EA Operational Awareness Record	Report Number: OAR-EA-WIPP-2017-03-27	
Site: Waste Isolation Pilot Plant	**Subject:**	Follow-up Assessment of the July 2016 Assessment of the Waste Isolation Pilot Plant Fire Protection Program
Dates of Activity: 3/27/2017 – 3/30/2017	**Report Preparers:** Jeff Snook, Jeff Robinson, Barry Snook	

Activity Description/Purpose:

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), performed a follow-up assessment of the corrective actions taken by Nuclear Waste Partnership, LLC (NWP) to address one of two findings and five follow-up items identified in the July 2016 report, *Office of Enterprise Assessments Assessment of the Waste Isolation Pilot Plant Fire Protection Program*. The second finding from the July 2016 report concerned escapeways in the mine and actions were previously reviewed and determined adequate. The July 2016 report documented an EA targeted fire protection assessment of the Waste Isolation Pilot Plant (WIPP) from February 1-5 and February 29 – March 4, 2016.

ATTACHMENTS: None.

Results:

EA reviewed one finding and five follow-up items from the July 2016 assessment report. The status of the finding and the correction actions for these issues are described below.

NWP Finding F-WIPP-02: NWP has not provided reliable and adequate water supply and distribution for fire suppression, contrary to DOE Order 420.1C, Attachment 2, Chapter II, Section 3.b.(3)(e). This finding remains open due to corrosion analysis issues.

During the 2016 FPP assessment, EA identified four areas of concern for this finding that represented a decreased margin of reliability and adequacy for this system. During this follow-up assessment, EA reviewed the status of these areas.

- Safety Support Systems – the classification of the safety significant (SS) electric fire pump and safety support systems was inadequate in 2016. The revised documented safety analysis (DSA) addressed this concern and states, "The electric-motor-driven pump must run for at least 90 minutes. Because there is no common failure that would cause a fire in the waste handling building (WHB) and simultaneously disrupt electric power to the electric-motor-driven pump, the electric power is not required to be SS. This is due to the physical separation of the WHB and the fire pump house where the electric-motor-driven pump is located." After reviewing the DSA, EA determined that the revised analysis of the electric power to the electric-motor-driven pump appropriately addresses the concern of safety support systems.

- Redundancy of Firewater Supply – NWP has fully repaired the 6-inch SS fire water lead-in to the WHB, and, thus, has adequately addressed the issue concerning redundancy.

- Age Degradation – there have been numerous firewater leaks and pipe failures of the underground fire water piping over the life of the system, particularly during the last few years. NWP has not performed an acceptable analysis evaluating the vulnerabilities due to corrosion of the underground fire water piping. NWP plans to include an analysis concerning the issues of corrosion in the next revision of the WHB Fire Hazard Analysis (FHA).

- Performance Degradation – the test records of the electric and diesel fire pumps indicate that the new diesel fire pump meets the performance requirements as specified by procedure WP 16-23274, *Diesel Fire Pump Acceptance Test*. The test data for the electric fire pump reveals almost 5% performance degradation. According to NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, a fire pump is acceptable if the performance degradation is no greater than 5% at rated conditions of pressure and flow. Although the electric fire pump's performance is within NFPA 25 specification, there is a work request (ref. ID 1736171) to replace the pump.

NWP has initiated a project to upgrade the site fire water system, addressing the risk of pipe failures due to corrosion. This upgrade includes a new fire pump house, an underground fire water loop, three pumps, and two tanks. The design for the upgrade is complete, but the project is not funded.

Although the reliability and availability of the underground fire water system has improved, NWP has not performed an acceptable analysis to evaluate the vulnerabilities resulting from corrosion of the underground fire water system. This finding will remain open until these remaining concerns are resolved.

EA Follow-up Items from the July 2016 Assessment Report:

There were five areas identified for follow-up in the 2016 Assessment Report. All five areas were reviewed.

Fire protection program (FPP), baseline needs assessment, FHA, and equivalency and exemption processes

The Carlsbad Field Office (CBFO) has approved the FPP and baseline needs assessment, and the new equivalency and exemption processes have been implemented. EA has determined these new documents and processes are adequate. Although NWP is in the process of replacing the FHA with facility-specific FHAs, including the WHB and the mine, the FHA has not been revised and will remain an item for follow-up.

Implementation of the combustible loading program

Overall, significant improvements were evident in the mine combustible loading program and administrative controls. NWP has adequately addressed discrepancies in the combustible control fuel package limits and separation distances that were identified in the 2016 report. EA performed a walkthrough of the mine on March 28, 2017, accompanied by the CBFO and NWP fire protection engineers (FPEs). Signs and barriers were installed at the shafts designating buffer zones where diesel powered equipment, parking of mobile equipment, and combustibles are prohibited. The NWP FPE has established designated long-term combustible storage areas and buffer zones throughout the mine. Approved long-term combustible storage areas are marked with green signs that adequately demarcate the long-term storage boundaries and with red signs specifying buffer zones where combustibles are not to be stored. These areas are inspected daily by the fire department using WP 12-FP3003, *Combustible Loading Controls for the WHB and UG*.

During the walkthrough of the mine, EA noted some combustible loading program discrepancies. The combustibles were stored beyond the demarcated boundary of the long-term combustible storage areas at N-460/E-140 and outside the E-140 maintenance shop, and a large wooden spool of cable was stored in a no-storage buffer zone at E-0/N-1400. The NWP FPE appropriately recorded these issues, and notifications were made to mine personnel. The fire department conducts daily/shift inspections in the mine to verify implementation of the combustible loading requirements. EA reviewed fire department inspections that were performed from March 20 to 26, 2017. These daily inspections did not identify the previously discussed combustible loading issues on Form EA 12FP3003-2-0. As a result, EA requested fire department training records for personnel who perform daily combustible loading inspections in the mine. In response to EA's request, NWP identified that training on WP 12-FP3003, revision 21, was not provided to firefighters. NWP appropriately issued a WF17-325 noncompliance form and initiated actions to begin training on the procedure. EA identified this item for follow-up.

The application of fire suppression systems (FSS) on diesel-powered equipment

NWP has satisfactorily completed the installation and acceptance testing of FSSs on eight pieces of mine equipment. A previous contractor installed FSSs on several vehicles. NWP determined these FSSs did not meet manufacturer's design and installation requirements. NWP has instituted appropriate compensatory measures. Additionally, due to inadequate ventilation in the mine, the mine refueling station has been placed out of service, and the lube trucks are being used to refuel mine equipment. No further action is required.

The Inspection Testing and Maintenance (ITM) documentation for the WIPP lightning protection system

The lightning dissipation system at WIPP uses a combination of pole umbrella arrays to protect against lighting strikes and induced surges. The system is showing signs of deterioration at three wood poles and dissipation arrays. NWP

contracted Lightning Eliminators and Consultants to evaluate the lightning protection system. Their evaluation resulted in a system health report, 2016 ED15 SHR, *Grounding & Lightning Protection, System Health Report*, December 17, 2016, which identified several recommendations and issues, including the lack of ITM. Work Order ID 1509995 is tracking the lack of ITM, and EA identified this item for follow-up.

The closure packages supporting the Accident Investigation Board (AIB) report.

There were 58 Judgments of Need that resulted from the three AIB reports. NWP has submitted closure documentation and received approval from CBFO with the exception of three. EA determined these closure packages are adequate. EA determined that the remaining AIB items are not required for compliance with the fire protection program and are outside the scope of this follow-up review. No further action is required.

Conclusion:

Overall, NWP and CFBO have made significant progress in addressing the issues identified in the July 2016 assessment. Despite this progress, Finding F-WIPP-02 has not been fully addressed and will remain open until the vulnerabilities due to corrosion of the underground fire water piping are fully analyzed as required. EA also identified three items for follow-up: the combustible loading program, replacement of the FHA with facility-specific FHAs, and the lack of ITM for the WIPP lightning protection system.

Were there any items for EA follow up? ☒ Yes ☐ No

EA Follow-up Items:

1. Combustible loading program
2. FHA
3. ITM for the WIPP lightning protection system

EA Participants:	**References (Key Documents, Interviews, and Observations):**
1. Jeff Snook (Site Lead) 2. Jeff Robinson 3. Barry Snook	**Key Documents** 1. WP 12-FP3003, Rev. 21, *Combustible Loading Controls for the WHB and UG*, 12/9/16 2. EA12FP3003-2-0, Rev. 5, *Underground Combustible Material/Gas Cylinder Check Sheet*, December 15, 2016 3. WP 12-FP.20, Rev. 0, *WIPP Equivalency, Exemption and Variance Program*, 7/20/16 4. WP 12-NS.02, Rev. 7, *Fire Hazard Analysis Updates*, 8/13/16 5. WIPP-023, Rev. 7, *Fire Hazard Analysis for the Waste Isolation Pilot Plant*, August 31, 2015 6. WP 12-FP3002, Rev. 16, *Hot Work Permits*, 5/17/16 7. WP 12-FP3001, Rev 9, *Fire Protection Impairment, 5/17/16* 8. CBFO:FED:RDE:LW:16-0608: UFC 1410.00, *Approval of Contract DE-EM0001971, Submittal of NWP WIPP Fire Protection Program, WP 12-FP.01 Rev. 14*, July 26, 2016 9. CBFO:OOM:JC:GS:16-0054:UFC 1410.00, *Safety Evaluation Report Clarification of Use of Interim Compensatory Measures for Underground Vehicles without Fire Suppression Systems*, December 15, 2016 10. CBFO: FED: RDE: LW: 16-0614: UFC 1410.00, *Approval of the NWP-Submitted Baseline Needs Assessment for the Waste Isolation Pilot Plant.* 11. 52-H-008A Transporter, *Vendor Re-performed Vehicle Fire System Final Inspection and Testing Report*, 10/28/16 12. 52-H-035A, *Vehicle Fire System Final Inspection & Testing Report*, 9/14/16 13. 52-H-035B, *Vehicle Fire System Final Inspection & Testing Report*, 9/14/16 14. 52-H-126, *Vehicle Fire System Final Inspection & Testing Report*, 8/10/16 15. 52-H-127C, *Vehicle Amerex Fire Suppression System Acceptance Checklist*, 3/3/16

16. 52-H-127D, *Vehicle Amerex Fire Suppression System Acceptance Checklist*, 3/3/16
17. 74-U-049, *Vehicle Fire System Final Inspection & Testing Report*, 12/20/16
18. 74-U-137, *Vehicle Fire System Final Inspection & Testing Report*, 1/17/17
19. 52-H-008A FS-1 As-Built Drawing, *Vehicle Fire Suppression System Isometric Layout*, 8/2/16
20. 52-H-035B FS-1 As-Built Drawing, *Vehicle Fire Suppression System Piping Isometric*, 1/16/17
21. 74-U-049 FS-1 As-Built Drawing, *Vehicle Fire Suppression System Isometric Piping*, 12/22/16
22. 74-U-137 FS-1 As-Built Drawing, *Vehicle Fire Suppression System Isometric Piping*, 1/25/17
23. Drawing VS-1 of 1, *VH30/ICEH2 Distribution Network*, March 2016
24. P/N 23576, *Vehicle Fire Suppression System Installation, Operation, and Maintenance Manual*, February 2015
25. P/N 19680, Rev. G, *Vehicle Fire Suppression System Installation, Operation, and Instruction Manual*, October 2014
26. No. 13980, Rev. J, *Amerex Modular Dry Chemical Vehicle Fire Suppression System Installation, Operation, and Maintenance Manual*, January 2015
27. EA 12FP0060-2-0, Rev. 2, *52-H-127D Semi-Annual Vehicle System Inspection and Test Checklist – Amerex ABC and ICE*, March 21, 2017
28. EA 12FP0060-5-0, Rev. 1, *52-H-008A Semi-Annual Vehicle System Inspection and Test Checklist – Amerex ABC and ICE*, March 21, 2017
29. DOE/WIPP 07-3372, Rev. 5b, *Waste Isolation Pilot Plant Documented Safety Analysis*, April 2016
30. 2016 ED15 SHR, *Grounding & Lightning Protection, System Health Report*, 12/17/2016

Interviews

1. NWP FPE/FPP Deputy Manager
2. Electrical Manager
3. System Engineer
4. Nuclear Safety Engineer
5. Nuclear Safety Group Manager
6. DSA Author
7. Project Update Manager
8. Assistance Fire Chief
9. Division Chief
10. Emergency Preparedness Manager
11. Readiness Mission Support Manager
12. CBFO FPE
13. CBFO Safety Basis Engineer

Observations

1. Walkthrough of the mine, including the Cease Fire Dry Chemical Fire Suppression Systems in Maintenance Shop, and Stat-X Aerosol Fire Suppression System in the maintenance Office
2. Vehicle FFSs
3. Fire pump building