to which each of the 12 DOE Directed Changes pertain is identified.

1. DSA Revision 7 Sub-Section 2.4.4.2.2 Experiments in Experimental Facilities Area
2. DSA Revision 7 Sub-Section 3.3.2.3.6 Externally Initiated, Natural Phenomena Hazard, and Other Hazard Events - *Seismic event with Subsequent Fire in WHB* (editorial)
3. DSA Revision 7 Sub-Section 5.7.6 *Waste Hoist Support System (DF 6.6)* (corrected error by direction of DOE); Subsection 5.7.1 Waste Handling Building Structure DF 6.1 text added to describe fire protection barrier
4. DSA Revision 7 Section 3.6 *Planned Design and Operational Safety Improvements* (corrected error by direction of DOE)
5. TSR Revision 7 - LCO 3.1.1 REQUIRED ACTIONs C.3 and C.5, and LCO 3.2.1 REQUIRED ACTION A.3, and supporting Bases Information for both LCOs
6. KE 7-4 - The Revision 7 KE text is changed to clearly communicate which NWP Organization Section (Radiation Protection or UG Ground Control) is responsible for the inspection and maintenance of the identified isolation structures and areas around those structures
7. KE 7-5 - The text is changed to correctly not allow portable air-samplers to be used when the CAM communication with the CMR becomes inoperable
8. KE-8-1 – Chapter 8.0, *Hazardous Material Protection*, pertains to both the WIPP surface and UG. The current KE 8-1 text was modified to apply to both the surface and the UG
9. KE 11-10 – The text of KE-10 was modified to highlight the inspection role for UG ground control of Panel 7 isolation barriers within the SMP
10. TSR Revision 7 - LCOs 3.4.3 REQUIRED ACTIONs E.1 and E.3, and COMPLETION TIMEs for E.1 and E.3
11. TSR Revision 7 – LCO 3.7.1 REQUIRED ACTIONS B.2.1 and B.2.2 and supporting Bases Information
12. WIPP-021, Revision 9, *Hazards Analysis for the Waste Isolation Pilot Plant.*

The incorporation of the identified DOE Directed Page Changes into the WIPP DSA/TSR Revision 7 and WIPP-021, Revision 9, will result in Revision 7a of the DSA, Revision 7a of the TSR, and Revision 9a of WIPP-021, *Hazards Analysis for the Waste Isolation Pilot Plant*. Upon NWP's incorporation of updated reference document revision numbers, the identified DOE Directed Changes of Enclosure 1, and the editorial corrections identified in the NRB meeting minutes of July 21st, 2020 (NRB-20-009), NWP will provide the revised documents to CBFO as informational copies.

11.0 RECORDS

Review of the WIPP DSA/TSR annual update is conducted in accordance with the requirements of DOE-STD-1104-1026 and the provisions of CBFO MP 4.11. Records generated by this procedure are maintained in compliance with current requirements identified in CBFO records management procedure MP 4.9, *Quality Assurance Records*. The Safety Basis Document Review Plan was developed to aid in managing and conducting the DOE review. In accordance with MP 4.11, the records generated and maintained during the DOE review of the submitted FINAL HIGH QUALITY DSA/TSR Revision 7 are identified below:

- U.S. DOE Carlsbad Field Office Safety Basis Document Review Plan for: Waste Isolation Pilot Plant Revision 7 of Documented Safety Analysis/Technical Safety Requirement (DSA/TSR) DOE/WIPP-07-3372/07-3373, Revision 7 USDOE Contract DE-EM0001971 Waste Isolation Pilot Plant.
- Completed CBFO Form 4.11-1, “Qualification of SB Review Team”
- Completed CBFO Form 4.11-2, “SB Document Review Record”
- DOE/WIPP-16-3565, Revision 2, *Safety Evaluation Report Addendum*
- The Safety Basis Documents being approved:
    - DOE/WIPP-07-3372, *WIPP Documented Safety Analysis*, Revision 7a
    - DOE/WIPP-07-3373, *WIPP Technical Safety Requirements*, Revision 7a

The SER is reviewed by management, in accordance with CBFO MP 4.2, *Document Review and Approval*, as 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.

ENCLOSURE 1

2.4.4.2.2 Experiments in Experimental Facilities Area

The Experimental Facilities Area was initially used for evaluating the interaction of simulated waste and thermal sources on bedded salt under controlled conditions. Portions of this area are now used for conducting scientific experiments, including the Enriched Xenon Observatory (EXO), and the Low Background Radiation Experiment.

The EXO is in the decommissioning phase. It was an experiment that investigated neutrino-less double-beta decay, a rare type of nuclear process that may allow measuring the mass of neutrinos. The EXO facilities are at E-300 between N-1100 and N-1400.

~~The Low Background Raidation Experiment is being conducted by New Mexico State University.~~ The Low Background Radiation Experiment is located at E-300, between N-1350 and N-1400. The experiments, conducted by New Mexico State University, expose basic life forms to controlled background radiation, isolated from terrestrial and cosmic radiation, to test whether exposure to "less than average" radiation will be a benefit, a detriment, or have no effect on the life forms.

2.4.4.2.3 Personal Emergency Equipment

Self-contained Self Rescuers

WIPP is required by New Mexico State Mining Law 69-8-16 to provide self-contained self-rescuers in the UG. A self-contained self-rescuer must be available for each person in the UG. A self-contained self-rescuer unit, which is enclosed inside polycarbonate housing, contains a small cylinder of pressurized oxygen and a carbon dioxide scrubber. Other personal protective equipment is provided in accordance with MSHA requirements.

The self-contained self-rescuers are stored in metal enclosures that are either at fixed locations or on movable skids.

Trauma Kits

Trauma kits are placed in the UG to assist in medical emergencies. These kits consist of a metal container containing emergency medical supplies including a small cylinder of pressurized oxygen. The trauma kits are placed near the Waste Shaft Station and toward the southern end of E-140, located such that they are not in the path of vehicular traffic.

2.4.4.2.4 Underground Mining Methods, Layout, and Development

Mining Methods

Mining at WIPP is performed by continuous mining machines. One type of continuous mining machine is a road header or boom-type continuous miner operating a milling head. The milling head rotates in line with the axis of the cutter boom, mining the salt from the face. The mined salt is picked up from the floor by the loading apron. The mined salt is pulled through the miner on conveyers and loaded into haul vehicles.

Another type of continuous mining machine is a drum miner operating a head that rotates perpendicular to the axis of the cutter boom. The mined salt is pulled through the miner on a chain conveyor and then loaded into haul vehicles. Before mining in new areas, probe holes are drilled to relieve any pressure that

Engineered Preventers

No engineered preventers were selected for risk reduction.

Administrative Preventers

No administrative preventers were selected for risk reduction.

Engineered Mitigators

Contact-Handled Waste Handling Confinement Ventilation System. The CH WH CVS provides a confinement barrier with HEPA filters providing the capability to limit releases of airborne radioactive contaminants from the CH Bay or Room 108. These features reduce the consequences to the co-located worker and MOI (HEPA filtration). The CH WH CVS was credited for the following WHB events:

CH/RH-WHB-20-001a

Administrative Mitigators

No administrative mitigators were selected for risk reduction.

External-, Natural Phenomena Hazard - and Other-Initiated Event Descriptions

Seismic event with Subsequent Fire in WHB

Event CH/RH-WHB-25-001a is the representative event for a seismic event with subsequent fire occurring in the WHB. The IC of the WHB being seismically qualified ensures the building does not collapse due to the seismic event, the WHB being of noncombustible construction IC reduces the likelihood for fire ignition and growth (i.e., limited combustibles), the RH Waste Cask (Facility Cask/LWFC) IC limits the RH contribution to the event consequences, and the WIPP WAC IC ensures the waste constituency and its confinement within a metal container of sound integrity. The MAR involved in the event is the WHB inventory. The CH Waste in the CH Bay is the bounding MAR. The unmitigated frequency is Extremely Unlikely with Low radiological dose consequences to the facility worker, ~~Moderate~~ High for the co-located worker, and Low for the MOI. The facility worker radiological dose consequences are Low as a seismic event with subsequent fire would be slow to develop and there are multiple exits from the WHB that would allow the facility worker to exit the area. This event is Risk Class III for the facility worker, II for the co-located worker, and III for the MOI.

No preventive or mitigative controls were identified for this event.

This ~~is~~ event is conservatively analyzed. From SAND 78-1596, the most conservative calculated estimate of the 1,000-year acceleration at the WIPP is ~~0.075~~0.06 g. For additional conservatism, a peak design acceleration of 0.1 g is selected for the WIPP DBE. The WHB and other structures are designed to withstand an earthquake of 0.1 g. The frequency of this earthquake would be lower than 1E-3 per year. ~~a~~A conditional probability of less than 0.1 for a subsequent fire would reduce the frequency of a seismic + fire event to an Extremely Unlikely bin. The ~~Moderate~~ High consequence and an Extremely Unlikely frequency ~~would~~ make it a Risk Bin ~~I~~II event for the co-located worker.

The equipment that can fail and impact waste containers during a seismic event are falling objects (e.g., lights, fire suppression sprinkler lines) and other overhead equipment not seismically rated in the structure that are not qualified to the “Code of Record” earthquake (i.e., 0.1 g PGA). The incidental impact of this equipment on waste containers is accounted for in the DRs as stated in DOE STD-5506-2014, Table 4.4.5-1 for the Code of Record seismic event.

designed to withstand the DBE. The Waste Hoist support structure is constructed of non-combustible steel components, and is designed to support the Waste Hoist Conveyance and a maximum load conveyance under all normal, upset and design basis NPH conditions. The Waste Hoist support structure is interconnected with and enclosed by the SS WHB (Chapter 4.0, Section 4.4.1); specifically, the Waste Hoist Tower portion of the WHB.

The Waste Hoist Support System is credited to protect an IC of this analysis through the performance of the safety function to prevent a radiological material release due to an uncontrolled Waste Conveyance movement that results in loss of confinement, fire, or NPH initiated failure of the Waste Hoist support structure by establishing a basis for the low (Unlikely for NPH and Extreme Unlikely for uncontrolled movement and fires) unmitigated likelihood assignments.

The performance criteria of the Waste Hoist Support System are as follows:

- The Waste Hoist support structure shall be designed for the vertical load combination of deadload, maximum payload, and forces transmitted from the hoisting ropes and tailropes during normal operation.
- Waste Hoist support structure shall be designed for a DBE of ~~0.01~~0.1 g PGA.
- The Waste Hoist support structure shall be constructed of noncombustible materials and not subject to failure due to in–situ combustible loads.

Key features of the Waste Hoist Support System include that the structure is located directly over the Waste Shaft, is a robust non-combustible steel structure that consists of four steel I-beam columns, mounted on a substantial concrete foundation, supporting four steel I-beam girders that support the Waste Hoist, the hoist motor and drum, the wire ropes and load bearing components, counterweights, hoist brake system, and a maximally loaded conveyance (up to a 45 ton payload) under all normal operating and design basis seismic conditions. The structure also has floor slabs and pads to which hoist equipment is bolted at various elevations to support the hoist system equipment. The Waste Hoist support structure is constructed of non-combustible materials and is not subject to failure from a fire related to combustible loads.

This DF will be inspected to confirm continued Operability per the In Service Inspection Program.

5.7.7 Underground Fuel and Oil Storage Areas (DF 6.7)

To support operations, Fuel and Oil Storage Areas are provided in the UG, and both are located north of S-90. These areas allow for substantial quantities of liquid-combustibles to be stored and dispensed.

The locations of the UG Fuel and Oil Storage Areas are credited to protect an IC of this analysis through the performance of the safety function to preclude or eliminate the flammable or combustible liquid hazard resulting in a pool fire or explosion at either storage location from affecting TRU Waste through the provisions of a substantial separation distance.

The performance criterion for the UG Fueling and Oil Storage Areas is that they shall be located at or north of the S-90 Drift. These physical locations/distances are far greater than those associated with the diameter of the worst case pool fires in these areas and where Waste may be present (i.e., Waste Shaft Station, Waste Transport Path, and Disposal Rooms). Any Fuel or Oil Storage Areas at or north of S-90 are greater than 300 feet from any TRU Waste activities.

Key features of the WHB structure include the concrete and metal structure and curbing of the WHB (CH Bay, Room 108, RH Bay, CUR, Transfer Cell, and Waste Hoist Tower), which are of noncombustible construction and meet design basis requirements for NPH events. Steel support columns located near the CH/RH roll-up door are coated with fire retardant insulation to prevent failure from credible internal fire scenarios. The noncombustible and structurally robust WHB structure and curbing will prevent fire and NPH events from impacting Waste in the WHB that is outside a Closed Type B Shipping Package. The concrete curbing is part of the building foundation that extends above grade.

The structural DFs of the, Support Building, TMF, and Main Access Corridor that will prevent damage to the WHB during a NPH event are specifically included in this DF control.

This DF will be inspected to confirm continued Operability per the In Service Inspection Program.

5.7.2 TRUDOCK 6-ton Crane – DELETED

5.7.3 Facility Pallet (DF 6.3)

To support the handling of CH Waste Containers within the facility, a Facility Pallet is employed. Facility Pallets (SDD WH00, *Waste Handling System, System Design Description*) are non-combustible, fabricated-steel units. Facility Pallets are designed to transport CH Waste assemblies such as drums, SWBs, shielded containers, TDOPs, and/or SLB2s to the UG. The Facility Pallet is presented in Chapter 2.0, Figure 2.6-23, of the DSA. WIPP Facility Pallets are constructed of carbon steel with American Society for Testing and Materials (ASTM) A240, *Standard Specification for Chromium, and Chromium-Nickel, Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*, Type 304 stainless steel (top surface only) with compatible fasteners and weld material. Except for 8 three-inch diameter hold down holes, the pallet is closed over the top and bottom surfaces. These hold down holes are located away from the pallet edge and away from Waste package locations on top of the pallet. Therefore, there are no holes that would expose the bottom of a CH Waste Container to direct flame impingement. This Facility Pallet on a flat surface would obstruct development of the flame structure and entrainment of combustion air in the pallet area. In addition to surviving a floor based pool fire, the metal Facility Pallet will also survive expected pool fires when suspended over an opening underneath the pallet. The pallet has a solid metal bottom, and an event such as a pool fire under a small portion of the pallet, such as exists when on the UG transporter trailer, will not compromise the structural integrity of the pallet.

The safety function of the Facility Pallet is to prevent direct flame impingement on CH Waste Containers in a pool fire to mitigate a release of radiological material.

Performance criteria of the Facility Pallet notes that the pallets shall be constructed of ASTM A240, Type 304 steel in a manner such that the pallet: 1, has no through hole penetrations that would allow direct flame contact with the container surfaces, and 2, will support the weight of the CH Waste Container load in a pool fire.

The Facility Pallet provides a stainless steel noncombustible surface excluding 8 tie-down penetrations, which provides a contiguous flame barrier that prevents direct flame impingement on the bottom of the CH Waste Containers and reduces the potential for lid ejection. Without lid ejection, the Waste would burn confined material, which has a lower Airborne Release Fraction (ARF) than unconfined burning of materials. Facility Pallets have a structural design rated load of 25,000 pounds of Waste material and associated containers. Fire Protection Engineer evaluations have been made to indicate that the current design requirements would prevent the collapse of a pallet in a potential pool fire.

SMPs provide accident mitigation for facility workers by providing personnel protection to facility workers who are trained to know and identify hazardous conditions and to take self-protective actions upon detection of adverse conditions. The SMPs provide protective equipment, training, and instructions for accepted work practices. In addition to reducing risk for the co-located worker, SS controls identified in Section 3.3.2.3 provide for facility worker protection by mitigating and preventing releases.

Externally-, Natural Phenomena Hazard-, and Other-Initiated

The prevention of Externally-, NPH-, and Other-Initiated events is of importance to protecting workers. The first level of protection is ensuring that TRU Waste complies with the WIPP WAC. This control is a preventer in that TRU Waste Containers provide resistance to impacts (e.g., metal construction). The WIPP WAC is also a mitigator in that the MAR per container is limited, thereby limiting consequences. The RH Waste Cask protect the RH Waste Containers from impacts and thereby prevent the release of radiological material. The Waste Hoist is a robust conveyance for movement of TRU Waste to the UG. The WHB is designed for design basis NPH events.

For facility workers, mitigation of radiological material releases is accomplished by either self-observation and egress when personnel are in position to observe the condition and evacuate or, in the event of a loss of confinement in the UG, by the vehicle/equipment Attendant initiating the notification of facility workers of adverse conditions so that they can evacuate.

Except for self-observation and egress, each of these controls was credited for worker protection in Section 3.3.2.3 as SS controls. SMPs such as Radiation Protection, Operational Safety, Training, and Emergency Preparedness, provide additional defense-in-depth for protection of workers.

Safety Management Programs

Chapter 7.0, “Radiation Protection,” describes the organization and functional responsibilities for radiological control, documents the RPP structure, and defines the radiological control management systems necessary to implement the program. KEs of this program ensure that programs and equipment are maintained to protect facility personnel from radiation involved with contamination and direct streaming. The KEs of the RPP are as follows:

- **KE 7-1**: Proper placement and operation of Continuous Air Monitors (CAMs).
- **KE 7-2**: Control access and entrance to RH Hot Cells.
- **KE 7-3**: Contamination control to address potential upcasting from the UG.
- **KE 7-4**: Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are monitored for airborne radioactivity, where physical access is possible.~~inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control,* and Section 2.4.4.7, *Geotechnical Monitoring Program.*~~
- **KE 7-5**: When the active panel including the exhaust drift is occupied, at least one CAM communicating with the CMR is required in the exhaust drift of the active Disposal Panel. Portable ~~air samplers or portable~~ CAMs are used when the CAM communication with the CMR becomes inoperable. The temporary use of portable devices and the return to service of CMR communication are managed under the Radiation Protection Program.

Chapter 8.0, "Hazardous Material Protection," describes the organization and functional responsibilities for the Industrial Safety Program and defines the hazardous material management systems necessary to implement the program. KEs of this program assure that programs and equipment are maintained to protect facility personnel from hazardous materials. The KEs of the Hazardous Material Protection program are as follows:

- **KE 8-1**: Establish provisions to monitor and control air quality to ensure ~~UG~~ workers are protected from VOCs; protective measures include posting hazardous areas, establishing monitoring requirements, ensuring local ventilation, and requiring personal protective equipment such as respiratory protection as needed.

Chapter 10.0, "Initial Testing, In Service Surveillance, and Maintenance," presents programs for demonstrating that testing is performed to ensure the SS SSCs and DFs subject to degradation; other systems that perform important defense-in-depth functions; equipment relied on for the safe operation, safe shutdown of the nuclear facility, and for maintaining the facility in a safe shutdown condition as documented in the safety basis and safety support systems meet their functional requirements and performance criteria such that the WIPP operations have assurance SSCs fulfill normal and safety functions described in this DSA; and ensuring that maintenance activities are conducted, in accordance with DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, to preserve and restore the availability, operability, and reliability of the WIPP SSCs important to the operation of the facility. The KEs of the in service inspections are as follows:

- **KE 10-1**: Development and implementation of in service inspections for DFs.
- **KE 10-2**: Testing, calibration, operability, and preventive/corrective maintenance in accordance with applicable code requirements, manufacturer recommendations, established technical requirements, and engineering judgement consistent with tracking, trending, and failure history.
- **KE 10-3**: Tracking and trending of the performance and deficiencies of the equipment covered by KE 10-2 above.

Chapter 11.0, "Operational Safety" describes the safety provided by conduct of operations and FPPs. In accordance with regulatory requirements, the conduct of operations specifically focuses on the bases of operations such as management, organization, the institutional safety provisions, procedures, training, and human factors. The KEs of the Operational Safety Program are as follows:

- **KE 11-1**: Routine maintenance and inspection of non-Waste Handling vehicles in the UG for leaks and accumulation of combustible materials (fire protection).
- **KE 11-2**: Formal Fire Protection Engineer (FPE) combustible control inspections to include inspection criteria, specified frequency of inspections, documentation of identified issues, issue disposition, tracking and trending of issues, and performance metrics.
- **KE 11-3**: Operability and testing of equipment (audible, visual) used for abnormal event communication/notification between workers (both aboveground and in the UG) and the CMR.
- **KE 11-4**: Placement of fuel barrier of absorbent materials at the static Waste Face when waste emplacement or retrieval has not occurred for a period of 10 days.

- **KE 11-5**: Fire prevention/suppression controls include the following KEs:
  - UG equipment is evaluated for fire risk in accordance with NFPA 122. All equipment determined to pose an unacceptable fire risk in the NFPA 122 analysis will be protected with an automatic fire suppression system prior to use, unless alternate risk reduction measures are approved by DOE.
  - Areas in the UG where there is an increased combustible loading (e.g., refueling station, maintenance shop, combustible storage area, maintenance offices, lunch room, oil storage area) will be protected by automatic fire suppression systems.
  - Ignition sources (e.g., hot work, designated smoking areas, portable heaters, electrical equipment) are controlled in accordance with the WIPP FPP and design control program.
  - UG combustible materials are controlled in accordance with the WIPP FPP (e.g., combustible control zone around personnel conveyances, combustible load permit process).
- **KE 11-6**: Hoisting and Rigging Program which protects safety SSCs, waste packaging, and personnel from dropped loads.
- **KE 11-7**: Mine entrance requirements impacting personnel safety (e.g., CAM operation, radiological conditions, ventilation capabilities, personnel training, personnel limits for in service conveyances, back-up power).
- **KE 11-8**: Mine evacuation requirements (e.g., unobstructed planned escape routes per the Life Safety Code and DOE approved Fire Protection Equivalency for NFPA 101, the Life Safety Code, and Alternative Egress Provisions (DOE 2016), mine egress markings, communications, Abnormal Operations Procedures).
- **KE 11-9**: Equipment deficiency tracking (including equipment in reduced status) that identifies, tracks, and evaluates safety impacts and implements compensatory measures until equipment is returned to service.
- **KE 11-10**: ~~Ground control inspections are conducted routinely, and remedial actions performed for unstable ground conditions by qualified personnel.~~ Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.
- **KE 11-11**: Maintenance and configuration control of ground management equipment.
- **KE 11-12**: Procedures address the actions to be performed by operators in response to CMR notifications, annunciators, and other types of facility displays that indicate an abnormal condition.
- **KE 11-13**: The Transport Path will be inspected for hazardous conditions and obstructions prior to moving CH Waste along the designated path.
- **KE 11-14**: The Transport Path will be identified by the use of flashing lights or by placement of physical indicators (e.g., temporary gates, traffic cones) when CH Waste is present in the Transport Path.

7.0 RADIATION PROTECTION

7.1 INTRODUCTION

This chapter summarizes the Radiation Protection Program at the Waste Isolation Pilot Plant (WIPP) as it relates to facility safety per the U.S. Department of Energy (DOE) Standard DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*. The format of this chapter was left as described in DOE-STD-3009-94, CN3, for the organization and content of Safety Management Program (SMP) Documented Safety Analysis (DSA) chapters, as allowed by DOE-STD-3009-2014. The SMP Chapters (7.0–18.0) will be reformatted as a consolidated Chapter 7.0 in a future revision of the DSA. This chapter summarizes the following:

- The radiological protection organization
- The As Low As Reasonably Achievable (ALARA) Policy and Program
- Radiological protection training
- The radiological exposure controls for Contact-Handled (CH) and Remote-Handled (RH) Transuranic (TRU) Waste Handling and disposal at the WIPP facility
- Radiological monitoring
- Radiological protection instrumentation
- Radiological protection recordkeeping

The Key Elements (KEs) of the WIPP Radiation Protection Program are as follows:

- **KE 7-1**: Proper placement and operation of Continuous Air Monitors (CAMs).
- **KE 7-2**: Control access and entrance to RH hot cells.
- **KE 7-3**: Contamination control to address potential upcasting from the UG.
- **KE 7-4**: Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are monitored for airborne radioactivity, where physical access is possible. ~~inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.~~
- **KE 7**-5: When the active panel including the exhaust drift is occupied, at least one CAM communicating with the CMR is required in the exhaust drift of the active Disposal Panel. Portable ~~air samplers or portable~~ CAMs are used when the CAM communication with the CMR becomes inoperable. The temporary use of portable devices and the return to service of CMR communication are managed under the Radiation Protection Program.

The Key Attributes (KAs) of the WIPP Radiation Protection Program described in this chapter are as follows:

- KA 7-1: Administrative Control (AC) levels and dose limits, including processes for planned special exposures, are established that meet the requirements of the *Code of Federal Regulations*, Title 10, Part 835 (10 CFR 835), "Occupational Radiation Protection."

8.0 HAZARDOUS MATERIAL PROTECTION

8.1 INTRODUCTION

This chapter summarizes the Hazardous Material Protection Program at the Waste Isolation Pilot Plant (WIPP) as it relates to facility safety per the U.S. Department of Energy (DOE) Standard DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*. The format of this chapter was left as described in DOE-STD-3009-94, CN3, for the organization and content of Safety Management Program (SMP) Documented Safety Analysis (DSA) chapters, as allowed by DOE-STD-3009-2014. The SMP Chapters (7.0–18.0) will be reformatted as a consolidated Chapter 7.0 in a future revision of the DSA. The purpose of this chapter is to describe the key aspects of the Hazardous Material Protection Program important to the safety basis at WIPP. It summarizes provisions for hazardous material (HAZMAT) protection (other than radiological hazards) and HAZMAT concerns. The elements of this chapter include:

- An overall description of the Hazardous Material Protection Policy and Program.
- A summary of the Hazardous Material Exposure Control Program.
- Information on the Hazardous Material Communication Program.

Although the focus of this chapter is primarily on occupational HAZMAT protection, DOE-STD-3009-2014 requests information concerning HAZMAT monitoring to protect the public and the environment, as well as the worker. Section 8.7 summarizes the monitoring programs to detect the release of HAZMAT as well as occupational monitoring.

The KE of the WIPP Hazardous Material Program is:

- **KE 8-1**: Establish provisions to monitor and control air quality to ensure ~~underground~~ workers are protected from ~~volatile organic compounds (~~VOCs~~)~~; protective measures include posting hazardous areas, establishing monitoring requirements, ensuring local ventilation, and requiring ~~personnel~~ personal protective equipment such as respiratory protection as needed.

For safety analysis purposes, the key attributes (KAs) of the WIPP Hazardous Material Protection Program described in this chapter are as follows:

- KA 8-1: A Hazard Communication Program is implemented that is consistent with the requirements of the *Code of Federal Regulations* Title 29, Part 1910.1200 (29 CFR 1910.1200), “Hazard Communication,” and 10 CFR 851.22 “Hazard Prevention and Abatement.”
- KA 8-2: Administrative Controls (ACs) and engineering controls are implemented to reduce planned exposures to HAZMAT below the exposure levels required by the Occupational Safety and Health Administration (OSHA) 29 CFR 1910 “Occupational Safety and Health Standards,” Mine Safety and Health Administration (MSHA) 30 CFR 47, 48, 49, 57, and 62 “Federal Metal and Nonmetallic Mine Training, Safety, and Health Standards,” and 10 CFR 851.23, “Safety and Health Standards.”
- KA 8-3: Hazard controls to limit exposure are applied with the following hierarchy: (1) hazard elimination or substitution, where feasible and appropriate; (2) engineered controls, where feasible and appropriate; (3) work practices and ACs that limit worker exposures; and (4) personal protective equipment (PPE).

  - Ignition sources (e.g., hot work, designated smoking areas, portable heaters, electrical equipment) are controlled in accordance with the WIPP FPP and design control program.
  - Underground combustible materials are controlled in accordance with the WIPP FPP (e.g., combustible control zone around personnel conveyances, combustible load permit process).

- **KE 11-6**: Hoisting and Rigging Program which protects safety Structures, Systems, and Components (SSCs), waste packaging, and personnel from dropped loads.
- **KE 11-7**: Mine entrance requirements impacting personnel safety (e.g., Continuous Air Monitor (CAM) operation, radiological conditions, ventilation capabilities, personnel training, personnel limits for in service conveyances, back-up power).
- **KE 11-8**: Mine evacuation requirements (e.g., unobstructed planned escape routes per the Life Safety Code and DOE approved Fire Protection (FP) Equivalency for NFPA 101, the Life Safety Code, and Alternative Egress Provisions (DOE 2016), mine egress markings, communications, Abnormal Operations Procedures).
- **KE 11-9**: Equipment deficiency tracking (including equipment in reduced status) that identifies, tracks, and evaluates safety impacts and implements compensatory measures until equipment is returned to service.
- **KE 11-10**: ~~Ground control inspections are conducted routinely, and remedial actions performed for unstable ground conditions by qualified personnel.~~Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.
- **KE 11-11**: Maintenance and configuration control of ground control equipment.
- **KE 11-12**: Procedures address the actions to be performed by operators in response to CMR notifications, annunciators, and other types of facility displays that indicate an abnormal condition.
- **KE 11-13**: The Transport Path will be inspected for hazardous conditions and obstructions prior to moving CH Waste along the designated path.
- **KE 11-14**: The Transport Path will be identified by the use of flashing lights or by placement of physical indicators (e.g., temporary gates, traffic cones) when CH Waste is present in the Transport Path.

The key attributes (KAs) of the WIPP Operational Safety Programs which describe how the SMPs meet the requirements of site procedures, and state and federal requirements are described in this chapter are as follows:

- KA 11-1: The WIPP facilities implement the requirements of DOE Order 422.1, and WIPP facilities have an implementing matrix for the guidelines specified in DOE Order 422.1.
- KA 11-2: The fire hazards for the WIPP nuclear facilities are defined in the facility-specific Fire Hazard Analysis (FHA), which meets the requirements of DOE Order 420.1C, *Facility Safety*. Life safety code evaluations are identified in the facility FHA development as specified in DOE Order 420.1C.
- KA 11-3: WIPP implements a Fire Prevention Program that meets or exceeds the requirements of nationally recognized codes and standards such as DOE Order 420.1C, the National Fire

3/4.1 Fire Suppression Systems (continued)

3.1.1 WHB Fire Suppression System (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
----------**NOTE**---------- Condition C is not entered for FSS inoperability due to an inoperable Fire Water Tank level loop 25F00601. Condition C is entered for inoperability due to a fire hydrant flow test only when Condition D is not met. ---------- C. The FSS for the WHB is NOT OPERABLE in a PROCESS AREA(S). **OR** Required Actions and Completion Times of Condition B or D are not met. **OR** No OPERABLE fire pumps available.	----------**NOTE**---------- LCO 3.0.4 is not applicable. ---------- C.1 Do not introduce new CLOSED Type B SHIPPING PACKAGES into AFFECTED PROCESS AREA(S). **AND** C.2 Stop hot work ACTIVITIES in WHB not related to restoration of FSS in AFFECTED PROCESS AREA(S). **AND** C.3 Establish a FIRE WATCH in the AFFECTED PROCESS AREA(S) when in WASTE HANDLING MODE. C.4 Remove liquid-fueled vehicle(s)/equipment from RH BAY **AND** C.5 Establish a ROVING FIRE WATCH in AFFECTED PROCESS AREA(S) at locations not covered by Required Action C.3. **AND**	IMMEDIATELY 1 Hour 1 Hour 1 Hour **AND** Every 2 Hours thereafter

(continued)

3/4.2 Confinement Ventilation Systems (continued)

3.2.1 CH WH Confinement Ventilation System (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The CH WH CVS is NOT OPERABLE in an applicable PROCESS AREA. **OR** IN SERVICE local gauge specified in Table 3.2.1-1 is NOT OPERABLE.	----------**NOTE**---------- LCO 3.0.4 is not applicable. ---------- A.1 Do not introduce new CLOSED Type B SHIPPING PACKAGES into AFFECTED PROCESS AREA(S). **AND** A.2 Stop hot work ACTIVITIES in AFFECTED PROCESS AREA(S) not related to restoration of CH WH CVS. ~~**AND**~~ ~~A.3 Establish a FIRE WATCH at the WASTE HANDLING ACTIVITY locations in AFFECTED PROCESS AREA(S).~~ **AND** A.3 Establish a ROVING FIRE WATCH at the WASTE STORAGE locations in AFFECTED PROCESS AREA(S). **AND** A.4.1 Restore the CH WH CVS to OPERABLE status. **OR** A.4.2 Place the AFFECTED PROCESS AREA(S) in STANDBY.	IMMEDIATELY IMMEDIATELY ~~1 Hour~~ 1 Hour **AND** Every 6 Hours thereafter 14 Days 14 Days

(continued)

3/4.4 Fuel Confinement (continued)

3.4.3 Temporary Liquid-combustible Storage (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Actions and Completion Times of Condition A, B, C or D are not met.	E.1 ATTEND each non-compliant temporary liquid-combustible storage location when the ACTIVE PANEL is manned ~~or during WASTE Transport~~.	IMMEDIATELY
	AND	
	E.2 SUSPEND WASTE HANDLING ACTIVITIES in the UNDERGROUND other than those related to re-establishing compliance of temporary liquid-combustible storage locations.	IMMEDIATELY ~~14 DAYS~~
	AND	
	E.3 Restore compliance with the LCO.	14 Days

(continued)

3/4.7 Suspect Container Response

3.7.1 Waste Acceptability Control

LCO 3.7.1 WASTE CONTAINERS SHALL be compliant with the WIPP Waste Acceptance Criteria (WAC).

MODE Applicability At all times

PROCESS AREA Applicability CH BAY, ROOM 108, RH BAY, HOT CELL COMPLEX, WASTE SHAFT ACCESS AREA, UNDERGROUND, OUTSIDE AREA

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Discrepancy between Shipment Manifest and Waste Data System (WDS).	A.1 Keep WASTE CONTAINER(S) in their CLOSED Type B SHIPPING PACKAGE. **AND** A.2 Restore compliance to WIPP WAC.	IMMEDIATELY 7 Days
B. WASTE CONTAINER(S) determined to be noncompliant through observable container configuration, structural defect, damage, degradation, or Radiological Work Permit (RWP) Limit exceedance.	B.1 Place WASTE CONTAINER(S) in a SAFE CONFIGURATION. **AND** B.2.1 Place accessible WASTE CONTAINER(S) in a WIPP WAC compliant overpack container. **OR** B.2.2 Implement a RESPONSE PLAN.	IMMEDIATELY ~~7~~4 Days 10 Days

(continued)

3/4.7 Suspect Container Response (continued)

3.7.1 Waste Acceptability Control (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Notification by a Generator Site of a WASTE CONTAINER(S) that can potentially result in internal energetic events such as fires, deflagrations/explosions, or other exothermic reactions; exceed WIPP WAC fissile mass and/or non-fissile mass limits; or exceed WIPP WAC PE-Ci limits.	E.1 Locate noncompliant WASTE CONTAINER(S). **AND** E.2 SUSPEND WASTE HANDLING ACTIVITIES in accessible AFFECTED AREA. **AND** E.3 Evacuate and post the accessible AFFECTED AREA. **AND** E.4 Implement a RESPONSE PLAN.	IMMEDIATELY IMMEDIATELY IMMEDIATELY 10 Days
F. Required Action and/or Completion Times for Required Actions A.2~~, B.2~~ or D.2 cannot be met.	F.1 Implement a RESPONSE PLAN.	10 Days

(continued)

5.0 Administrative Controls (continued)

5.6.1 Safety Management Programs (continued)

Chapter 7.0, Radiation Protection

The Radiation Protection Program describes the organization and functional responsibilities for radiological control, documents the Radiation Protection Program structure, and defines the radiological control management systems necessary to implement the program in accordance with the requirements of 10 CFR 835. The program includes ALARA (As Low As Reasonably Achievable) practices, training, radiation monitoring, radiation exposure control, radiation protection instrumentation, and record keeping. The Radiation Protection Program includes specific program documents, and procedures developed and maintained to implement the program.

The KEs of this program ENSURE that programs and equipment are maintained to protect facility personnel from radiation involved with contamination and direct streaming. While the detailed aspects of the program will vary with the assessment of the hazards, the KEs will be in place as follows.

KE 7-1: Proper placement and operation of Continuous Air Monitors.

KE 7-2: Control access and entrance to RH Hot Cells.

KE 7-3: Contamination control to address potential upcasting from the UNDERGROUND.

KE 7-4: Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are monitored for airborne radioactivity, where physical access is possible. ~~inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.~~

KE 7-5: When the ACTIVE PANEL including the exhaust drift is occupied, at least one CAM communicating with the CMR is required in the exhaust drift of the active Disposal Panel. Portable ~~air samplers or portable~~ CAMs are used when the CAM communication with the CMR becomes inoperable. The temporary use of portable devices and the return to service of CMR communication are managed under the Radiation Protection Program.

Chapter 8.0, Hazardous Material Protection

The Hazardous Material Protection Program is established to protect human health and the environment by controlling chemical hazards in accordance with 10 CFR 851, W*orker Health and Safety Program*, and 29 CFR 1910.1200, *Hazard Communication*. The program defines the scope of chemicals covered and provides direction and references to analyze the hazards that are inherent in their storage and use. Aspects of the program include Hazard Communications, training, Hazardous Material Exposure Control, Hazardous Material Monitoring, instrumentation, and recordkeeping. It describes the processes and systems used for work performed by NWP and by subcontractors for their activities to control chemical hazards to protect personnel, the public, and the environment. The KE of the WIPP Hazardous Material Program is:

- **KE 8-1**: Establish provisions to monitor and control air quality to ensure ~~underground~~ workers are protected from ~~volatile organic compounds (~~VOCs~~)~~; protective measures include posting hazardous areas, establishing monitoring requirements, ensuring local ventilation, and requiring ~~personnel~~ personal protective equipment such as respiratory protection as needed.

5.0 Administrative Controls (continued)

5.6.1 Safety Management Programs (continued)

KE 11-5: Fire prevention/suppression controls include the following KEs:

- UNDERGROUND equipment is evaluated for fire risk in accordance with National Fire Protection Association (NFPA) 122. All equipment determined to pose an unacceptable fire risk in the NFPA 122 analysis will be protected with an automatic fire suppression system prior to use, unless alternate risk reduction measures are approved by DOE.
- Areas in the UNDERGROUND where there is an increased combustible loading (e.g., refueling station, maintenance shop, combustible storage area, maintenance offices, lunch room, oil storage area) will be protected by automatic fire suppression systems.
- Ignition sources (e.g., hot work, designated smoking areas, portable heaters, electrical equipment) are controlled in accordance with the WIPP Fire Protection Program and design control program.
- UNDERGROUND combustible materials are controlled in accordance with the WIPP Fire Protection Program (e.g., combustible control zone around personnel conveyances, combustible load permit process).

KE 11-6: Hoisting and Rigging Program which protects safety SSCs, waste packaging, and personnel from dropped loads.

KE 11-7: Mine entrance requirements impacting personnel safety (e.g., continuous air monitor operation, radiological conditions, ventilation capabilities, personnel training, personnel limits for IN SERVICE conveyances, back-up power).

KE 11-8: Mine evacuation requirements (e.g., unobstructed planned escape routes per the Life Safety Code and DOE approved Fire Protection (FP) Equivalency for NFPA 101, the Life Safety Code, and Alternative Egress Provisions (DOE 2016) mine egress markings, communications, Abnormal Operations Procedures).

KE 11-9: Equipment deficiency tracking (including equipment in reduced status) that identifies, tracks, and evaluates safety impacts and implements compensatory measures until equipment is returned to service.

KE 11-10: ~~Ground control inspections are conducted routinely, and remedial actions performed for unstable ground conditions by qualified personnel.~~Isolation structures emplaced east of the air intake and air exhaust closure barriers of Room 7, Panel 7 are inspected, where physical access is possible. The accessible areas around these isolation structures are inspected and maintained in accordance with the Hazardous Waste Facility Permit and 30 CFR 57, Subpart B as described in Section 2.4.4.3, *Ground Control*, and Section 2.4.4.7, *Geotechnical Monitoring Program*.

KE 11-11: Maintenance and configuration management of ground control equipment.

KE 11-12: Procedures address the actions to be performed by operators in response to CMR notifications, annunciators, and other types of facility displays that indicate an abnormal condition.

B3/4.1 Fire Suppression Systems (continued)

B3.1.1 WHB Fire Suppression System (continued)

Bases (continued)

ACTIONS (continued)

C.3	Required Action C.3 requires a FIRE WATCH to be established within 1 Hour ~~at each location in the~~ at each AFFECTED PROCESS AREA(S) when in WASTE HANDLING MODE. ~~where WASTE HANDLING ACTIVITIES are being conducted.~~ One FIRE WATCH is required for each AFFECTED PROCESS AREA when in WASTE HANDLING MODE. WASTE HANDLING ACTIVITIES are not permitted in WASTE STORAGE MODE. Any ACTIVITY requiring a Fire Watch in WASTE STORAGE MODE is controlled in accordance with the Fire Protection Program. A FIRE WATCH provides for visual observation, identification, and reporting of actions or conditions that could initiate a fire, and prompt reporting of a fire to initiate emergency response should one occur. Training also allows for extinguishing incipient fires if safe to do so. This Required Action reduces the potential for fire initiation and incipient fire growth. WASTE HANDLING ACTIVITIES are allowed to continue during this Condition as there is low risk for a significant fire event to occur without observation with the FIRE WATCH in place. Combustible material loading is controlled by the Fire Protection Program and liquid-fueled vehicles and equipment are prohibited from being within the CH BAY or ROOM 108. A Completion Time of 1 Hour provides time to determine the WASTE HANDLING ACTIVITIES being performed and their locations, and to identify qualified individuals and their assignments to perform the required FIRE WATCH. The FIRE WATCH remains in place for the duration of this Condition.
C.4	This Required Action requires liquid-fueled vehicles/equipment to be removed from the RH BAY in 1 Hour. A fuel leak from a liquid-fueled vehicle/equipment that are in the RH BAY could potentially result in fuel running under the rollup door and into the CH BAY and result in a fire in the CH BAY. Removal of any liquid-fueled vehicles/equipment in the RH BAY prevents this possibility during the time the CH BAY FSS is NOT OPERABLE. A completion time of 1 Hour is required to provide adequate time to safely remove the liquid-fueled vehicles/equipment and minimize the time at risk.

(continued)

B3/4.1 Fire Suppression Systems (continued)

B3.1.1 WHB Fire Suppression System (continued)

Bases (continued)

ACTIONS (continued)

C.5	This Required Action requires a ROVING FIRE WATCH to be established in the AFFECTED PROCESS AREA(S) within 1 Hour and complete a round every 2 Hours thereafter. The ROVING FIRE WATCH performs an inspection of AFFECTED AREAS for the purpose of making fire safety observations, notifying building occupants and the CMR of an emergency, and minimizing the potential for a fire to occur, and/or extinguishing incipient fires, thus compensating for the lack of an OPERABLE FSS. A Completion Time of 1 Hour is adequate to identify the AFFECTED AREA(S), identify required personnel, and establish the ROVING FIRE WATCH. The 2-Hour interval allows sufficient time to complete the previous inspection and is frequent enough to reduce the risk of a fire while the FSS is restored to OPERABLE status.

(continued)

B3/4.1 Fire Suppression Systems (continued)

B3.1.1 WHB Fire Suppression System (continued)

Bases (continued)

ACTIONS (continued)

C.6.1/C.6.2/C.6.3 With the compensatory actions of Required Actions C.1, C.2, C.3, C.4, and C.5 implemented, this Required Action allows 31 Days to perform either Required Action C.6.1, C.6.2, or C.6.3. Because the Required Actions are separated by an "OR", one of these Required Actions must be completed within 31 Days of entering the Condition. Successful performance of either Required Action removes the facility from the LCO Condition. Required Action C.6.1 requires restoration of the FSS to OPERABLE status in the AFFECTED AREA(S). Required Action C.6.2 requires the AFFECTED PROCESS AREA(S) to be placed in STANDBY so that the hazard no longer exists and the LCO no longer applies. This Action is completed by the removal of the MAR from the AFFECTED PROCESS AREA or placing it in a CLOSED SHIPPING PACKAGE. In the event it is determined that Required Actions C.6.1 or C.6.2 cannot be accomplished within the 31 Day Completion Time, Required Action C.6.3 is provided to require that a RESPONSE PLAN be implemented to address the Condition. To support the completion of this Required Action within 31 Days, the RESPONSE PLAN must be prepared, receive CBFO approval, and be implemented. All of these actions should be considered in achieving the required Completion Time of 31 Days. The plan content should specify, based on existing conditions, the detailed plan of action for restoring compliance with the LCO. Section 5.4.4 of this TSR discusses the use and content of RESPONSE PLANS. A Completion Time of 31 Days is sufficient to perform either of these Required Actions while risk of a fire is minimized by Required Actions C.1, C.2, C.3, C.4, and C.5 ~~and C.6~~. The LCO Required Actions address the requirement to stop all Hot Work. A FIRE WATCH is required in the AFFECTED PROCESS AREA(S) when in WASTE HANDLING MODE. In addition, to a ROVING FIRE WATCH is required every 2 Hours where a FIRE WATCH is not required. Also, LCO 3.3.2 prevents the introduction of any liquid-fueled vehicles/equipment into the CH BAY. The CVS for the WHB is also required to be OPERABLE (LCO 3.2.1) which would mitigate any fire events, if they were to occur. ~~The LCO Required Actions address the requirement to stop all Hot Work and require ROVING FIRE WATCHES for all WASTE HANDLING ACTIVITIES in the AFFECTED PROCESS AREA in addition to a ROVING FIRE WATCH every 2 Hours.~~ New CLOSED Type B SHIPPING PACKAGES are prohibited from the AFFECTED PROCESS AREAS. Combustible material loading is controlled by the Fire Protection Program and ignition sources in the WHB are limited. All of these factors were considered to support the Completion Time of 31 Days.

(continued)

B3/4.2 Confinement Ventilation Systems (continued)

B3.2.1 CH WASTE Handling Confinement Ventilation System (continued)

Bases (continued)

ACTIONS (continued)

A.2	The Required Action requires hot work ACTIVITIES not related to restoration of the CH WH CVS to be stopped in the AFFECTED PROCESS AREAS IMMEDIATELY. Hot work ACTIVITIES being conducted in the WHB have the potential to initiate a fire event. Therefore, if the CH WH CVS is NOT OPERABLE the risk of fires should be reduced. Stopping hot work ACTIVITIES reduces the likelihood of fire events. An exception is allowed for those hot work ACTIVITIES that could be necessary to restore the CH WH CVS to OPERABLE status. These specific hot work ACTIVITIES are allowed to continue as long as ~~a FIRE WATCH is established and remains in place at the location that the~~ hot work ACTIVITIES are being performed. A Completion Time of IMMEDIATELY initiates prompt and sustained action to stop hot work not related to restoration of the CH WH CVS and to properly secure the ACTIVITY and work area while minimizing the time-at-risk.
~~**A.3**~~	~~Required Action BA.3 requires establishing a FIRE WATCH within 1 Hour at each location in the AFFECTED PROCESS AREAS where WASTE HANDLING ACTIVITIES are being conducted.~~ ~~A FIRE WATCH provides for visual observation, identification, and reporting of actions or conditions that could initiate a fire, and prompt reporting of a fire to initiate emergency response should one occur. Training also allows for extinguishing incipient fires if safe to do so. This Action reduces the potential for fire initiation and incipient fire growth. WASTE HANDLING ACTIVITIES are allowed to continue during this Condition as there is low risk for a significant fire event to occur without observation with the FIRE WATCH in place. Combustible material loading is controlled by the Fire Protection Program and liquid-fueled vehicles and equipment are prohibited from being within the CH BAY or ROOM 108. Ignition sources in the WHB are limited. Additionally, the WHB FSS is required to be OPERABLE during the WASTE HANDLING MODE (LCO 3.1.1). A Completion Time of 1 Hour provides time to determine the WASTE HANDLING ACTIVITIES being performed and their locations, and to identify qualified individuals and their assignments to perform the required FIRE WATCH. The FIRE WATCH remains in place for the duration of this Condition while WASTE HANDLING ACTIVITIES are being conducted.~~

(continued)

B3/4.2 Confinement Ventilation Systems (continued)

B3.2.1 CH WASTE Handling Confinement Ventilation System (continued)

Bases (continued)

ACTIONS (continued)

A.3	Required Action A.~~34~~ requires a ROVING FIRE WATCH to be established within 1 Hour and every 6 hours thereafter at each location in the AFFECTED PROCESS AREA(S) where WASTE STORAGE ACTIVITIES are being conducted. A ROVING FIRE WATCH provides for a roving inspection of AFFECTED AREAS for the purpose of making fire safety observations, notifying building occupants and the CMR of an emergency, minimizing the potential for a fire to occur, and/or extinguishing incipient fires. A ROVING FIRE WATCH may have other duties between inspections. This Action reduces the potential for fire initiation and incipient fire growth. WASTE STORAGE ACTIVITIES are allowed to continue during this Condition as there is low risk for a significant fire event to occur without observation with the ROVING FIRE WATCH in place. Combustible material loading is controlled by the Fire Protection Program and liquid-fueled vehicles and equipment are prohibited from being within the CH BAY or ROOM 108. Ignition sources in the WHB are limited. Additionally, the WHB FSS is required to be OPERABLE during the WASTE HANDLING and WASTE STORAGE MODES (LCO 3.1.1). An initial Completion Time of 1 Hour provides time to determine the WASTE STORAGE ACTIVITIES locations and to identify qualified individuals and their assignments to perform the required ROVING FIRE WATCH. Performance of a ROVING FIRE WATCH every 6 Hours thereafter provides verification that no excessive combustible material accumulation has occurred or other conditions that could potentially initiate a fire. The 6 Hours is based upon the lack of transient combustible loading increase for storage activities. ~~In addition, WASTE HANDLING activities have a continuous FIRE WATCH.~~

(continued)

B3/4.2 Confinement Ventilation Systems (continued)

B3.2.1 CH WASTE Handling Confinement Ventilation System (continued)

Bases (continued)

ACTIONS (continued)

A.4.1/A.4.2

These Required Actions provide an equivalent level of compensatory measures to be implemented within 14 Days in the event that the CH WH CVS is NOT OPERABLE. Required Action A.~~5~~4.1 requires restoration of the CH WH CVS to OPERABLE status within 14 Days and A.~~5~~4.2 requires placing the AFFECTED PROCESS AREA(S) in STANDBY MODE within 14 Days.

Required Action A.~~5~~4.1 requires the CH WH CVS to be restored to OPERABLE status within 14 Days. In the event that the CH WH CVS is NOT OPERABLE and Condition A was entered, Actions A.2 and A.3~~, and A.4~~ have significantly reduced the potential for fire initiation in the AFFECTED PROCESS AREAS by stopping hot work ACTIVITIES, ~~establishing a FIRE WATCH at locations where WASTE HANDLING ACTIVITIES are being performed,~~ and establishing a ROVING FIRE WATCH at locations where WASTE STORAGE ACTIVITIES are being performed. Therefore, the risk of a large fire event is significantly reduced. The 14 Days allows Waste Containers that are outside of their CLOSED Type B SHIPPING PACKAGES and in the CH BAY or ROOM 108 to be transferred to the UNDERGROUND for storage.

Additionally, determination of the cause of the Condition and efforts to restore the CH WH CVS is required. A Completion Time of 14 Days may be necessary to identify the cause of the CH WH CVS Condition, to obtain the necessary parts and/or components required to repair the CH WH CVS and to perform the work to restore the CH WH CVS OPERABILITY. A Completion Time of 14 Days is considered sufficient to restore the system while minimizing the time-at-risk.

Required Action A.~~5~~4.2 requires the AFFECTED PROCESS AREA(S) to be placed into STANDBY MODE within 14 Days from when the CH WH CVS was declared to be NOT OPERABLE and Condition A was entered. In this MODE, WASTE is not permitted to be present unless in a CLOSED SHIPPING PACKAGE. Site-derived WASTE (when present in the CH BAY or RH BAY) must be in a WASTE CONTAINER with the lid CLOSED. The Completion Time of 14 allows sufficient time to transfer Waste Containers that are outside of their CLOSED Type B SHIPPING PACKAGES and in the CH BAY or ROOM 108 to the UNDERGROUND for storage or to restore the CH WH CVS OPERABILITY.

(continued)

B3/4.2 Confinement Ventilation Systems (continued)

B3.2.1 CH WASTE Handling Confinement Ventilation System (continued)

Bases (continued)

Surveillance Requirements (continued)

References

1. SDD HV00, *Heating, Ventilation and Air Conditioning System System Design Description (SDD)* (current revision), Nuclear Waste Partnership LLC, Carlsbad, NM.

2. DOE/WIPP 07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis* (current revision), U.S. Department of Energy, Carlsbad Field Office, Carlsbad, NM.

3. ASME N510-2007, *Testing of Nuclear Air-Treatment Systems,* American Society of Mechanical Engineers, New York, NY.

4. Deleted

5. ECO-13842, *Evaluation of Differential Pressure Instrumentation Loops for HEPA Filter Banks*, Nuclear Waste Partnership, Carlsbad, NM, December 2015.

6. WIPP-021, *Hazards Analysis for the Waste Isolation Pilot Plant Transuranic Waste Handling Safety Basis*, Revision ~~9~~9a, Nuclear Waste Partnership LLC, Carlsbad, NM.

7. Calc 16-007, *Room and HEPA Instrument Uncertainty*, Revision 2, Nuclear Waste Partnership LLC, Carlsbad, NM, April 2016.

B3/4.2 Confinement Ventilation Systems (continued)

B3.2.3 UNDERGROUND Ventilation Filtration System/Interim Ventilation System (continued)

Bases (continued)

References

1. SDD VU00, *Underground Ventilation System Design Description (SDD)* (current revision), Nuclear Waste Partnership LLC, Carlsbad, NM.

2. DOE/WIPP 07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis* (current revision), U.S. Department of Energy, Carlsbad Field Office, Carlsbad, NM.

3. ASME N510-1989, *Testing of Nuclear Air-Treatment Systems*, American Society of Mechanical Engineers, New York, NY.

4. ASME N511-2007, In-Service Testing of Nuclear Air Treatment, Heating, Ventilating and Air-Conditioning Systems, American Society of Mechanical Engineers, New York, NY.

5. CALC-15-029, *Loop Accuracy for a New Pressure Transmitters at Bulkhead 308 Rev. 1*, Nuclear Waste Partnership LLC, Carlsbad, NM, February 2016.

6. ETO-K-224, Rev. 2, *Uncertainty of Instrumentation Loops for Differential Pressure Measurement Across HEPA Filter Banks*, Nuclear Waste Partnership LLC, Carlsbad, NM, April 2016.

7. Memorandum from Keith Wallace, Mine Ventilation Services, Inc., to Jill Farnsworth, Nuclear Waste Partnership, *Modeling UVFS/IVS Fan Configurations with Various NVPs and Upset Conditions*, April 13, 2016.

8. WIPP-021, *Hazards Analysis for the Waste Isolation Pilot Plant Transuranic Waste Handling Safety Basis*, Revision ~~9~~9a, Nuclear Waste Partnership LLC, Carlsbad, NM.

9. CALC-16-008, *Uncertainty of Mechanical Gauges for Differential Pressure Measurement across HEPA Filter Banks*, Revision 1, Nuclear Waste Partnership LLC, Carlsbad, NM, April 2016.

10. ETO-Z-269, *Engineering Recommendations on how to Perform Air Flow Volume Readings in the WIPP Underground*, Rev. 1, Waste Partnership LLC, Carlsbad, NM, March 2016.

B3/4.3 Fuel Confinement (continued)

B3.4.3 Temporary Liquid-combustible Storage (continued)

Bases (continued)

ACTIONS (continued)

E.1	This Required Action is entered when Required Actions and/or Completion Times of CONDITION A, B, C, or D are not met. The CONDITIONS address discoveries where the total volume of liquid-combustibles exceeds 534 gallons, the temporary liquid-combustible storage locations are less than 200 feet from the TRANSPORT PATH and any CH WASTE FACE in an ACTIVE PANEL, and where more than two temporary liquid-combustible storage locations exist or are not separated by at least 300 feet. ~~Depending on the CONDITION entered, Required Actions assign ATTENDANTS, SUSPEND movement of CH WASTE in the affected TRANSPORT PATH COMPLETION, and restore operation to within the boundaries of the controls.~~ ACTION E.1 requires that an ATTENDANT be assigned, when the ACTIVE PANEL is manned ~~or during WASTE Transport,~~ at each temporary liquid-combustible storage location IMMEDIATELY upon discovery that Required Actions and/or Completion Times cannot be met. Each ATTENDANT will serve to minimize the potential for impacts or collisions that could result in combustible liquid leaks and reduce the risk that a fire could involve the CH WASTE. Each ATTENDANT will look for potential collision conditions and identify potential ignition sources. If the ACTIVE PANEL is not manned ~~and no WASTE is being transported~~, ATTENDANTs are not required as there would be no vehicle/equipment activity to create a collision between vehicle/equipment and the temporary liquid-combustible storage locations. A Completion Time of IMMEDIATELY limits the time this condition poses an unmitigated fire risk to the CH WASTE. As is the case for all LCO conditions, the restoration of compliance with the LCO statement is preferred. The Required Action is taken along with the understood action of IMMEDIATELY, if possible, satisfying the Required Actions and/or Completion Times.

(continued)

B3/4.3 Fuel Confinement (continued)

B3.4.3 Temporary Liquid-combustible Storage (continued)

Bases (continued)

ACTIONS (continued)

E.2	This Required Action requires the facility to SUSPEND WASTE HANDLING ACTIVITIES in the UNDERGROUND IMMEDIATELY other than those related to re-establishing compliance of temporary liquid-combustible storage locations. Suspending WASTE HANDLING ACTIVITIES in the UNDERGROUND reduces any potential for collisions between WASTE HANDLING VEHICLES/EQUIPMENT and non-compliant temporary liquid-combustible storage locations. ACTIVITIES related to re-establishing compliance of temporary liquid-combustible storage locations are allowed under this Required Action. The risk associated with allowing activities to be performed to re-establish compliance of temporary liquid-combustible storage locations ~~a Completion Time of 14 days~~ is acceptable since all WASTE HANDLING ACTIVITIES unrelated to restoring compliance with the LCO are SUSPENDED. ACTION E.1 requires ATTENDANTs at each location, when the ACTIVE PANEL is manned. ~~or during WASTE Transport, to minimize the potential for impacts or collisions that could result in combustible liquid leaks and reduce the risk that a fire could involve the CH WASTE.~~ Each ATTENDANT will look for potential collision conditions during recovery and identify potential ignition sources. Failure to comply with the allowable number of temporary liquid-combustible storage locations does not in and of itself create a collision or a combustible liquid spill and an ignition source to initiate the fire. However, reducing the temporary liquid-combustible storage locations to two is necessary to restore compliance with the LCO.
E.3	This Required Action restores LCO compliance. The action requires completion of any one of several actions A.3, B.1, C.1, and D.3. This may include restoring the total volume of liquid-combustibles to a maximum of 534 gallons, restoring the temporary liquid-combustible storage locations to less than 200 feet from the TRANSPORT PATH and any CH WASTE FACE in an ACTIVE PANEL, and restoring the temporary liquid-combustible storage locations to no more than two separated by at least 300 feet. Condition E.3 allows 14 Days to restore LCO compliance. The risk associated with allowing 14 days to restore LCO compliance is acceptable since all WASTE HANDLING ACTIVITIES unrelated to restoring compliance with the LCO are SUSPENDED. ACTION E.1 requires ATTENDANTs at each location, when the ACTIVE PANEL is manned. Each ATTENDANT will look for potential collision conditions during recovery and identify potential ignition sources.

B3/4.7 Suspect Container Response (continued)

B3.7.1 Waste Acceptability Control (continued)

Bases (continued)

ACTIONS (continued)

B.1	In the event that a WASTE CONTAINER(S) is determined to be noncompliant through observable configuration, damage, or degradation, Condition B is entered. WIPP completes a series of checks upon WASTE processing to VERIFY container integrity after receipt. Although WASTE CONTAINER integrity issues may be discovered during processing or disposal of WASTE, suspect WASTE CONTAINER(S) may be identified after the WASTE is emplaced. Identifying the suspect WASTE CONTAINER IMMEDIATELY upon removal of WASTE CONTAINER(S) from its SHIPPING PACKAGE supports the disposition and resolution of the noncompliant WASTE CONTAINER. This Required Action requires accessible WASTE CONTAINER(S) with improper configuration, structural defects, damage, or degradation to be placed in a SAFE CONFIGURATION IMMEDIATELY, thereby reducing the potential for fires or other accidents that could impact the CH WASTE.
~~**B.2**~~	~~Required Action B.2 requires accessible WASTE CONTAINER(S) with structural defects, damage, or degradation to be overpacked in a WIPP WAC compliant WASTE CONTAINER within 48 Hours7 days of entering in Condition B. WIPP does not open or modify WASTE CONTAINERS received from generator sites. However, overpacking noncompliant containers is an allowed ACTIVITY in the DSA.~~ ~~Based on operational experience, the 48 7 Days Hours allotted to complete an overpack ACTIVITY is needed for obtaining a WIPP WAC compliant overpack, disassembly of the payload, dunnage adjustments, modifying the WDS with new entries, documentation and approvals, and therefore minimizes risk.~~ ~~WASTE CONTAINERS are visually inspected for proper configuration, physical damage (e.g., severe rusting, apparent structural defects, etc.) and leakage to ENSURE they are in good condition prior to storage. WASTE CONTAINERS are also checked for external surface contamination and direct radiological dose. WIPP may initiate local decontamination on containers above the WIPP WAC limits, in good condition, and free of leakage. External surface contamination or radiation dose rates in excess of RWP limits are controlled in accordance with established operational and radiological control procedures. Should the noncompliant items not be readily rectified, a RESPONSE PLAN is developed in accordance with Required Action F.1.~~

(continued)

B3/4.7 Suspect Container Response (continued)

B3.7.1 Waste Acceptability Control (continued)

Bases (continued)

ACTIONS (continued)

B.2.1	Condition B provides the option of either placing the accessible noncompliant WASTE CONTAINER(S) in a WIPP WAC compliant overpack container or implementing a RESPONSE PLAN. Required Action B.2.1 requires accessible WASTE CONTAINER(S) with structural defects, damage, or degradation to be overpacked in a WIPP WAC compliant WASTE CONTAINER within 4 days of entering in Condition B. WIPP does not open or modify WASTE CONTAINERS received from generator sites. However, overpacking noncompliant containers is an allowed ACTIVITY in the DSA. Based on the availability of shift crew, the 4 Days allotted to complete an overpack ACTIVITY is needed for staging a WIPP WAC compliant overpack, disassembly of the payload, dunnage adjustments, mockups, modifying the WDS with new entries, and documentation and approvals. Allowing adequate time to mockup and procedure walkthroughs for the overpacking operations reduces the potential for errors and reduces risk to workers. During this time period, the noncompliant WASTE CONTAINER is in a SAFE CONFIGURATION in accordance with Required Action B.1. WASTE CONTAINERS are visually inspected for proper configuration, physical damage (e.g., severe rusting, apparent structural defects, etc.) and leakage to ENSURE they are in good condition prior to storage. WASTE CONTAINERS are also checked for external surface contamination and direct radiological dose. WIPP may initiate local decontamination on containers above the WIPP WAC limits, in good condition, and free of leakage. External surface contamination or radiation dose rates in excess of RWP limits are controlled in accordance with established operational and radiological control procedures. Should the noncompliant items not be readily rectified, Required Action B.2 provides the option to develop a RESPONSE PLAN in accordance with Required Action B.2.2.

(continued)

B3/4.7 Suspect Container Response (continued)

B3.7.1 Waste Acceptability Control (continued)

Bases (continued)

ACTIONS (continued)

B.2.2	Required Action B.1 requires WIPP to place WASTE CONTAINER(S) in a SAFE CONFIGURATION. Required Action B.2.1 requires placing accessible WASTE CONTAINER(S) in a WIPP WAC compliant overpack container. Should the noncompliant items not be rectified within the required Completion Time, a RESPONSE PLAN is developed in accordance with Required Action B.2.2. A CBFO-approved RESPONSE PLAN SHALL be implemented within 10 Days of entry into Condition B.2.2. To support the completion of this Required Action within 10 Days, the RESPONSE PLAN must be prepared and submitted to CBFO for approval. Following CBFO approval, the plan must be implemented. All of these actions should be considered in achieving the required Completion Time of 10 Days. Since IMMEDIATE action is taken in B.1 to place WASTE CONTAINER(S) in a SAFE CONFIGURATION, a 10 Day Completion Time is deemed adequate to minimize the risk. The RESPONSE PLAN SHALL provide an evaluation of the available information on the suspect WASTE CONTAINER and SHALL include the appropriate actions to disposition the suspect WASTE CONTAINER(S). Required Action B.2.2 implements the NWP/DOE approved RESPONSE PLAN which contains adequate direction and compensatory measures to resolve the WASTE CONTAINER noncompliance. The plan content should specify, based on existing conditions, the detailed plan of action for restoring compliance with the LCO. Section 5.4.4 of this TSR discusses the use and content of RESPONSE PLANS. Required Action B.2.2 does not replace or circumvent the USQ process for determining if a PISA exists. A positive PISA determination will still require entry into LCO 3.7.1 for a suspect noncompliant WASTE CONTAINER(S). Because the safety analysis evaluates loss of confinement events, indication of WASTE CONTAINER defects may not result in a PISA USQ. For these instances, the RESPONSE PLAN describing the planned action to be taken to comply with TSR requirements is required.

(continued)

Event Category: 04 **Event No.:** CH/RH-WHB-04-001a

Event Description	Causes	Unmitigated Risk			Preventive Features	Mitigative Features	Mitigated Risk		
		Freq. Level	Conseq. Level	Risk Bin			Freq. Level	Conseq. Level	Risk Bin
Fire external to WHB propagates to Waste handling areas affecting the CH and RH Waste resulting in release of radiological material. **Location(s):** • WHB: CH and RH Bays **MAR:** • 8 CH Facility Pallets and RH Bay Inventory **Release Mechanism(s):** • Thermal release **Initial Condition(s):** • RH Facility Cask/ Light Weight Facility Cask - **Structural integrity** • WHB Design - **Noncombustible construction and curbing** • WIPP WAC - **Compliance** **Initial Assumption(s):** • Property Protection Area - Noncombustible construction (paved/ graveled)	• Maintenance activities • Flammable/combustible materials and ignition source • Equipment malfunction	EU	FW: L CW: H MOI: L	III I III	**Engineered:** • WHB Fire Suppression System - **Fire Suppression** • Vehicle Barriers - Substantial barrier 25 feet from SW CH Bay Exterior Wall **Administrative:** • Fire Protection Program - Combustible Loading Control - Fire response (i.e., WIPP Fire Brigade and local fire department(s))	**Engineered:** • CH Waste Handling Confinement Ventilation System - HEPA Filtration **Administrative:** • Emergency Preparedness Program - Emergency egress - Emergency response	BEU	FW: L CW: H MOI: L	IV III IV

Credited Initial Assumptions/Conditions:

Control	Attribute	Class	Description
RH Facility Cask/ Light Weight Facility Cask	Structural integrity	SS	Provides physical barrier that minimizes effects on RH Waste drums. The substantial barrier of the RH Waste Cask minimizes adverse effects on RH Waste drums and therefore, permits a reduction in the damage ratio used for scoping calculation.
WHB Design	Noncombustible construction and curbing	SS	~~Minimizes~~ Reduces the likelihood ~~of ignition and/or~~ for propagation of fires into the CH Bay through the primary use of metal and concrete construction.
WIPP WAC	Compliance	SS	Waste generator compliance with the WAC protects the assumptions of the analysis as to the nature and confinement of the waste.

Initial Condition/Assumption Notes:
• The likelihood for a fire external to the WHB to initiate a fire in/on the noncombustible construction is considered to be Unlikely.

The above listed Note(s) and/or credited Initial Condition(s)/Assumption(s) for this event establish that the frequency of its occurrence is EU with Low consequences to the FW, High to the CW, and Low to the MOI.

Event Category: 04 **Event No.:** CH/RH-WHB-04-001a

Credited Prevention:

Control	Attribute	Class	Description
WHB Fire Suppression SystemVehicle Barriers	Fire SuppressionSubstantial barrier 25 feet from SW CH Bay Exterior Wall	SSSS	An Operable WHB fire suppression system consists of (a) fire water supply system, (b) pumping capability, (c) auto-start, and (d) adequate water source. The fire suppression system suppresses fires associated with fires at their incipient stage. This control reduces the likelihood for an external fire to adversely affect Waste within the CH Bay.Provides assurance that liquid-fueled vehicles will not contribute to a fuel pool fire involving TRU Waste. The Vehicle Barriers prevent vehicles from crashing through the CH Bay southwest wall, or to be parked adjacent to the wall, by reducing the likelihood of either event. The barriers provide a significant impediment to inadvertent vehicle movement and prevent vehicles from being passing through or parking adjacent to the wall. Prohibition of vehicles in this area reduces the likelihood for pool fires that could affect CH Waste within the CH Bay.

Prevention Notes:

- *None*

The likelihood of this event is reduced to BEU with the credited preventive controls.

Credited Mitigation:

Control	Attribute	Class	Description
None			

Mitigation Notes:

- *None*

The radiological dose consequences of this event remain Low to the FW, High to the CW, and Low to the MOI without credit for mitigative controls.

Event Notes:

- *Time at risk for the FW is limited due to opportunity for the FW to observe the upset condition and to exit the area which limits exposure.*
- *Unmitigated - qualitative evaluation of the entire WHB inventory burning in a confined manner.*

Represents:

Event No.	MAR	Description		Consequence			Risk		
			Freq.	FW	CW	MOI	FW	CW	MOI
CH/RH-WHB-04-001b	8 CH Facility Pallets and RH Bay Inventory	Fire propagates from the CH Bay to the WHB RH Bay	U	L	M	L	III	II	III
CH/RH-WHB-04-001c	1 CH Facility Pallet	Fire from the outside enters waste hoist area and damages waste containers	U	L	M	L	III	II	III
CH/RH-WHB-04-001d	1 CH Facility Pallet	Fire in upper levels of waste hoist tower propagates to the waste collar area with waste containers present	U	L	M	L	III	II	III
CH/RH-WHB-04-001e	1 CH Facility Pallet	Vehicle from the outside area north of the waste tower, enters waste hoist area results in fire and damages waste containers	U	L	M	L	III	II	III
CH/RH-WHB-04-001f	RH Bay Inventory	Fire propagates from the adjacent Support Building to the WHB RH Bay	U	L	M	L	III	II	III
CH/RH-WHB-04-001g	1 RH Waste Canister	Fire from the outside enters waste hoist area and damages waste containers	U	L	L	L	III	III	III
CH/RH-WHB-04-001h	1 CH Facility Pallet or 1 RH Waste Canister	Fire in upper levels of waste hoist tower propagates to the collar area with facility cask/light weight facility cask present	U	L	M	L	III	II	III
CH/RH-WHB-04-001i	2 Shipping Packages	Fire propagates from the adjacent Safety Building to the WHB RH Bay	U	L	M	L	III	II	III
CH/RH-WHB-04-001j	2 Shipping Packages	Fire propagates from the outside parking area to the WHB RH Bay	U	NR	NR	NR	NA	NA	NA
CH/RH-WHB-04-001k	2 Shipping Packages	Fire propagates from the second floor of the RH portion of the WHB to the RH Bay	U	NR	NR	NR	NA	NA	NA
CH/RH-WHB-04-001l	2 RH Waste Canisters	Fire propagates from the WHB RH Bay to the Hot Cell Complex/FCLR	EU	L	M	L	IV	III	IV
CH/RH-WHB-04-001o	1 CH Facility Pallet	Fire from the CH Bay enters waste hoist area and damages CH waste containers	U	L	M	L	III	II	III
CH/RH-WHB-04-001p	8 CH Facility Pallets	Fire propagates from the TMF to the CH Bay and/or Room 108	U	L	M	L	III	II	III
CH/RH-WHB-04-001q	8 CH Facility Pallets	Fire propagates from the second floor of the WHB to the CH Bay and/or Room 108	U	L	M	L	III	II	III
CH/RH-WHB-04-001r	1 CH Facility Pallet	Fire from the FCLR enters waste hoist area and damages CH waste containers	U	L	M	L	III	II	III
CH/RH-WHB-04-001s	1 RH Waste Canister	Fire from the CH Bay enters waste hoist collar area and damages RH waste container	U	L	L	L	III	III	III
CH/RH-WHB-04-001t	1 RH Waste Container	Fire from the RH FCLR enters waste hoist area and damages RH waste container	U	L	L	L	III	III	III

Event Category: 10 **Event No.:** CH/RH-UG-10-004a

Event Description	Causes	Unmitigated Risk			Preventive Features	Mitigative Features	Mitigated Risk		
		Freq. Level	Conseq. Level	Risk Bin			Freq. Level	Conseq. Level	Risk Bin
Uncontrolled rapid descent of loaded Waste Hoist and impact with Waste Shaft Station floor resulting in waste container breach resulting in release of radiological material. **Location(s):** • UG: Waste Shaft **MAR:** • 1 CH Facility Pallet or 1 RH Waste Canister **Release Mechanism(s):** • High energy impact with spill **Initial Condition(s):** • Waste Hoist - **Support System** • WIPP WAC - **Compliance** • RH Facility Cask/ Light Weight Facility Cask - Structural integrity **Initial Assumption(s):** • None	• Equipment malfunction • Operator error (e.g., distraction, obstruction) • Loss of electrical power	EU	FW: H CW: H MOI: L	II II IV	**Engineered:** • Waste Hoist - **Brakes** **Administrative:** • Initial Testing, In-Service Surveillance, and Maintenance Program - Waste Hoist inspections per 30 CFR 57, Subpart R • Training and Qualification Program - Operators trained to properly operate vehicles/ equipment	**Engineered:** • UG Ventilation Filtration System (UVFS/IVS) - HEPA Filtration and Air Flow in the UG **Administrative:** • Emergency Preparedness Program - Emergency egress - Emergency response • Radiation Protection Program - Local surveys, PPE - Routine and Pre-entry Radiological Monitoring • Vehicle/Equipment Attendance - Notification	BEU	FW: H CW: H MOI: L	III III IV

Credited Initial Assumptions/Conditions:

Control	Attribute	Class	Description
Waste Hoist	Support System	SS	The Waste Hoist Support System includes the physical structure that supports the Waste Hoist which is designed to withstand the DBE, and also includes the bedplate, friction drum, drum shaft, and six head ropes of the Waste Conveyance. The Waste Hoist systems in the shaft and all shaft furnishings are designed to resist the dynamic forces of the hoisting operations (the dynamic forces are greater than the seismic forces on the UG facilities). The design reduces the likelihood for failure of the waste conveyance.
WIPP WAC	Compliance	SS	Waste generator compliance with the WAC protects the assumptions of the analysis as to the nature and confinement of the waste.

Initial Condition/Assumption Notes:

• The design of the Waste Hoist is such that an uncontrolled rapid descent/ascent of the hoist is considered to be Extremely Unlikely. The waste hoist system includes redundant and diverse sytems that make the likelihood of an uncontrolled descent or ascent of the conveyance implausible.

The above listed Note(s) and/or credited Initial Condition(s)/Assumption(s) for this event establish that the frequency of its occurrence is EU with High consequences to the FW, High to the CW, and Low to the MOI.

Event Category: 10 **Event No.:** CH/RH-UG-10-004a

Credited Prevention:

Control	Attribute	Class	Description
Waste Hoist	Brakes	SS	The Waste Hoist Brakes work to control movement of the conveyance up and down the Waste Shaft. There are two brake units mounted approximately 180 degrees apart on each brake disc of the hoist wheel. The Waste Hoist Brakes are designed so that either set of brakes can stop a fully loaded conveyance when they are in-service. This reduces the likelihood of an uncontrolled movement of the conveyance loaded with Waste.

Prevention Notes:

- *None*

The likelihood of this event is reduced to BEU with the credited preventive controls.

Credited Mitigation:

Control	Attribute	Class	Description
None			

Mitigation Notes:

- *None*

The radiological dose consequences of this event remain High to the FW, High to the CW, and Low to the MOI without credit for mitigative controls.

Event Notes:

- *None*

Represents:

Event No.	MAR	Description		Consequence			Risk		
			Freq.	FW	CW	MOI	FW	CW	MOI
CH/RH-UG-10-004b	1 CH Facility Pallet or 1 RH Waste Canister	Two redundant ~~W~~waste hoist brake systems fail with loaded conveyance.	BEU	H	H	L	II	II	IV
CH/RH-UG-10-004c	1 CH Waste Assembly or 1 RH Waste Canister	Uncontrolled ascent of conveyance during waste retrieval.	EU	L	L	L	IV	IV	IV
CH/RH-UG-10-004d	1 CH Facility Pallet or 1 RH Waste Canister	Uncontrolled ascent during downloading activity due to failure of waste hoist system.	BEU	H	H	L	III	III	IV

ENCLOSURE 2

Original Line #	Chapter	Section	Table/Figure/TSR	Comment/Issue Description (DSA/TSR Chapter, Page, if relevant)	Action	Resolution	Status
132	3	3.5		Section 3.5 doesn't discuss the NPH of flooding to the facility. Even though this NPH may have a very low likelihood, still discuss.		Flooding events are addressed in WIPP-021 in events CH/RH-OA-26-001a, CH/RH-UG-26-001a, CH/RH-UG-26-002a, CH/RH-WHB-26-001a, CH/RH-WHB-26-002a.	Closed
648	7			• KE 7-1: Proper placement and operation of Continuous Air Monitors (CAMs) Sections 7.6 and 7.8 discuss the program provisions for CAM placement and utilization to protect facility workers from airborne radioactivity. Specific CAM requirements are also established by SAC 5.5.8, Real-Time Monitoring at Panel 6 and Panel 7 Isolation Bulkheads. The Key Element ensures that the provisions for detection and response are implemented in a manner that protects facility workers from high radiological consequences.		Refer to DSA Revision 6a, Page Change 2. SAC 5.5.8 was removed from the TSRs based on the safety analysis in WIPP-051, Revision 5. Key Element 7-4 was added to ensure isolation structures are inspected where physical access is possible.	Closed
763		7.2	FHA Table 7.2-1	The total fire water storage requirement listed in the table does not reflect the two-hour duration requirement specified in DOE STD 1066-2012, Paragraph 4.2.7.1.1.	Revise the table to consider the DOE requirement for a two-hour water supply.	Incorporated in FHA Revision	Closed
764		2.1	FHA	The ability to meet the fire flow requirements delineated in IFC 2012, Appendix B, Table B10.1 is not addressed. FHA Section 2.1 states that the WHB is constructed to NFPA 220, Type II (000) construction which is equivalent to IBC Type IIB construction identified in IFC. IFC 2012, Appendix B, Table B10.1 specifies the required fire flow and duration.	Address the capability to meet IFC fire flow requirements.	Incorporated in FHA Revision	Closed
765	7			• KE 7-2: Control access and entrance to RH hot cells Section 7.6.2 describes program provisions for hot cell access control when RH waste is present in the hot cell. The Key Element ensures that these provisions are implemented in a manner that protects facility workers from high radiological consequences		KE 7.2 is retained in DSA Revision 7.	Closed
766			FHA	The FHA does not provide adequate discussion as to compliance with DOE STD 1066-2012, Paragraph 4.2.7.1.2, regarding the reliability of the water supply design and the condition of the underground piping, specifically the fire water tank and piping from the fire water storage tank to the WHB.	Discuss in more detail the reliability of the water supply to include the safety significant fire water storage tank and underground transfer piping from the tank to WHB.	Incorporated in FHA Revision	Closed
767		14.2	FHA Appendix B, Page 195	The system description Paragraph does not discuss the addition of HEPA filters being added by the Interim Ventilation system (IVS) modification. The newly configured filtered exhaust system will now consist of the existing two parallel HEPA filtered trains in addition to IVS all operating together.	Integrate the discussion related to IVS on Page 199 into the system description on Page 195.	Incorporated in FHA Revision	Closed

Original Line #	Chapter	Section	Table/Figure/TSR	Comment/Issue Description (DSA/TSR Chapter, Page, if relevant)	Action	Resolution	Status
768		1.1	FHA Page 24	The cost of program interruption has not been factored into the determination of MPFL. Program interruption costs can in many cases be the largest input to the determination of MPFL. DOE Order 420.1C establishes facility safety requirements related to fire protection to in part minimize unacceptable interruptions to vital DOE programs as a result of fire and related hazards. The cost of program interruption is sometimes difficult to quantify but must be considered in determination of MPFL. DOE STD 1066-2012, Appendix B, Section B4.5, recognizes that the FHA is based on the premise that a fire will occur and considers a variety of fire issues such as property loss and program interruption potential.	Consider the cost of program interruption in determining MPFL.	Incorporated in FHA Revision	Closed
769		9.1	FHA Page 153-154	The cost of program interruption has not been factored into the determination of MPFL. Program interruption costs can in many cases be the largest input to the determination of MPFL. DOE Order 420.1C establishes facility safety requirements related to fire protection to in part minimize unacceptable interruptions to vital DOE programs as a result of fire and related hazards. The cost of program interruption is sometimes difficult to quantify but must be considered in determination of MPFL. DOE STD 1066-2012, Appendix B, Section B4.5, recognizes that the FHA is based on the premise that a fire will occur and considers a variety of fire issues such as property loss and program interruption potential.	Consider the cost of program interruption in determining MPFL.	Incorporated in FHA Revision	Closed
771			FHA	There is no exemption or equivalency listed in Section 11.3, Existing Exemptions and Equivalencies, for the non-fire rated bulkheads, airlocks, and overcasts.	Provide an exemption or equivalency reference, or alternate action plan to address non-rated bulkheads, and airlocks.	Incorporated in FHA Revision	Closed
772			FHA Table 2.10-2	The electrical load for the new IVS exhaust fans (960 fans) are not listed on the emergency generator load list. Based on the load list provided the emergency generator has insufficient capacity to handle all current loads without employing sequencing and without the addition of the IVS fans and accessories.	Provide discussion on providing emergency power to the IVS system fans and accessories and the ability of the current emergency generator to handle the electrical loads.	Incorporated in FHA Revision	Closed

Original Line #	Chapter	Section	Table/Figure/TSR	Comment/Issue Description (DSA/TSR Chapter, Page, if relevant)	Action	Resolution	Status
818	6			The assumption of credible errors in the container fissile mass loading used in the criticality safety evaluations needs a technical basis. Document the issue of the credible errors of the NDA measurements in the Criticality Safety Program Description Document (PDD), preferably by reference to the white paper being developed by the Technical Support Group (chaired by Frank Lamb) and being drafted by Jeff Chapman.		Issuance of a White paper is a DOE action.	Closed
922	7			• KE 7-3: Ensure action to limit radiological release from the facility via the waste hoist tower during an underground pool fire or when a CAM alarm is received while UVFS/IVS is not operable. This key element requires the program to ensure that procedures are in place to limit the potential for radiological releases from the facility that may not be protected by the installed filtered ventilation systems. The potential doses do not exceed the guidelines for selection of safety significant controls and thus the objective is defense in depth, risk minimization, and environmental protection. Two circumstances of possible concern are identified: 1. An extremely unlikely fuel pool fire at the waste shaft station may cause upcasting through the Waste Hoist Tower that the ventilation system is not sized to prevent. The potential radiological release from such an event is minimized by ensuring closure of the Auxiliary Air Intake and by configuring the top of the waste hoist tower for HEPA filtration by either the CH Bay or RH Bay installed filtration systems, recognizing that significant smoke loading of the installed filters may occur. 2. An exothermic chemical reaction in a closed disposal room could occur with the UVFS/IVS as governed by LCO 3.2.3 out of service. Should such an event occur (e.g., CAM alarm received at the CMR), provisions to limit upcasting via the Air Intake and Salt Shafts via covering are appropriate as are provisions to ensure the Auxiliary Air Intake is closed and the Waste Shaft is configured for HEPA filtration via CH Bay or RH Bay installed filtration systems. These provisions may be instituted as a precaution for		Radiological release events at the waste shaft loading station are analyzed in Chapter 3 and in Chapter 4 of the DSA (Ref: Mine Ventilation Services, Inc., *Modeling UVFS/IVS Fan Configurations with Various NVPs and Upset Conditions*). LCO 3.2.4 specifically addresses controls required to prevent upcasting during an event when waste is present.	Closed
1051				Page 7-11, 7.8: It references "Radiation Protection Instrumentation Test and Calibrations – Portable Survey Instruments (ANSI N323A-1997)". However, there is a newer version of this reference (ANSI N323AB-2013). NWP will need to determine which one is more appropriate for its program?		NWP still follows the older version.	Closed
1152	4			Provide more detail on Waste Hoist Breaking system and how/why it is robust enough to withstand a DBE. Also include the sequence of events upon an DBE and how the system would fail (e.g. fail safe?).		The reviewer is referred to DSA Section 4.4.7 (Waste Hoist Brakes) and Section 4.4.9 (Waste Hoist Support System) for full descriptions. The Waste Hoist Brakes are designed to stop a fully loaded conveyance (with significant margin) to prevent an uncontrolled movement of the Waste Hoist that could breach TRU Waste Containers. The Waste Hoist support structure is required to meet DOE-STD-1020- 2002	Closed

Original Line #	Chapter	Section	Table/Figure/TSR	Comment/Issue Description (DSA/TSR Chapter, Page, if relevant)	Action	Resolution	Status
1152	4					PC-2 seismic criteria of 0.06g for the WIPP site. The WHB is designed to withstand a DBE with 0.1 g PGA with a 1,000-year return interval. The analyses referenced in SDD CF00-GC00, Section 3.1.6, "System Reliability Features" demonstrate design adequacy. The Waste Hoist Brake System automatically applies the brakes upon loss of hydraulic pressure due to loss of electric power or conveyance over speed. The performance criteria of bringing the conveyance to a stop within a 30-foot travel distance (Table 4.4.7-2) will result in a rapid, but controlled deceleration of the conveyance. The Waste Hoist is designed for a maximum deceleration of 16 feet/sec2 (~0.5g) upon actuation of an emergency stop; a force which is significantly less than the gravitational force associated with a free fall of the conveyance and a seismic event. This force may result in some minor movement or jostling of containers but is not expected to significantly damage a payload. DSA Section 3.5.1 evaluates a design basis seismic event including collapse of the WHB and the failure of the Waste Hoist with a loaded facility pallet of CH Waste containers. Unmitigated doses to the MOI were low.	Closed
1153	18			Add more detail on how section 18.8 is implemented. In addition, add detail similar to SER on how the waste is expected to be certified when the DSA/WAC line is snapped. How will previous waste and new waste be handled?		Refer to Chapter 18, which was revised in DSA revision 6a to address certification program specifics and responsibilities of the generator sites and CCP.	Closed