



Independent Assessment of Work Planning and Control for Waste Management and Cleanup Work at the Los Alamos National Laboratory

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Table of Contents

Acronyms.....	ii
Executive Summary	iv
1.0 Introduction.....	1
2.0 Methodology.....	1
3.0 Results.....	2
3.1 Work Planning and Control Institutional Programs.....	2
3.2 Work Planning and Control Implementation.....	5
3.3 Flowdown of Safety Requirements to Subcontractors.....	12
3.4 Contractor Assurance System/Feedback and Improvement.....	13
3.5 Environmental Management Los Alamos Field Office Oversight.....	16
4.0 Best Practices	18
5.0 Findings.....	18
6.0 Deficiencies	19
7.0 Opportunities for Improvement	20
Appendix A: Supplemental Information.....	A-1

Acronyms

AED	Automated External Defibrillator
AIHA	American Industrial Hygiene Association
ALARA	As Low As Reasonably Achievable
BGI	Banda Group International, LLC
CA	Contamination Area
CAS	Contractor Assurance System
CBDPP	Chronic Beryllium Disease Prevention Program
CFR	Code of Federal Regulations
CH-TRU	Contact-Handled Transuranic
CMP	Corrugated Metal Pipe
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
DOP	Detailed Operating Procedure
EA	Office of Enterprise Assessments
ECP	Employee Concerns Program
EMCBC	Environmental Management Consolidated Business Center
ER	Environmental Remediation
ESH&Q	Environment, Safety, Health and Quality
EM-LA	Environmental Management Los Alamos Field Office
EMRB	Executive Management Review Board
FAQS	Functional Area Qualification Standard
FETL	Field Execution Technical Lead
FR	Facility Representative
FY	Fiscal Year
HSP	Health and Safety Procedure
IH	Industrial Hygiene
IS	Industrial Safety
ISMS	Integrated Safety Management System
JHA	Job Hazards Analysis
LL	Lesson Learned
LOTO	Lockout/Tagout
MDPR	Middle DP Road
MOV	Management Observation and Verification
MRB	Management Review Board
N3B	Newport News Nuclear BWXT Los Alamos, LLC
NAAR	New Activity ALARA Review
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
OPEX	Operating Experience
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
OSQS	Organization-Specific Qualification Standard
PPE	Personal Protective Equipment
RBA	Radiological Buffer Area
RP	Radiation Protection
RWP	Radiological Work Permit
SME	Subject Matter Expert
STARRT	Safety Task Analysis Risk Reduction Talk

Acronyms (continued)

TA	Technical Area
TQP	Technical Qualification Program
WCD	Work Control Document
WBGT	Wet Bulb Globe Thermometer
WP&C	Work Planning and Control

INDEPENDENT ASSESSMENT OF WORK PLANNING AND CONTROL FOR WASTE MANAGEMENT AND CLEANUP WORK AT THE LOS ALAMOS NATIONAL LABORATORY

Executive Summary

The U.S. Department of Energy Office of Enterprise Assessments (EA) conducted an independent assessment of work planning and control (WP&C) of Newport News Nuclear BWXT Los Alamos, LLC (N3B) at the Los Alamos National Laboratory in June 2023. This assessment focused on elements of N3B's implementation of the integrated safety management system core functions (define the scope of work, identify and analyze hazards, identify and implement controls, perform work safely within controls, and provide feedback and improvement), with an emphasis on waste management work. Also assessed were the flowdown of safety requirements to subcontractors, the effectiveness of the N3B contractor assurance system, and the Environmental Management Los Alamos Field Office (EM-LA) WP&C oversight.

EA identified the following strengths:

- The N3B industrial safety, industrial hygiene, and radiation protection programs are well documented.
- N3B leaders demonstrated a culture of continuous improvement as evidenced by their conduct of a self-critical programmatic compliance assessment of the integrated work management program against DOE-HDBK-1211-2014, *Activity-Level Work Planning and Control Implementation*, which identified 36 vulnerabilities and gaps in the implementation of the organization's work control programs. While N3B did not enter those items in its issues management system, an immediate compensatory action was taken to improve hazards analysis for low-level activities.

EA also identified weaknesses, including six findings, as summarized below:

- N3B does not implement those occupational medical program provisions in 10 CFR 851, *Worker Safety and Health Program*, appendix A.6 and A.8 that require contractors to: provide the occupational medicine provider with information on, and the opportunity to participate in, worker safety and health team meetings and committees; and provide the occupational medical provider access to information on actual or potential work-related site hazards, job-task and hazard analysis, and other information necessary to effectively implement the occupational medicine program. (Finding)
- N3B and subcontractors did not properly identify and/or analyze some workplace hazards (silica, beryllium, ergonomics, and noise). (Finding)
- N3B did not notify workers of their exposure monitoring results. (Finding)
- N3B has not completed an arc flash risk assessment or ensured that electrical equipment is field marked with a label. (Finding)
- EM-LA has not implemented an effective issues management system. (Finding)
- EM-LA has not implemented an effective lesson learned and operating experience program. (Finding)
- N3B procedures for the assessment of heat stress conditions and controls at remote work sites and lockout/tagout are inadequate.
- N3B and its subcontractors did not always identify hazards and controls, properly post and control radiological contamination areas, perform work in accordance with required hazard controls, ensure

that all required training (i.e., thermal stress awareness and work planning) was completed, or properly categorize issues.

- EM-LA has not established organization-specific qualification standards for all oversight staff or conducted a self-assessment of its employee concerns program.

In summary, N3B self-identified vulnerabilities and gaps in its WP&C program, and EA identified many additional weaknesses. Until the weaknesses self-identified by N3B and identified in this report are addressed and effective corrective actions are completed, N3B's worker safety and health programs will not ensure that N3B workers' health and safety are adequately protected.

INDEPENDENT ASSESSMENT OF WORK PLANNING AND CONTROL FOR WASTE MANAGEMENT AND CLEANUP WORK AT THE LOS ALAMOS NATIONAL LABORATORY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted a work planning and control (WP&C) assessment of Newport News Nuclear BWXT-Los Alamos, LLC (N3B) at Los Alamos National Laboratory. The assessment focused on the work performed by two N3Bs organizations, Contact-Handled Transuranic Waste Management (CH-TRU) and Environmental Remediation (ER), as well as several subcontractors, including Northwind Site Services, LLC, Tech2Solutions, and Banda Group International, LLC (BGI). The ER work takes place at various outdoor remediation areas, and the CH-TRU work is conducted in the Technical Area (TA)-54 waste storage and disposal area, designated as a hazard category 2 nuclear facility. EA conducted the onsite portion of this assessment from June 12-15 and 26-29, 2023.

Consistent with the *Plan for the Independent Assessment of Work Planning and Control of N3B at the Los Alamos National Laboratory, June 2023*, this assessment evaluated N3B's design and the effectiveness of the implementation of the integrated safety management system (ISMS) core functions (define the scope of work, identify and analyze hazards, identify and implement controls, perform work safely within controls, and provide feedback and make improvements) with respect to activity-level CH-TRU and ER waste management work being performed at Los Alamos National Laboratory. The assessment also evaluated the effectiveness of N3B's contractor assurance system (CAS) and its flowdown of requirements to subcontractors. EA also evaluated the effectiveness of Federal oversight by the Environmental Management Los Alamos Field Office (EM-LA).

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which EA implements through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms "best practices, deficiencies, findings, and opportunities for improvement (OFIs)" as defined in the order.

As identified in the assessment plan, this assessment considered objectives and criteria from DOE Guide 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities*, appendix D, *Activity Level Work Planning and Control Criterion Review and Approach Documents with Lines of Inquiry*. EA also used elements of Criteria and Review Approach Document (CRAD) EA-30-07, Rev. 0, *Federal Line Management Oversight Processes*, to collect and analyze data on the EM-LA oversight activities related to WP&C.

In addition, EA used selected objectives and criteria from the following EA-specific CRADs:

- EA CRAD 30-01, Rev. 1, *Contractor Assurance System*
- EA CRAD 30-09, Rev. 0, *Occupational Radiation Protection Program*
- EA CRAD 32-03, Rev. 1, *Industrial Hygiene Program*
- EA CRAD 32-11, Rev. 0, *Control of Hazardous Energy (Lockout/Tagout)*
- EA CRAD 32-12, Rev. 0, *Material Handling and Safety*

- EA CRAD 32-13, Rev. 1, *Electrical Safety*

EA examined key activity-level work control documents (WCDs), such as integrated work documents, work packages, procedures, hazard analysis documents, policies, and training and qualification records, along with other relevant WP&C documents. EA also interviewed key personnel responsible for developing and executing the associated programs and observed 21 onsite work activities. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in Appendix A.

There were no previous findings for follow-up addressed during this assessment.

3.0 RESULTS

3.1 Work Planning and Control Institutional Programs

This portion of the assessment evaluated N3B's WP&C programs and processes at the institutional level that flow down worker safety and health program requirements into WP&C procedures and enable the safe performance of work.

System description N3B-SD100, *Integrated Safety Management System*, adequately addresses safety standards, tailored hazard control, work authorization, and worker involvement, as well as the integrated work management processes for the ISMS core functions as defined in DOE Policy 450.4A, *Integrated Safety Management Policy*. N3B-PD100, *Worker Safety and Health Program*, and N3B-ESH-PLAN-0003, *N3B 10 CFR 851 Compliance Matrix – Worker Safety and Health Program*, provide an adequate framework for flowing down the requirements of 10 CFR 851, *Worker Safety and Health Program*, into implementing safety and health program procedures. The N3B radiation protection (RP) program also includes an adequate radiological work hazard grading process and appropriate program plans, manuals, and procedures to enable the flowdown of 10 CFR 835, *Occupational Radiation Protection*, requirements to the working level.

Further, program description N3B-P300, *Integrated Work Management*, and procedure N3B-AP-P300-1, *Integrated Work Control Process*, adequately define the institutional process for developing a job hazards analysis (JHA), and clearly define the responsibilities of workers, line managers, and subject matter experts (SMEs). N3B-P300 defines “types” to indicate the level of work control documents: type 1 for the highest level of rigor and control using a work package plus detailed step-by-step instructions with integrated hazard control requirements; type 2 requiring a work package and JHA; and Type 3 and 4 (pre-screened activities) for low-hazard work activities that are familiar to the workers.

In March 2023, N3B self-identified many institutional compliance issues in an extensive review of the integrated work management program. N3B's 2023 programmatic compliance assessment of integrated work management identified 36 actions for improvement, including the need for hazard identification and analysis for types 3 and 4 work, work steps or instructions in type 2 work packages, a sitewide general hazard analysis, required attendance at JHA walkdowns, improved WP&C training, and consistent pre-job briefings. N3B demonstrated a culture of continuous improvement regarding worker safety and health through this self-critical assessment.

The N3B CH-TRU and ER organizations have established implementing procedures that partially address institutional WP&C processes. CH-TRU procedures provide some requirements for implementing N3B-AP-P300-1, including work initiation and screening, work planning, scheduling, performance, pre-job briefings, and work closeout. ER relies upon the N3B-AP-P300-1 procedure for most of its WP&C

processes; however, N3B-AP-ER-1002, *Environmental Remediation (ER) Field Work Requirements*, describes only some general hazard controls for field work. The N3B industrial safety (IS), industrial hygiene (IH), and RP programs are well documented. Each of these programs provides appropriate programmatic requirements and procedures to enable proper identification and analysis of IS, IH, and RP hazards and required controls. IS, IH, and RP procedures are detailed, well-written, and appropriate for the types of physical, chemical, biological, and radiological hazards observed at N3B operations and facilities. Several procedures are supplemented with detailed desktop work instructions that provide additional practical guidance to technicians.

The IH exposure assessment program, for example, adequately implements the requirements of 10 CFR 851 and the guidance provided by the American Industrial Hygiene Association (AIHA). N3B procedures for performing IH exposure assessments and IH monitoring and sampling are detailed, well-written, and use recognized exposure and testing methodologies. Desktop instructions for exposure assessments and sampling are well-written, technically adequate, and provide additional guidance to technicians on implementing the exposure assessment process. Sampling plans, sampling and monitoring results, and IH exposure reports are well documented in the Open Range comprehensive tracking system (a standardized industry-wide exposure assessment database).

While N3B self-identified many weaknesses in WP&C institutional programs, EA identified the following additional weaknesses:

- Contrary to 10 CFR 851, appendix A, sections 6 and 8, and N3B-PD100, sections 6.5 and 6.6, N3B does not implement all occupational medicine program requirements. (See **Finding F-N3B-1.**) Non-compliance could result in personnel with occupational exposures not receiving appropriate medical evaluation. The N3B occupational medical program uses outside vendors to provide a range of medical services that typically encompass the medical surveillance required by N3B workers, including beryllium and silica medical surveillances. However, the medical services available to N3B by these occupational medical providers are limited, and do not incorporate some 10 CFR 851 requirements associated with ongoing knowledge of CH-TRU and ER work areas and hazards or planning for medical services. As a result, some of the 10 CFR 851 occupational medicine requirements are not being implemented by N3B, such as:
 - Coordination between IH and the occupational medical professionals as required by 10 CFR 851, appendix A, section 6(c) and N3B-PD100, section 6.5.
 - Access to actual or potential work-site exposures of each employee and workplace hazards to the medical provider as required by 10 CFR 851, appendix A, section 8(d)(1)(iii) and N3B-DI-IHS-0014, *Industrial Hygiene Air, Swipe and Bulk Sampling/Monitoring*. N3B does not routinely provide this data because the medical provider does not offer a review of such data as a service.
 - Ensuring that the contracted medical provider plans and implements the occupational medicine services for the N3B workforce as required by 10 CFR 851, appendix A, section 8(e)(1).
 - Requiring that the contracted medical provider participate in worker protection teams to build and maintain necessary partnerships among workers, their representatives, managers, and safety and health protection specialists as required by 10 CFR 851, appendix A, section 8(e)(2).
 - Verifying that the contracted medical provider has access to and uses hazard information from the worksite to plan and implement occupational medicine services as required by N3B-PD100 section 6.6.

Furthermore, N3B-P102, *Occupational Medicine Program*, does not reflect the current N3B medical program staff and responsibilities and assigns key program responsibilities to an N3B Senior Technical Advisor for the Occupational Medicine Program – a position that does not currently exist.

- Some N3B RP procedures lack the level of detail that may be necessary to support proper implementation. (See **OFI-N3B-1.**) Specifically:
 - Neither N3B P-121, *Radiation Protection*, nor N3B-SOP-RP-0002, *RWP Desktop Instructions*, defines the criteria for selecting between a “job routine” radiological work permit (RWP) and a “job specific” RWP. Consequently, N3B inappropriately developed “job routine” RWPs for ER RWP 23-0008, *Radioactive Sealed Source Handling and Leak Testing*, and CH-TRU RWP 23-0031, *Waste Container Liner Pulls / Drill and Drain*, instead of “job specific” RWPs, even though the work involved complex work entry into areas of higher radiological hazard. DOE-STD-1098-2017, *Radiological Control*, recommends general RWPs (job routine) for entry and repetitive work in areas with known and stable low-hazard radiological conditions, while job-specific RWPs are used for more complex work and for entry into higher radiological hazard areas.
 - N3B has not established RP or WP&C programmatic requirements to ensure integration and specific linkage between RWPs and the WCDs they are intended to control. N3B JHAs do not list the specific RWP for the work scope, and N3B RWPs do not list all applicable WCDs to ensure that workers can self-identify the appropriate RWP for their work. Establishing the linkage between RWPs and associated WCDs is a common approach among other DOE and National Nuclear Security Administration sites.
 - Neither N3B-P-121 nor N3B-SOP-RP-0044, *Air Monitoring*, requires the collection of air sampling data during intrusive ground surface disturbance work. N3B currently determines air sampling requirements based on calculating potential exposures with assumed modeling factors. Other DOE sites that perform outdoor intrusive work using heavy equipment with the potential for ground disturbance in radiologically contaminated areas have more specific requirements and criteria for conducting appropriate air sampling during this type of work, including high- and/or low-volume job-specific air sampling, work area boundary air sampling, and breathing zone air sampling.
 - N3B does not require proficiency demonstrations as part of refresher radiological worker training to ensure that workers remain competent in radiation control practices. While 10 CFR 835 requires Radworker II training to be performed at a periodicity no less than every 24 months, the N3B practical evaluation is a one-time requirement which is less conservative than many DOE sites which require proficiency demonstrations every two years. This weakness is exemplified in section 3.2 of this report, which addresses multiple issues in posting and boundary control.
- The current version of N3B’s lockout/tagout (LOTO) program N3B-P101-3, *Lockout Tagout for Hazardous Energy Control*, does not require periodic (annual) inspection of energy control procedures in accordance with Occupational Safety and Health Administration 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*. Rather, the program requires a “periodic inspection of lock and tag activities,” which involves a physical examination of all installed LOTO devices. (See **Deficiency D-N3B-1.**) Without an annual inspection of written procedures, deviations or other inadequacies may not be discovered and corrected in a timely manner. N3B has prepared a draft revision of N3B-P101-3 that is expected to address this deficiency once implemented.

Work Planning and Control Institutional Programs Conclusions

N3B’s Institutional WP&C description documents are generally adequate, but some procedures omit necessary details to ensure compliance with the institutional requirements. Both the CH-TRU and ER organizations have established implementing procedures that partially address the institutional WP&C processes. The N3B IS, IH, and RP programs are generally well documented. N3B self-identified numerous WP&C institutional compliance issues in a March 2023 review of the integrated work

management safety management program. EA identified additional weaknesses in the areas of occupational medicine program requirements not being compliant with 10 CFR 851, and deficiencies in RP and LOTO programmatic requirements.

3.2 Work Planning and Control Implementation

This portion of the assessment evaluated N3B's and subcontractors' implementation of the WP&C institutional programs for ongoing CH-TRU and ER work through the ISMS core functions of defining the scope of work, identifying and analyzing hazards, developing and implementing hazard controls, performing work within controls, and providing feedback to support continuous improvement.

Defining the Scope of Work

The definition of work scope for observed CH-TRU work performed with detailed operating procedures (DOPs) was adequate to permit the identification of hazards and necessary controls. DOPs N3B-DOP-TRU-2135, *CMP* [Corrugated Metal Pipe] *Retrieval*; N3B-DOP-TRU-2136, *CMP Intra Facility Transfer*; and N3B-DOP-TRU-2161, *CMP SSSR* [Sort, Segregate, and Size Reduction] *Operations*, provided clearly defined work scopes, including detailed precautions and limitations, and adequate work steps to identify IS, IH, and radiological hazards and necessary controls. The JHA for N3B-DOP-TRU-2135 was revised in May 2023 in response to a significant event in September 2022. Also, the observed CH-TRU job planning walkdown review of the work scope definition for the asphalt matting job at pad 10 in TA-54 Area G adequately supported the follow-on job hazards identification tabletop review.

In contrast, the work scope for CH-TRU and ER work performed with a work package, rather than a DOP, is not defined in adequate detail to permit the identification of hazards and necessary controls. The type 2 work packages reviewed by EA did not include work tasks, steps, approaches/processes, and scope boundaries, contrary to N3B-SD100, section 3.4.1. EA confirmed these omissions, which N3B identified in its March 2023 self-assessment, during two observed ER subcontracted jobs. Specifically, the type 2 work packages ER-WP-22-033, *Twomile Canyon Aggregate Area Investigation*, and ER-WP-21-043, *Middle DP Road Phase III*, did not include detailed work steps or instructions.

Identifying and Analyzing Hazards

N3B adequately identified and analyzed most hazards for the observed work. For most type 1 and type 2 work, implementation of the JHA process resulted in appropriate SME involvement and adequate analysis of the task-based hazards associated with the work. The JHA for CMP waste retrieval included adequate information on major job steps/activities; potential hazards (including environmental considerations); control measures; type of hazard control, such as elimination of hazard, engineering, administrative, or personal protective equipment (PPE); and basis/notes. The JHA for the Middle DP Road (MDPR) project, developed by the N3B subcontractor BGI, provided detailed control measures for each identified hazard and adequately identified the type of control elimination and the basis for the control (e.g., BGI procedure).

Radiological hazards associated with observed intrusive radiological work activities were analyzed effectively through the N3B radiological activity review and RWP development processes. For example, a new activity ALARA (as low as reasonably achievable) review (NAAR) was appropriately performed and documented as required by N3B-SOP-RP-0038, *Radiological Activity Reviews*, during the development of -003123-0022, *CMP Retrieval*, and RWP 23-0023, *CMP Size Reduction*. The reviewed NAAR documents appropriately analyze radiological hazards, including the source terms associated with the work tasks, expected work area and contact level dose rates, and expected individual and collective dose estimates. The NAAR documents also provide appropriate radiological controls that were properly

flowed into the job specific RWP to maintain doses ALARA.

IH sampling plans are detailed and provide an effective means for analyzing and quantifying airborne and noise hazards. For example, the *Noise & Silica Sampling Plan for CMP Retrieval in Pit 29* (no document number) provided detailed instructions to sample airborne silica and monitor worker exposures to noise during retrieval operations. Information on the collection of samples, including the identification of sampling media and equipment, was detailed. The plan also adequately cross referenced the applicable IH procedures, established similar exposure groups, and identified the appropriate number of samples to be collected for statistical analysis. In another example, IH developed the *Dome Sampling Plan* (no document number) to investigate and analyze potential off-gases from waste drums located in eight TA-54 waste storage facilities (or domes). The plan was comprehensive and detailed and began with a dome walkdown and preparation of a health hazard risk assessment. A sampling campaign for each dome was described, including a review of the waste composition, chemical volatility, occupational exposure limits, and odor profile associated with suspect hazardous chemicals.

While most hazards were adequately identified and analyzed, EA identified the following weaknesses:

- Contrary to N3B-SD100, section 3.3.5, N3B and some subcontractors did not properly identify and/or analyze some workplace silica, beryllium, ergonomic, and noise hazards. (See **Finding F-N3B-2.**) The lack of hazard identification and analysis can result in unnecessary risk to workers. Specifically:

- Silica hazards were not identified in work documents and/or hazard analyses for some observed work activities that presented a potential silica exposure to workers.

For example, the work package and JHA for the Twomile Canyon Aggregate Area environmental sampling project included abrasive cutting of concrete and asphalt, which is an activity that may generate airborne silica. However, the JHA did not identify the potential silica hazard associated with this activity. In addition, N3B did not identify silica hazards and controls in the safety task analysis risk reduction talk (STARRT) card or discuss silica hazards with workers performing weed mitigation at TA-21.

The N3B ER subcontractor Northwind's respirable silica program, health and safety procedure (HSP)-1134, is inappropriately based on the Occupational Safety and Health Administration (OSHA) construction silica tables when addressing respirable silica hazards and controls. These tables are based on an OSHA permissible exposure level that is two times higher than the DOE-adopted American Conference of Governmental Industrial Hygienists threshold limit values for silica and are therefore not conservative. Because Northwind relies solely on the OSHA construction silica tables, it does not perform the necessary exposure analyses for silica as required by 10 CFR 851.

- The beryllium contamination hazard of an excavator engine compartment observed in use at the Pit 29 CMP removal project was not assessed. Also, the beryllium hazard controls were not in compliance with the N3B chronic beryllium disease prevention program (CBDPP) or communicated to workers during the observed pre-job briefing. During the observed daily pre-use equipment inspection, the excavator hood was raised and fluid levels inside the excavator engine compartment were checked and documented on a pre-use inspection checklist. The excavator was previously used in an ER beryllium area and was partially contaminated.
- Although beryllium decontamination of portions of the excavator had been performed, the engine compartment had not been decontaminated and previously exhibited beryllium surface contamination levels as high as 5 micrograms/100 square centimeters, which is 25 times the CBDPP allowable beryllium surface contamination limit of 0.2 micrograms/100 square centimeters. The beryllium surface contamination hazard and hazard controls required by the CBDPP were not identified in the CMP work document or the JHA. For this work activity, the

following CBDPP requirements were not followed: a beryllium hazard assessment for the engine compartment was not completed; the pre-use inspection work activity was not evaluated for beryllium; the engine compartment was not posted as an accessible beryllium contaminated area; and periodic beryllium sampling has not been performed since the initial beryllium sampling conducted in March 2022 when the 5 micrograms/100 square centimeters surface contamination had been detected.

- Ergonomic hazards for three observed work activities that involved ergonomic risk factors, as defined in N3B-P101-1, *Ergonomics*, were not evaluated prior to work. First, the hand auguring work performed by the ER subcontractor Northwind at the Twomile Canyon Aggregate Area project involved working in an awkward position with the neck bent more than 30 degrees for more than 2 hours per day. Also, at the same project, a single worker lifted a weight greater than 80 pounds multiple times daily. Finally, the vegetation control work activity performed by N3B maintenance workers at TA-21 required workers to use a gas-powered weed cutter involving the same repeated motion with the neck, shoulders, elbows, wrists, and hands for more than two hours per day.
- Potential noise hazards for three observed work activities were not identified in work documents and JHAs or analyzed. First, ER subcontractor Tech2Solutions has not performed an exposure assessment for generator noise associated with the TW2-A groundwater sampling activity at Pueblo Canyon. Also, Northwind employees working at the Twomile Canyon Aggregate Area project using high-noise equipment, such as concrete saws, a powered auger, and generators, have not been properly evaluated for inclusion in Northwind's hearing conservation program. Finally, noise exposure monitoring (i.e., noise dosimetry) for N3B ER maintenance workers performing weed mitigation at TA-21 has not been conducted to verify the adequacy of the prescribed hearing protectors.
- Contrary to N3B-AP-P300-1, sections 5.0 and 10.0, N3B and subcontractors did not correctly classify a work activity or identify hazards in four hazard control documents. (See **Deficiency D-N3B-2.**) Incorrect classification of work can result in the inappropriate identification, analysis, and control of hazards. Specifically:
 - The TW2-A groundwater sampling activity at Pueblo Canyon was incorrectly classified as type 3 work by ER subcontractor Tech2Solutions. The groundwater sampling procedure N3B-SOP-ER-3003, *Groundwater Sampling*, stated that this activity was moderate-hazard work rather than low-hazard work. According to N3B-AP-P300-1, this activity should have been classified as type 2 work, requiring a work package with a supporting JHA.
 - Hazards for the TW2-A groundwater sampling activity at Pueblo Canyon included biological hazards (bears, snakes, stinging insects, ticks), but Tech2Solutions did not identify such hazards on the STARRT card.
 - The STARRT card for weed mitigation by N3B maintenance workers at TA-21 identified "hearing protection" but did not specify the type of hearing protectors or when double hearing protectors were required. Also, the STARRT card did not identify "face shields" for weed mitigation in the PPE section. Face shields were worn by all five observed workers, but two of those workers had their face shields lifted. The interviewed safety officer and N3B management had conflicting understandings of whether face shields were a requirement or voluntary.
 - During the observation of CMP retrieval at Pit 29, N3B worker visibility was obscured during wind gusts prior to winds reaching the 20 miles per hour work suspension limit. The JHA for N3B-DOP-TRU-2135 did not include the potential hazard associated with limited visibility due to windblown dust and debris.

- Implementation of the STARRT card process for type 3 or 4 work activities has not ensured that hazards are identified or that controls are adequately defined and implemented. A compensatory action (timely order) requiring the use of a STARRT card before the performance of any type 3 or type 4 work was implemented on June 12, 2023. However, N3B did not train workers on the STARRT card process prior to the timely order, and N3B Environment, Safety, Health & Quality (ESH&Q) SMEs are not required to be involved with the completion of STARRT cards. (See **OFL-N3B-2.**)

Developing and Implementing Hazard Controls

Hazard controls were generally effectively developed and implemented for type 1 and type 2 WCDs and hazard-specific permits (e.g., RWPs). DOPs N3B-DOP-TRU-2135 and N3B-DOP-TRU-2161 included appropriate precautions and limitations consistent with the hazards identified in the JHA. The procedure work steps also contained appropriate warning steps for various hazards that would be present at each work step.

EA noted appropriate use of the hierarchy of controls (engineered, administrative, and PPE) during the observed CH-TRU work. For example, N3B CH-TRU personnel implemented extensive and appropriate engineered controls for the observed higher-hazard CH-TRU radiological work. Specifically, the CMP SSSR work was adequately planned and is being performed in an engineered structure (permacon) inside a large dome. The permacon contains appropriate controls to minimize the potential for any airborne radioactivity during cutting operations. RWP 23-0023, which governs this work, was effectively arranged by work tasks and provided the required information on expected radiological conditions, dosimetry and PPE requirements, hold points, and limiting conditions. N3B appropriately practiced performing this work in a mockup using clean CMPs for several months before receiving authorization from EM-LA to start working with contaminated CMPs.

IH and safety hazard controls in type 1 and type 2 work documents are generally well developed and consistent with the hazard controls identified in the JHA. IS and IH hazard controls for CMP removal and drum mining and retrieval in Area G were adequately described in the type 1 work package. Hazard controls in the BGI JHA for the MDPR project (type 2 work package) were detailed and specific.

Hazard controls were effectively developed for critical lifts and high hazard equipment use. For cranes and high-hazard equipment, N3B requires and effectively uses critical lift plans that are integrated into WCDs, as observed during the retrieval of CMP containers using a telehandler in TA-54 and the crane lift of transuranic waste containers into casks for transport to the Waste Isolation Pilot Plant.

While N3B has developed and implemented many hazard controls effectively, EA identified the following weaknesses:

- Contrary to 10 CFR 851.20(b)(3) and (b)(4); 29 CFR 1926.1153(d)(2)(vi), *Employee notification of assessment results*; and N3B-DI-IHS-0014, *Industrial Hygiene Air, Swipe and Bulk Sampling/Monitoring*, section 5.5.2, N3B does not notify all workers of their exposure monitoring results, as identified in two reports issued during 2019 and 2022. (See **Finding F-N3B-3.**) Not providing workers with their exposure monitoring results is not in compliance with 10 CFR 851 and precludes an individual's ability to seek additional medical consultation. Two reviewed airborne silica and dust sampling reports (a 2019 report for four workers, and a 2022 report for seven workers) identified worker exposure results; all but two exposures were below occupational exposure limits. However, N3B did not ensure that any of these workers were notified of their exposure results, which was not in accordance with the following requirements:

- 10 CFR 851.20(b)(3) requires that workers be notified when results indicate that the worker was overexposed to hazardous materials.
- 10 CFR 851.20(b)(4) states that a worker has a right to observe monitoring or measuring of hazardous agents and to receive the results of their own exposure monitoring.
- 29 CFR 1926.1153(d)(2)(vi) requires that the results of an exposure assessment for silica be provided to each affected employee within five days after completing an exposure assessment.
- N3B-DI-IHS-0014, section 5.5.2 requires a written notification to affected workers with findings and recommendations following personal air monitoring.
- Contrary to National Fire Protection Association (NFPA) 70E-2015, *Standard for Electrical Safety in the Workplace*, sections 130.5 and 130.5(D), N3B's electrical configuration management is not complete. The N3B electrical department has not completed an arc flash risk assessment or ensured that electrical equipment that is likely to require servicing, such as switchboards, panel boards and industrial control panels, have been field marked with a label in all their facilities. Approximately 20% of the electrical system assessments have been completed, and the staffing available to conduct configuration management of the electrical system is limited. (See **Finding F-N3B-4.**) Non-compliance could result in employee exposure to electrical shock and/or arc flash if they rely solely on old arc flash label information and do not follow their electrical safety or lockout tagout programs which require an electrical risk/hazard assessment to implement conservative controls when performing electrical work.
- Contrary to N3B-SD100, section 3.3.3, N3B has not ensured that work planners completed training commensurate with the work they perform. (See **Deficiency D-N3B-3.**) A lack of training for work planners could result in inadequate scope determination, missed or unanalyzed hazards, inadequate hazard controls, and work packages that are difficult to execute. N3B-QS-TRU-024, *N3B Work Planner*, the work planner qualification standard, has been assigned to all five CH-TRU work planners. The qualification standard includes a core training course for work planners, CW-2022-0011, *Work Planner Fundamentals*. This course is not yet available, so none of the CH-TRU work planners have completed the qualification standard. One ER work planner is qualified through an exception request.
- Contrary to N3B P-121, table 7, and N3B-SOP-RP-0004, *Posting and Labeling*, N3B did not properly post and control the CMP work area as a contamination area (CA). (See **Deficiency D-N3B-4.**) Not properly posting CAs can result in the spread of contamination to clean areas. Specifically:
 - During one CMP work observation, the Pit 29 work area was incorrectly posted as a radiological buffer area (RBA) (a clean area) in contrast to RWP 23-2022, task 2, which describes the work task as "CMP Retrieval Activities for expected contamination area and radiation area values." EA discussed this issue with N3B RP management, who agreed with the concern and committed to having it corrected.
 - During a subsequent work observation, this concern persisted, and some other weaknesses were identified. Specifically, most of Pit 29 remained improperly posted as an RBA, which did not reflect the actual RWP task work conditions. When workers donned their PPE and entered the work area through a single CA posting entrance, the signage attached to a chain barrier was left on the ground and was not replaced for the duration of the job. As a result, the only visible posting for the work area entry/exit location was an RBA posting a few feet before the CA posting that had been left on the ground. The overall configuration of the CA entry area was inadequate because it lacked sufficient space and design for workers to doff their PPE before stepping from a properly posted CA exit point into a separately posted RBA. When EA again informed N3B RP management of these issues, the RP management undertook appropriate corrective action to properly reconfigure and post the entire area for subsequent work evolution.

A contributing factor to these weaknesses may have been the lack of required periodic proficiency demonstrations as part of routine Radworker II training requirements (discussed in section 3.1).

- Contrary to N3B-POL-ESH-0005, *Thermal Stress Program*, section 3.2.3, N3B ER has not established an effective means to assess and communicate heat stress conditions and controls at remote work sites. (See **Deficiency D-N3B-5.**) Ineffective communication of such conditions and controls could result in heat stroke or other heat disorders. N3B-POL-ESH-0005, section 3.2.3, requires establishing work/rest regimens based upon wet bulb globe thermometer (WBGT) instrument values. At an ER drill pad construction site, EA observed that the N3B work crew had no WBGT instrument for determining heat stress conditions although temperatures were approaching the N3B criteria requiring a limited work/rest regimen based on WBGT instrument data. An ER subcontractor representative from Northwind explained that they rely on ambient dry bulb temperature measurements instead of evaluating heat stress using a WBGT instrument. This issue is of particular concern due to the heat stress event that occurred during a CH-TRU work activity at TA-54 in September 2022. While CH-TRU management responded with corrective actions to address the mechanism for communicating heat stress conditions to work groups (e.g., the issuance of a heat stress standing order), the ER organization did not have a similar response.
- Contrary to N3B-AP-ER-1002, section 4, N3B ER did not ensure that general field workers were trained on thermal stress awareness. (See **Deficiency D-N3B-6.**) Without this training, workers may not be aware of heat stress symptoms, how to prevent heat stress, and what to do if heat stress symptoms occur. N3B-AP-ER-1002 requires curricula 9433, including course 18649, *Thermal Stress Awareness*, to be assigned to all designated field personnel, including subcontractors. Five reviewed training reports (four N3B ER employees and one subcontractor) showed that training course 18649 was not listed, so supervisors cannot confirm that workers are up to date on this important training. The N3B training manager explained that when training class 18649 was last updated about six months ago, the old version was removed from curricula 9433, but the new version was inadvertently not added. In response, N3B researched this issue and identified 19 N3B employees and 14 subcontractors who were not assigned the *Thermal Stress Awareness* training course and began to address corrective actions.
- Contrary to N3B-P101-7, *Vehicle and Pedestrian Safety*, section 3.2, N3B ER is not completing the appropriate equipment safety inspection checklist form when performing daily pre-use inspections of heavy equipment. (See **Deficiency D-N3B-7.**) N3B-P101-7, section 3.2, requires an inspection of a vehicle before each operation, and documentation of the inspection results on checklist form N3B-Form-6463, *Equipment Safety Inspection and Repair Report*. However, during an observed daily equipment inspection of a grader at the ER Drill Pad R-80, the ER equipment checklist used in performing the inspection was a generic equipment inspection form rather than the required form. The generic form did not incorporate the daily checklist items specified by the manufacturer, such as validating the operation of the air conditioning system in the equipment cab (a corrective action from the investigation of the heat stress event in September 2022); checking the engine shields, the fire extinguisher, and the pedals for movement; and inspecting the grill and radiator system. Additionally, after the 2022 heat stress event, the CH-TRU organization developed a daily heavy equipment inspection form that incorporated manufacturer recommendations; however, the ER organization does not use this form. Using a checklist form that does not incorporate manufacturer recommendations to record daily pre-checks of heavy equipment could cause important equipment checks to be missed, resulting in injuries to operators and nearby workers.
- Contrary to N3B-SD100, section 3.3.5, N3B has not developed hazard controls to limit worker exposures to potentially hazardous gaseous emissions from waste drums stored in seven of eight CH-TRU domes. (See **Deficiency D-N3B-8.**) Exposure to unanalyzed hazardous gases could result in adverse health effects for workers. In May 2023, several N3B workers performing a Resource

Conservation and Recovery Act inspection of hazardous waste drums in Dome 230 experienced odors and health effects requiring medical attention as a result of gaseous emissions from waste drums. As a result of this event, a standing order was issued requiring that an IH professional perform a survey for volatile organic compounds before any worker enters Dome 230. However, the waste drums stored in Dome 230 are similar to waste drums stored in seven other domes for which volatile organic compound monitoring prior to entry is not required (e.g., Dome 232); work continues in these domes.

- During drum mining (retrieval) work in posted radiation areas in domes 29 and 30, EA observed that there was no systematic mechanism in place to ensure that workers were properly informed of the locations in the domes where the highest radiation levels existed. The observed pre-job briefing did not include any discussion of radiation levels in the work areas, as would be required for radiological work covered by an RWP. Also, no radiological survey maps with dose rates were posted at dome entry points; in the past, such survey maps were routinely posted in Area G domes. N3B-P-121 does not require an RWP for radiation area work if workers are trained to N3B-AP-TRU-1003, *Facility Radiation Protection Requirements* for TA-48.

Performing Work Within Controls

Planned work is appropriately authorized and released, and the observed CH-TRU pre-job briefings were generally effective. EA observed daily plan-of-the-day meetings and daily work authorization meetings, which appropriately authorized and released work. The observed CH-TRU pre-job briefings were comprehensive and used a checklist that covered work scope, hazards, and controls relative to the tasks of the day, including critical work steps and possible plan deviations. Reverse briefing techniques were also employed effectively.

The observed work was generally performed in accordance with established controls. EA observed comprehensive radiological control technician coverage during CMP retrieval work and ER soil sampling operations, and the reviewed radiological survey and sampling reports were documented effectively. Interviews, observations, and reviewed documents demonstrated that N3B industrial hygienists are actively involved in the planning, pre-job briefings, and support of CMP retrieval and drum mining work activities. Work observed at the MDPR project was appropriately performed within controls defined in the JHA for the work activity. Subcontract work observed to re-skin Dome 49 was well controlled, and all workers on site had current required training. Also, the associated lockout of electrical energy to conduct work on a conduit was adequately performed in accordance with the controls identified on the STARRT card and consistent with N3B-P101-3 and N3B-P101-13, *Electrical Safety Program*.

Stop/pause work is well understood, and work activities were appropriately paused when necessary. Stop/pause work authority is appropriately emphasized throughout the WP&C processes, and the interviewed workers were aware that they had this authority. When a potential silica exposure hazard was identified at Pit 29, work was appropriately paused for over two days while the worksite and potential hazard were evaluated. In response to EA's observations of improper radiological boundary controls and postings, N3B RP management appropriately paused CMP waste retrieval activities. When a suspect electrical conduit was identified in Dome 54, work was paused while the circuit was locked out.

The observed excavation work was conducted within defined controls. N3B used a third-party SME effectively to ensure that the CMP Pit 29 excavation was properly designed, that the proper controls were incorporated into the WCDs, and that competent persons were used for inspections. The reviewed daily excavation inspection forms demonstrate that a competent person reviewed the excavation each day for evidence of possible cave-ins. The interviewed competent persons and the inspector demonstrated knowledge of excavation hazards and proficiency in their assigned duties.

While most observed work was performed within controls, EA identified the following weaknesses:

- Contrary to N3B-SD100, section 3.4.4, N3B and Northwind employees did not perform some observed work in accordance with required hazard controls. (See **Deficiency D-N3B-9.**) Not performing work within controls poses unnecessary risks to workers. Specifically:
 - Six N3B maintenance workers were observed performing weed mitigation before water was sprayed in the area for dust control, contrary to the applicable STARRT card. Water spraying occurred about an hour after the work activity had begun, even though some dust clouds had been present. The IH professional at the job site also identified this issue and paused the job. As discussed above in the Identifying and Analyzing Hazards section, IH sampling of this type of activity performed without water spraying in 2019 identified two workers who exceeded the occupational exposure limit for silica.
 - Two N3B ground workers in the CMP retrieval pit 29 were observed not wearing high visibility vests while working near an excavator, contrary to the JHA.
 - A subcontracted Northwind worker at the Twomile Canyon Aggregate Area project was observed lifting and moving steel plates weighing approximately 80 pounds each, exceeding the 50-pound limit specified for a one-person lift in the Northwind JHA. The same worker was observed hand augering while not in an upright position, contrary to the Northwind JHA. Also contrary to the Northwind JHA, numerous trip hazards were observed at this project, including three uncovered holes.
- Two pre-job briefings were observed that were not fully effective. During a pre-job briefing for the Twomile Canyon Aggregate Area project, Northwind did not discuss all relevant hazards associated with the work to be performed (e.g., heat stress, potential physical fatigue, or ergonomic issues associated with hand auguring). During a CH-TRU pre-job briefing for CMP retrieval, two workers left for 5 to 10 minutes without informing the person in charge, but subsequently signed onto the pre-job briefing sheet and were observed conducting hands-on work.

Work Planning and Control Implementation Conclusions

N3B WP&C implementation is partially effective, with more rigor applied to the CH-TRU nuclear activities in the areas of work scope definition, hazard control selection, and pre-job briefings. Planned work was appropriately authorized and released, and observed work was performed without incident and generally in accordance with established controls. Workers understood their stop/pause work authority and paused work when necessary. However, N3B did not properly identify and/or analyze some workplace industrial hygiene hazards and does not notify all workers of their exposure monitoring results. Weaknesses were identified in the areas of electrical safety, training, posting and controlling CAs, assessing heat stress conditions, inspections of heavy equipment, and potential hazardous gaseous exposure to workers. Some observed work activities were not performed in accordance with required hazard controls.

3.3 Flowdown of Safety Requirements to Subcontractors

N3B adequately flows down 10 CFR 851 requirements to subcontractors. The flowdown of safety requirements to subcontractors is described in N3B-PD100 and N3B-P101-12, *ES&H Requirements for Subcontractors*. The worker safety and health program requirements are properly flowed down to subcontractors through the procurement processes. N3B-P840-1, *Technical Requirements for Procurement of Goods and Services*, appropriately requires exhibit F, *Environmental, Safety and Health Requirements*, to be developed by ESH&Q and attached to each subcontract requisition. Exhibit F appropriately flows down 10 CFR 851 requirements, responsibilities, and accountability that apply to

subcontracted work, and requires N3B ESH&Q to verify that subcontractors have a suitable safety history and programs in place before contracts are awarded. N3B-P300 appropriately states that it is applicable to all work activities managed and performed by N3B and is implemented and flowed down to subcontractors in accordance with the detailed requirements of N3B-AP-P300-1.

N3B provides some oversight of subcontractors using subcontract technical representatives, who focus on contractual obligations, and field execution technical leads (FETLs), who focus on work performance. EA observed one FETL attending a pre-job briefing at the work site and he displayed an adequate knowledge of the work performance and safety requirements. However, the N3B oversight for the ER subcontractor work was potentially inadequate due to the lack of training and the number of issues identified during this assessment. The training records for the three FETLs responsible for oversight of the observed subcontracted work showed they were delinquent in required training, such as hazardous waste operations (HAZWOPER), electrical safety, hearing conservation, PPE, pause/stop work, cardiopulmonary resuscitation (CPR)/first aid, and N3B-AP-ER-1002.

Contrary to N3B-P101-7, N3B subcontractors use their own safety and health programs, which are not always as stringent as N3B's programs. (See Deficiency **D-N3B-10**.) Following less stringent safety protocols than required by contract or regulation exposes employees to adverse health hazards. For example, Northwind uses its own program for determining when first aid or automated external defibrillator (AED) is required. N3B-P101-7 requires the presence of an AED in vehicles where it would take more than three to four minutes to get medical attention. HSP-1139, *First Aid and Medical Services*, states that Northwind will evaluate the requirement on a case-by-case basis. The work in the Twomile Canyon Aggregate Area is often remote, and the Northwind onsite safety representative stated that they do not have AEDs in their trucks.

Flowdown of Safety Requirements to Subcontractors Conclusions

The worker safety and health program requirements are properly flowed down to subcontractors through the procurement processes including the use of exhibit F, *Environmental, Safety and Health Requirements*. N3B provides some oversight of subcontractors, however, not all FETLs have completed the required training needed to oversee safety and health in the field. Also, contrary to N3B requirements, some N3B subcontractors use their own safety and health programs, which are not always as stringent as N3B's programs.

3.4 Contractor Assurance System/Feedback and Improvement

This portion of the assessment evaluated the N3B CAS program, assessments, issues management, and performance review and feedback and improvement.

Contractor Assurance System Program

N3B has appropriately established an approved CAS. The N3B CAS was established as required under List B (*List of Applicable DOE Directives*) of DOE Contract 89303318CEM000007. EM-LA approved the N3B CAS description document on April 18, 2018. N3B CAS-related directives (e.g., CAS description, issues management, and employee concerns) are currently being revised because many of the existing documents are still the "blue sheeted" requirements that were used by the previous contractor.

Assessments

N3B conducts generally adequate independent and management assessments, and management observation and verifications (MOVs). N3B-P328-3, *Management and Independent Assessments*, and

N3B-P328-4, *Management Observation and Verification*, provide adequate processes and requirements for conducting assessments and workplace observations. The two most recent integrated assessment schedules were appropriately prepared and shared with EM-LA.

In fiscal year (FY) 2022, N3B conducted 103 assessments, 38 (37%) of which were related to WP&C. Of those 38 assessments, 22 appropriately involved activity-based work observations. N3B performs many MOVs with 1,044 completed in 2022. MOVs are not generally critical or rigorous, but serve to promote management presence and interaction in the field.

Fourteen reviewed assessments (11 management assessments and 3 independent assessments) demonstrated generally self-critical evaluations, with identified findings, deficiencies, and OFIs. These issues were appropriately managed through the issues management system (iCAS module of the Devonway system), which identified various corrective actions. Two of the 14 reviewed assessments (*Management Assessment of Lessons Learned*, 9/9/2022, and *Independent Maturity Assessment of N3B CAS*, 6/9/2023) were robust with findings, OFIs, and recommendations that if implemented will improve and enhance the N3B CAS program.

N3B appropriately established an enterprise risk management program to assess organizational risk and brief the Executive Management Review Board (EMRB). N3B Mission Assurance/CAS separately identifies and prioritizes assessments for management approval and periodically briefs the EMRB on CAS metrics. However, N3B does not integrate the efforts of the CAS and EMRB teams to inform risk-based selection of assessments; the CAS organization currently collects risk information through informal meetings with line management. (See **OFI-N3B-3**.)

N3B does not perform periodic independent assessments and benchmarking that would provide useful information to the EMRB in the areas of lessons-learned (LL) implementation, issue categorization, and effective use of the action tracking and issues management modules in the issues management system. There are currently no planned N3B assessments to determine how well applicable LLs related to WP&C are analyzed, shared, accepted by line management, and subsequently implemented in applicable WCDs. In addition, there have been no periodic assessments to determine how well issues are being categorized in accordance with N3B-P322-4, *Issues Management*, and to determine whether the action tracking module is being used to track actions that should be tracked under the issues management module. (See **OFI-N3B-4**.)

Issues Management

N3B processes provide a systematic approach to event and issue causal analysis, development of corrective actions, and tracking of corrective action status. N3B-P322-4, *Issues Management*, and N3B-P322-3, *DOE Occurrence Reporting and Processing of Operations Information (ORPS)*, provide generally adequate requirements for managing events, issues, extent-of-condition reviews, corrective actions, effectiveness reviews, OFIs, and lessons learned. The issues management system effectively supports tracking of issue/event causal analyses, extent-of-condition reviews, corrective action completion, LLs, and effectiveness reviews. Two reviewed Occurrence Reporting and Processing System (ORPS) reports in the issues management system demonstrated adequate causal analyses, extent-of-condition reviews, corrective action development, corrective action completion, and effectiveness reviews. N3B appropriately uses the EMRB to perform contractor assurance performance reviews (similar to a Corrective Action Review Board at other sites) consisting of senior managers to approve, monitor, and track significant corrective actions. However, the following weaknesses were identified:

- Contrary to DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, attachment 1, section 2.b.(3)(b), N3B has not implemented an “issues management process that is

capable of categorizing the significance of findings based on risk and priority and other appropriate factors.” (See **Deficiency D-N3B-11.**) Improper categorization of issues may result in ineffective causal analysis and corrective action oversight by senior management. EA determined that 18 of the last 47 issues (prior to 6/15/2023) that the Issues Screening Team screened as “low significance” actually met the general “moderate significance” criteria provided in N3B-P322-4, table 1.

- The desktop instruction guide provided to members of the Issues Screening Team does not include specific guidance on the graded approach to issue categorization or EMRB-approved examples for each of the three issue significance levels (high, moderate, low). (See **OFI-N3B-5.**)
- Contrary to N3B-DI-QAT-0002, *Desktop Instruction for Issues Management Screening*, step 3a, N3B participants in an observed Issues Screening Team meeting did not include analysis or discussion as to whether any of the issues being reviewed were repetitive issues. (See **Deficiency D-N3B-12.**) Analysis of repetitive issues can support the identification of systemic weaknesses.
- Contrary to N3B-CHR-QAT-0001, *N3B Quality and Contractor Assurance Performance Review Charters*, section 2.0, N3B participants in an observed EMRB CAS performance review meeting did not address overdue corrective actions and causal analyses or mitigating actions. (See **Deficiency D-N3B-13.**) Untimely corrective actions and causal analyses inhibit the ability to mitigate the potential for repeated events that could jeopardize personnel safety and mission accomplishment.
- Contrary to N3B-PD100 and N3B-SD320, *Contractor Assurance System*, N3B personnel did not enter 36 issues identified during the N3B safety management program assessment of WP&C into the issues management system. When informed by EA of this issue, N3B entered the issues and corresponding corrective actions into the issues management system to revise N3B-P300 and N3B-AP-P300-1 to resolve the gaps identified in the N3B March 2023 assessment of integrated work management (IM-2023-0438-01).
- N3B does not document objective evidence of management actions to approve corrective action plans, extent-of-condition reviews, and effectiveness reviews, and to authorize event/issue closure in the issues management system. Although the EMRB charter specifically addresses the requirement for meeting minutes, no formal minutes are recorded. CH-TRU/ER Management Review Board (MRB) formal minutes are documented but are not provided to the Mission Assurance/CAS organization for applicable entry into the issues management system. (See **OFI-N3B-6.**)
- N3B does not adequately communicate safety issues across the entire organization. (See **OFI-N3B-7.**) For example:
 - An extent-of-condition review concerning beryllium postings (N3B-IM-2022-0252-03) was performed by the CH-TRU organization, but was not shared with the ER organization, which also operates similar heavy equipment.
 - The CH-TRU organization identified a concern that pre-operational heavy equipment inspections were too generic and did not reflect equipment manufacturer requirements for pre-use inspections. The concern was documented in the issues management system and corrective actions were implemented. However, ER did not implement the corrective actions, and similar concerns were identified by EA during the ER work observations, as discussed in section 3.2.
 - After the heat stress event in September 2022, CH-TRU issued a standing order for supplemental heat stress control observations. ER did not issue a similar standing order, even though both organizations have similar heat stress risks, as discussed in section 3.2.

Performance Review and Feedback and Improvement

N3B has generally adequate processes and tools for performance review and sharing of LLs. Periodic performance reviews and reports include effective weekly CAS metrics, EMRB dashboard, monthly performance reports, and quarterly performance reports. N3B-P323-1, *Operating Experience and Lessons Learned*, provides adequate direction on collecting and distributing LLs. Applicable DOE OPEX LLs and local LLs are appropriately distributed throughout the N3B organization. Five reviewed LL bulletins, which were prepared and distributed with input from the N3B Safety Action Team, were well written and easy to understand. However, N3B has not identified a specific set of leading and lagging WP&C performance metrics. (See **OFI-N3B-8**.)

Contractor Assurance System/Feedback and Improvement Conclusions

N3B has an approved CAS program and conducts a generally adequate set of independent and management assessments. N3B provides a systematic approach to event and issue causal analysis, development of corrective actions, and tracking of corrective action status. The issues management system effectively supports tracking of issue/event causal analyses, extent-of-condition reviews, corrective action completion, LLs, and effectiveness reviews. N3B has generally adequate processes and tools for performance review and sharing of LLs. However, weaknesses were identified in assessments, implementation of the issues categorization process, EMRB CAS performance reviews, communication of safety-related issues across the entire N3B organization, and identification of a specific set of leading and lagging indicators for monitoring WP&C performance.

3.5 Environmental Management Los Alamos Field Office Oversight

This portion of the assessment evaluated EM-LA's WP&C oversight of N3B, as well as specific EM-LA programs, including issues management, the technical qualification program (TQP), the employee concerns program (ECP), and the LL and OPEX programs.

Oversight

EM-LA has developed a generally adequate oversight program that is described in EM-LA-PR-02.02.14, *Oversight Activities Processing and Controls*. Facility Representatives (FRs) and SMEs conduct and document routine operational awareness activities, planned assessments, surveillances, shadow assessments, and ORPS reviews, and they attend meetings and work observations. EM-LA documents routine operational activities on surveillance reports using form 02.02.14-14-F4. Planned assessment reports were generally complete and clearly written. However, multiple surveillance reports did not provide sufficient supporting evidence for the assigned performance rating or review category, and many fields contained very little or no information. EM-LA had identified this discrepancy and entered it in its Action Tracking System.

EM-LA conducted a self-assessment of the FR program in February 2022 and identified a FR staffing shortage. The EM-LA FR program has not been fully staffed over the last five years. The most recent analysis in 2023 showed that EM-LA is short two FRs. Additional vacancies in the Office of Operations, Health, Safety and Security (OHSS) include one industrial hygienist, one safety system oversight engineer, and one nuclear safety specialist. The FR and SME vacancies have impacted EM-LA in completing oversight activities, with some assessment activities pushed forward to other quarters or cancelled. The EM-LA FY 2022 oversight scorecard showed that EM-LA had completed 9 of 30 contractor assessments; 8 of 16 EM-LA self-assessments; 3 of 6 EM-LA management assessments; and 33 of 66 EM-LA shadow assessments of N3B. The FY 2023 scorecard to date shows that EM-LA has completed 3 of 18 EM-LA contractor assessments; 3 of 15 EM-LA self-assessments; and 2 of 3 EM-LA

management assessments. The OHOSS Director has taken steps to address the vacancies, including posting on the USA jobs website and actively recruiting and soliciting resumes. In the meantime, technical assistance contract support is used to supplement the FR program.

Issues Management

EM-LA has not implemented an effective issues management process. EM-LA completed a self-assessment of its issues management program, including a review of its issues management procedure EM-LA-PR-2.03.05, *Issues Management*, and identified findings and areas for improvement. The issues that EM-LA identified include inconsistencies and conflicts within EM-LA-PR-2.03.05 and EM-LA-PR-02.02.14, improper classification of issues (findings, OFIs, deficiencies), and the overall quality of assessment and surveillance reports. EA identified that procedure EM-LA-PR-2.03.05 does not reflect current practices as the EM-LA organizational structure has changed and responsibilities have shifted, and some actions are not performed as written. Contrary to DOE Order 226.1B, sec 4.b.4 and procedure EM-LA-PR-2.03.05, EM-LA does not track issues, review corrective actions, verify closure, and trend issues to support a risk-informed approach in developing the integrated assessment schedule. (See **Finding F-EM-LA-1**.) Not tracking and trending issues could result in missing high-risk activities for assessments, and not verifying corrective actions could result in controls not being implemented.

Technical Qualification Program

EM-LA has established and implemented a generally effective TQP meeting the requirements of DOE Order 426.1B, *Department of Energy Federal Technical Capabilities*. EM-LA-PR-0-1 R.2, *Technical Qualification Program*, appropriately documents EM-LA's process, roles and responsibilities, maintenance of organization-specific and any job-specific qualification standards, and timelines for completion of qualification. Review of training records and the progress tracker, along with interviews with both the EM-LA Training Specialist and oversight staff, demonstrated that the EM-LA Training Specialist manages the TQP effectively and tracks the progress, completion status, and continuing training requirements for TQP participants. As required by DOE Order 426.1B, EM-LA completed a self-assessment of the EM-LA TQP in June 2022 but did not identify the lack of an organization-specific qualification standard (OSQS) for non-FR oversight staff assigned functional area qualification standards (FAQSs). Contrary to DOE Order 426.1B, section 4.d.(3), not all personnel who are assigned FAQSs are assigned an OSQS. (See **Deficiency D-EM-LA-1**.) Personnel who are not assigned an OSQS may not get site- or facility-specific knowledge for effective oversight.

Employee Concerns Program

EM-LA has a generally effective ECP through a service-level agreement with the Environmental Management Consolidated Business Center (EMCBC) to provide ECP services. The EM-LA ECP manager works remotely and periodically visits the site as needed. The ECP is well advertised, and the annual ECP notice is issued by the EM-LA manager. The ECP manager appropriately logs, tracks, and processes employee concern cases and submits required reports to the Headquarters ECP Director in the Office of Environment, Health, Safety and Security, as required by DOE Order 442.1B, *Department of Energy Employee Concerns Program*. In the last three years, there were 14 formal cases: 8 Federal and 6 N3B ECP cases. The ECP manager completed an assessment of N3B's ECP and identified several issues that led to N3B updating its ECP. The DOE ECP Director completed an assessment of EM-LA's ECP on March 23, 2023, and the report is under development. Although the ECP manager manages the ECP effectively, EA identified the following weaknesses:

- Contrary to DOE Order 442.1B, appendix A, EM-LA has not conducted a self-assessment of its ECP. (See **Deficiency D-EM-LA-2.**) Self-assessments provide valuable information on program implementation effectiveness and identify areas for improvement.
- The EMCBC ECP description, as written, does not include specific EM-LA information for an ECP implementation plan as required by DOE Order 442.1B, appendix A. (See **OFI EM-LA-1.**)
- The Field Office ECP is not in reasonable geographic proximity to Federal and contractor employees at the site in accordance with DOE Order 442.1B sec.4a.2. (See **OFI-EM-LA-2.**)

Lessons Learned and Operating Experience Programs

EM-LA has not fully implemented effective LL and OPEX programs. The EM-LA Site Manager designated an EM-LA OPEX coordinator in September 2022. However, the OPEX coordinator has not taken any actions regarding the LL and OPEX programs. Contrary to DOE Order 210.2A, *DOE Corporate Operating Experience Program*, and EM-LA-PR-2.02.04, *Operating Experience*, EM-LA does not adequately develop, share, and implement LLs through the LL and OPEX programs and has not completed an assessment of the N3B LL and OPEX programs. (See **Finding F-EM-LA-2.**) Not fully implementing LL and OPEX programs and sharing LLs prevents valuable information from past events from being used as learning opportunities.

Environmental Management Los Alamos Field Office Oversight Conclusions

EM-LA has a generally adequate oversight process for Federal oversight of N3B. EM-LA's oversight activities are documented, and its TQP and ECP are generally effective. However, EM-LA does not track issues, review corrective actions, verify closure, and trend issues. Other weaknesses include EM-LA not reviewing N3B corrective actions, not conducting a self-assessment of its ECP, not assigning all appropriate personnel an OSQS, and not fully implementing effective LL and OPEX programs.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

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Finding F-N3B-1: N3B has not ensured that all elements of the N3B occupational medical program are compliant with the requirements of the DOE worker safety and health program. (10 CFR 851, app. A, secs. 6 and 8, and N3B-PD100, sections 6.5 and 6.6)

Finding F-N3B-2: N3B and some subcontractors did not properly identify and/or analyze some workplace silica, beryllium, ergonomics, and noise hazards. (N3B-SD100, sec. 3.3.5)

Finding F-N3B-3: N3B does not notify all workers of their exposure monitoring results. (10 CFR 851.20(b)(3) and (b)(4), 29 CFR 1926.1153(d)(2)(vi), and N3B-DI-IHS-0014, sec. 5.5.2)

Finding F-N3B-4: N3B has not completed an arc flash risk assessment or ensured that electrical equipment, such as switchboards, panelboards, and industrial control panels, is field marked with a label. (NFPA 70E-2015 130.5, and NFPA 70E-2015 130.5(D))

Environmental Management Los Alamos Field Office

Finding F-EM-LA-1: EM-LA does not track issues, review corrective actions, verify closure, and trend issues to inform risk and develop the integrated assessment schedule. (DOE Order 226.1B, sec. 4.b.4, and EM-LA-PR-2.03.05)

Finding F-EM-LA-2: EM-LA does not adequately develop, share, and implement LLs through the LL and OPEX programs and has not completed an assessment of the N3B LL and OPEX programs. (DOE Order 210.2A, and EM-LA-PR-2.02.04)

6.0 DEFICIENCIES

Deficiencies are inadequacies in the implementation of an applicable requirement or standard. Deficiencies that did not meet the criteria for findings are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

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Deficiency D-N3B-1: The current version of N3B-P101-3 does not require annual inspection of energy control procedures. (29 CFR 1910.147(6)(i))

Deficiency D-N3B-2: N3B and subcontractors did not correctly classify a work activity or identify hazards. (N3B-AP-P300-1, secs. 5.0 and 10.0)

Deficiency D-N3B-3: N3B has not ensured that work planners completed training commensurate with the work they perform. (N3B-SD100, sec. 3.3.3)

Deficiency D-N3B-4: N3B did not properly post and control the CMP work area as a CA. (N3B P-121, table 7, and N3B-SOP-RP-0004)

Deficiency D-N3B-5: N3B ER has not established an effective means to assess and communicate heat stress conditions and controls at remote work sites. (N3B-POL-ESH-0005, sec. 3.2.3)

Deficiency D-N3B-6: N3B ER did not ensure that general field workers were trained on thermal stress awareness. (N3B-AP-ER-1002, sec. 4)

Deficiency D-N3B-7: N3B ER is not completing the appropriate equipment safety inspection checklist form when performing daily pre-use inspections of heavy equipment. (N3B-P101-7, sec. 3.2)

Deficiency D-N3B-8: N3B has not developed hazard controls to limit worker exposures to potentially hazardous gaseous emissions from waste drums stored in seven of eight CH-TRU domes. (N3B-SD100, sec. 3.3.5)

Deficiency D-N3B-9: N3B and Northwind employees did not perform some observed work in accordance with required hazard controls. (N3B-SD100, sec. 3.4.4)

Deficiency D-N3B-10: N3B subcontractors follow safety and health programs that are less stringent than N3B safety and health programs. (N3B-P101-7)

Deficiency D-N3B-11: N3B issues management process does not sufficiently categorize the significance of findings. (DOE Order 226.1B, att. 1, sec. 2.b.(3)(b))

Deficiency D-N3B-12: N3B participants in an observed Issues Screening Team meeting did not include analysis or discussion as to whether any of the issues being reviewed were repetitive issues. (N3B-DI-QAT-0002, step 3a)

Deficiency D-N3B-13: N3B participants in an observed EMRB CAS performance review meeting did not address overdue corrective actions and causal analyses or mitigating actions. (N3B-CHR-QAT-0001, sec. 2.0)

Environmental Management Los Alamos Field Office

Deficiency D-EM-LA-1: EM-LA does not ensure that all personnel who are assigned FAQs are assigned an OSQS. (DOE Order 426.1B, sec. 4.d.(3))

Deficiency D-EM-LA-2: EM-LA has not conducted a self-assessment of its ECP. (DOE Order 442.1B, app. A)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFIs shown below to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

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OFI-N3B-1: Consider the following RP program enhancements to better facilitate proper implementation of requirements by RP staff and workers:

- Revise N3B-P-121 and/or N3B-SOP-RP-0002 to include details on the definitions, content, and proper assignment of “job routine” and “job specific” RWPs, consistent with DOE-STD-1098-2017.
- Revise N3B-P-121 and/or N3B-SOP-RP-0002 to provide an effective means of relating each RWP to applicable WCDs.

- Benchmark other DOE sites, such as the Portsmouth Gaseous Diffusion Plant and United Cleanup Oak Ridge, LLC at Oak Ridge National Laboratory, that perform intrusive ground disturbance work activities with respect to the air monitoring requirements contained in site radiological control manuals and the technical basis documents for air monitoring and air sampling procedures, and consider making similar programmatic changes for N3B.
- Benchmark other DOE sites, such as the Hanford Site and Savannah River Site, with respect to biennial training proficiency demonstrations for radiological workers.

OFI-N3B-2: Consider providing worker training on the use of STARRT cards and provide ES&H SME guidance to work crews until the process is fully implemented.

OFI-N3B-3: Consider expanding the Enterprise Risk Management Program Risk Assessment Team to include a representative from the CAS assessments team for the purpose of informing risk-based selection of assessments for EMRB approval.

OFI-N3B-4: Consider conducting periodic independent assessments to determine how well applicable lessons learned are analyzed, shared, accepted by line management, and subsequently implemented in applicable WCDs. In addition, consider conducting periodic assessments to determine how well issues are being categorized in accordance with N3B guidance, and to determine whether the action tracking module in the issues management system is being used to track actions that should be tracked under the issues management module. Benchmarking with Sandia National Laboratories-New Mexico, the Paducah Gaseous Diffusion Plant, and Lawrence Livermore National Laboratory may be useful.

OFI-N3B-5: Consider including specific guidance on the graded approach to issue categorization and EMRB-approved examples for each of the three issue significance levels (high, moderate, and low) in the desktop instruction guide provided to members of the Issues Screening Team. Benchmarking Lawrence Livermore National Laboratory and Argonne National Laboratory may be useful.

OFI-N3B-6: Consider including objective evidence (e.g., MRB or EMRB formal minutes) in the issues management system to document MRB and EMRB actions to approve corrective action plans, extent-of-condition reviews, and effectiveness reviews, and to authorize event/issue closure. Benchmarking Sandia National Laboratories-New Mexico and Argonne National Laboratory may be useful.

OFI-N3B-7: Consider adding responsibilities to N3B-P322-4 for responsible line managers to ensure that extent-of-condition reviews, lessons learned, and applicable corrective actions (e.g., standing orders) are appropriately assigned for action and widely communicated to all parts of N3B that may benefit from them. Benchmarking Lawrence Livermore National Laboratory may be useful.

OFI-N3B-8: Consider identifying a specific set of leading and lagging indicators for monitoring WP&C performance. Review of WP&C related metrics developed by Lawrence Livermore National Laboratory may be useful.

Environmental Management Los Alamos Field Office

OFI-EM-LA-1: Consider developing a separate ECP implementation plan that is signed by the EM-LA Site Manager and contains specific information relevant to EM-LA.

OFI-EM-LA-2: Consider appointing an ECP coordinator at the site office to assist the ECP manager.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: June 12-15 and 26-29, 2023

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