Independent Assessment of Nuclear Maintenance Management at the Idaho Cleanup Project

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Office of Enterprise Assessments
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Acronyms

BEA	Battelle Energy Alliance
CAIS	Condition Assessment Information System
CAS	Condition/Functionality Assessment Survey
CM	Corrective Maintenance
CPP	Chemical Processing Plant
CSE	Cognizant System Engineer
DOE	U.S. Department of Energy
DOE-ICP	DOE Idaho Operations Office Idaho Cleanup Project
EA	Office of Enterprise Assessments
FIMS	Facility Information Management System
ICP	Idaho Cleanup Project
IEC	Idaho Environmental Coalition, LLC
INTEC	Idaho Nuclear Technology and Engineering Center
M&TE	Measuring and Test Equipment
MEL	Master Equipment List
NCR	Nonconformance Report
NMMP	Nuclear Maintenance Management Program
OFI	Opportunity for Improvement
PdM	Predictive Maintenance
PM	Preventive Maintenance
PMT	Post-Maintenance Test
PPE	Personal Protective Equipment
QL	Quality Level
S&CL	Standards and Calibration Laboratory
S/CI	Suspect/Counterfeit Item
SHR	System Health Report
SME	Subject Matter Expert
SSCs	Structures, Systems, and Components
USQ	Unreviewed Safety Question
WO	Work Order

INDEPENDENT ASSESSMENT OF NUCLEAR MAINTENANCE MANAGEMENT AT THE IDAHO CLEANUP PROJECT

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the nuclear maintenance management program (NMMP) at the Idaho Cleanup Project (ICP) from February to March 2023. This assessment evaluated the effectiveness of the Idaho Environmental Coalition, LLC (IEC) NMMP as implemented at the Idaho Nuclear Technology and Engineering Center (INTEC) to ensure that safety structures, systems, and components can reliably meet their credited safety functions. The INTEC facilities are managed and operated by IEC for the DOE Idaho Operations Office Idaho Cleanup Project (DOE-ICP) under direction of the DOE Office of Environmental Management.

EA identified the following strengths:

- IEC is adequately planning, scheduling, coordinating, and controlling maintenance activities, and emphasizing equipment availability.
- Cognizant system engineers are actively and appropriately engaged in the planning and performance of maintenance activities.
- IEC has established and implemented an effective procurement process to ensure availability of parts, materials, and services for maintenance activities, including appropriate storage facilities for parts and materials.
- IEC has a mature and effectively implemented training and qualification program for maintenance personnel.

EA also identified several weaknesses, as summarized below:

- IEC maintains a master equipment list that has incorrectly identified several hundred items as safety class safety structures, systems, and components. This could lead to improper control and use of unnecessary resources for maintenance activities.
- IEC has not implemented the formal predictive maintenance program throughout ICP facilities.
- IEC does not always record measurement data supporting long-term trending of hoist maintenance.
- IEC is not providing environmental protection for several lots of rusting QL-2 and QL-3 steel plate.
- Observed manipulator repairs and discussions with the IEC repair technicians suggested that IEC has a trend of excessive manipulator failures, potentially resulting in a disproportionate consumption of resources for restoration, excessive repair costs, and operational downtime.
- DOE-ICP is not conducting the required periodic programmatic assessments of IEC's NMMP. (Finding)

In summary, IEC has a mature NMMP at INTEC that is effectively implementing the requirements of DOE Order 433.1B. The IEC personnel responsible for managing, supporting, and accomplishing the maintenance work who were interviewed and observed by EA during this assessment were knowledgeable and skilled at fulfilling their responsibilities. Addressing the weaknesses identified by EA will further strengthen IEC's NMMP. Although previously self-identified, DOE-ICP's lack of programmatic assessments of IEC's NMMP remains a significant weakness. Until this weakness is addressed, DOE management's ability to ensure that safety SSCs can reliably meet their credited safety functions may be degraded.

INDEPENDENT ASSESSMENT OF NUCLEAR MAINTENANCE MANAGEMENT AT THE IDAHO CLEANUP PROJECT

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), assessed the nuclear maintenance management program (NMMP) at the Idaho Cleanup Project (ICP). The assessment was conducted from February to March 2023.

Consistent with the *Plan for the Independent Assessment of Nuclear Maintenance Management at the Idaho Cleanup Project, February - March 2023*, this assessment evaluated the effectiveness of the Idaho Environmental Coalition, LLC (IEC) NMMP to ensure that safety structures, systems, and components (SSCs) can reliably meet their credited safety functions. The assessment focused on the implementation of the NMMP at three hazard category 2 nuclear facilities at the Idaho Nuclear Technology and Engineering Center (INTEC): Radioactive Mixed Waste Staging Facility (Chemical Processing Plant [CPP]-1617), New Waste Calcining Facility (CPP-659) (waste management portion), and Fluorinel Dissolution Process (CPP-666).

The INTEC facilities, which are part of the ICP, are managed and operated by IEC for the DOE Idaho Operations Office ICP (DOE-ICP) under the direction of the DOE Office of Environmental Management.

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 requirements in DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, for NMMPs. EA used criteria and review approach document EA CRAD 30-06, Rev. 0, *Conduct of Maintenance*, to guide this assessment.

EA examined key documents such as system descriptions, work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs; observed maintenance activities; and walked down significant portions of selected INTEC facilities, focusing on CPP-1617, CPP-659, and CPP-666. 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 Nuclear Maintenance Management Program Description and Assessments

This portion of the assessment evaluated whether IEC has a DOE-approved NMMP description document, and the effectiveness of IEC's and DOE-ICP's assessments of the NMMP.

The IEC NMMP is adequately described in PDD-600, *ICP Nuclear Maintenance Management Program*. PRD-600, *Maintenance Management Requirements*, appendix A, contains a matrix that adequately addresses the requirements of DOE Order 433.1B and identifies implementing documents. As required by DOE Order 433.1B, attachment 2, section 1.e, IEC appropriately submitted the current versions of PDD-600 and PRD-600 to DOE-ICP and received approval of the NMMP on May 25, 2022. Additionally, based on review of the last five changes to PDD-600, IEC appropriately uses the unreviewed safety question (USQ) process as required by DOE Order 433.1B to evaluate the need for DOE-ICP approval of proposed changes to the NMMP that occur between the three-year approval cycle. However, while PRD-600 identifies the requirement for NMMP approval at least every three years and specifies that the three-year approval is implemented by PDD-600, PDD-600 does not address that requirement. In response to EA's communication of this inconsistency, IEC initiated a change to PDD-600 to include the three-year DOE approval process description.

DOE Order 433.1B, att. 2, sec. 1.g, requires assessments of NMMP implementation by contractor organizations at least every three years. IEC adequately satisfies this requirement by completing a series of assessments in a three-year period that collectively assess the implementation of the 17 NMMP elements. Fourteen assessments addressing 5 of the 17 elements were reviewed and found to be appropriately scoped. In addition, an overall programmatic assessment IAS22528, *Management Review – NMMP Implementation and Compliance to the Contractor Requirements Documents (CRDs) of DOE O 433.1B*, adequately verified that all required elements of the NMMP had been assessed by the series of assessments performed in the last three years. However, none of the IEC assessments of the NMMP included observation of maintenance jobs being performed. This weakness is partly compensated for by IEC's management observation program, a structured approach that promotes management presence in the workplace and includes observation of maintenance activities.

DOE line management organizations are also required to assess contractor NMMP implementation at least every three years. However, contrary to DOE Order 433.1B, sec. 4.d, DOE-ICP has not completed an assessment of IEC's NMMP since 2016, exceeding the three-year periodicity requirement. (See **Finding F-DOE-ICP-1.**) Not performing the required periodic DOE oversight of IEC's NMMP could result in the lack of information necessary for DOE management to ensure that safety SSCs can reliably meet their credited safety functions. DOE-ICP self-identified this issue in *Management Assessment of the 2021 Oversight Performance for the DOE Idaho Cleanup Project*, performed April through June 2022. In the nine months between DOE-ICP's management assessment and this EA assessment, no progress has been made in addressing the issue, and no compensatory measures have been implemented.

Further, DOE-ICP does not have a maintenance management subject matter expert (SME) assigned to oversee the NMMP and primarily relies on the day-to-day oversight of maintenance activities provided by Facility Representatives. However, the Facility Representative oversight does not meet the requirement to fully assess the NMMP at least every three years. In addition, for the ICP contractor prior to IEC, DOE-ICP did not ensure that the NMMP was being submitted to DOE for approval at least every three years. To correct the weaknesses with its oversight of IEC's NMMP, DOE-ICP is recruiting for a maintenance management SME who will be responsible for ensuring that the requirements of DOE Order 433.1B are effectively implemented.

Nuclear Maintenance Management Program Description and Assessments Conclusions

IEC has an adequate DOE-approved NMMP description document. Overall, IEC is adequately assessing the NMMP elements within the required three-year periodicity. However, DOE-ICP has not been performing programmatic assessments of IEC's NMMP, as required.

3.2 Maintenance Organization, Procedure for the Work Control Process, and Resources

This portion of the assessment evaluated IEC's nuclear maintenance organization, procedure for the work control process, and maintenance and planning resources.

Maintenance Organization

IEC has effectively established a nuclear maintenance organization structure defining managers, craft supervisors, and craft personnel, as required by DOE Order 433.1B, att. 2, sec. 2.b. PDD-600, sec. 3.4.1 describes an adequate organization to address the functional maintenance areas for instrumentation shops, power/roads/grounds, remote handling equipment, and balance of plant (e.g., heating ventilation and air conditioning, and water and steam systems). Each functional maintenance area is appropriately staffed with supervisors and craft personnel who perform maintenance activities and interface with supporting organizations (e.g., engineering, independent oversight, radiological control, occupational safety).

Procedure for the Work Control Process

IEC has established and implemented an adequate maintenance procedure for planning, scheduling, work control, and oversight of maintenance activities in accordance with PDD-600, sec. 3.5.4. MCP-101, *ICP Integrated Work Control Process*, effectively specifies the work order (WO) development process. This process appropriately includes work scope, planning walkdowns, job hazard analysis, WO control, pre-job briefs, WO steps, work documentation and acceptance, post-maintenance tests (PMTs), and closeout. Twenty-one reviewed WOs demonstrated consistent adherence to MCP-101.

Resources

Maintenance staffing levels are appropriately determined annually through a formal staffing plan that considers priorities for current and future workloads. The annual staffing plan is appropriately developed based on available task order funding and anticipated maintenance workload for the Maintenance group. IEC's INTEC maintenance organization chart identifies 4 maintenance managers, 18 craft supervisors, and 118 craft personnel who support the conduct of nuclear maintenance activities, which is consistent with the annual staffing plan. The current 140 maintenance staff personnel assigned to the INTEC maintenance group is adequate for planned workloads, which is substantiated by performance metrics showing a limited backlog of corrective maintenance (CM) and preventive maintenance (PM) WOs.

Maintenance Organization, Procedure for the Work Control Process, and Resources Conclusions

IEC has effectively established an adequate nuclear maintenance organization with an implementing maintenance procedure for planning, scheduling, work control, and oversight. IEC has the appropriate maintenance resources assigned to specific functional areas necessary to support the NMMP.

3.3 Master Equipment List and Maintenance History Records

This portion of the assessment evaluated whether IEC's master equipment list (MEL) identifies credited SSCs, and maintenance history is used to support work planning and maintenance performance.

IEC adequately developed and maintains a generally accurate MEL as required by DOE Order 433.1B, att. 2, sec. 2.c. IEC's established process, MCP-6402, *Master Equipment List and Maintenance History*, adequately addresses the management of the MEL and appropriately establishes the responsibilities for all involved organizations to develop and maintain the MEL. Critical spare parts are properly tracked in Maximo® (a computerized maintenance management system). Facility walkdowns and observations of

maintenance activities demonstrated that facility systems were properly and uniquely identified. However, contrary to DOE Order 433.1B, att. 2, sec. 2.c, IEC incorrectly designated several hundred (almost 90%) of the non-safety basis items in the MEL as safety class SSCs. (See **Deficiency D-IEC-1**.) Over designating non-safety basis items as safety class SSCs can lead to unnecessary procurement and maintenance activities, diluting attention to safety SSCs. The system engineering group maintains a separate database that properly identified the safety designation of all SSCs.

IEC personnel effectively document maintenance history in accordance with MCP-6402. Maintenance records are readily retrievable from Maximo, and the record copy is contained in the electronic document management system. MCP-6402 adequately establishes responsibility to conduct maintenance history reviews for maintenance planning by planners, and trending by system engineers, which are documented in system health reports (SHRs). Five reviewed SHRs confirmed that IEC personnel properly conducted maintenance history trending. However, IEC has not established a required periodicity for performing SHR reviews; therefore, the availability of trending information is sporadic. Prior to the conclusion of this assessment, the Chief Engineer provided correspondence that directed the IEC contractor assurance program manager to include performing annual SHRs into their assessment schedule.

Master Equipment List and Maintenance History Records Conclusions

IEC has an adequate process for developing and maintaining the MEL. Maintenance history and trending reviews were adequately conducted, as documented in reviewed SHRs. However, IEC improperly designated hundreds of items in the MEL as safety class SSCs.

3.4 Maintenance Performance

3.4.1 Maintenance Procedures

This portion of the assessment evaluated IEC's maintenance procedures for performing maintenance activities.

IEC has established and implemented a generally adequate maintenance procedure process in MCP-101. This procedure provides effective direction including all necessary steps to perform work, including hazard identification and control, hold points, appropriate review and sign-offs, and PMT. MCP-101 properly requires changes to the NMMP and maintenance procedures to be evaluated through the USQ process. Two work planners effectively demonstrated the use of Maximo to plan maintenance work packages, which include the WO and other relevant documents (e.g., work authorizations, job hazard analysis, and pre-job documentation). The two interviewed work planners have craft backgrounds and described effective coordination with SMEs (e.g., maintenance, quality assurance, engineering, operations, and radiological control) to develop WO process steps. An observed weekly plant priority meeting demonstrated effective communication regarding planned staff participation on scheduled WOs. Sixteen reviewed WOs were prepared at least 60 days prior to WO implementation, ensuring that all relevant SMEs had reviewed or approved their applicable sections.

Further, 21 evaluated work packages properly adhered to the requirements of MCP-101. Eight observed work activities were adequately performed as instructed in the WO. Closeout of all work packages included appropriate review and sign-offs by operations management, system engineering, and work control. Twelve observed pre-job briefs were effectively led by the maintenance supervisor and included the maintenance, operations, radiation safety, and industrial safety personnel involved. All personnel participated fully in the pre-job brief, which appropriately covered the work plan.

While MCP-101 is mostly adequate, it does not provide direction on the establishment of procedure use level. In practice, maintenance procedures are categorized as either "reference" or "continuous" use level, based on a document development template; most procedures were categorized as "Reference Use." During the review of three hoist WOs, one was categorized as "continuous" use level, one was designated as "critical," and the third WO was not categorized or designated, which causes inconsistent handling of the WO. The maintenance program manager explained that a recent DOE readiness assessment had identified that maintenance procedures were not properly categorized as "continuous" use. In resolving this weakness, IEC developed a corrective action plan to revise MCP-101. The reviewed corrective action plan demonstrated that IEC is progressing towards resolving this issue.

Additionally, one of the three reviewed hoist WOs was inadequate. WO #590676, *Hoist HST-NCD-921*, addresses a PM activity to evaluate the change in chain length, chain link diameter, and hook opening dimensions. The procedure requires the recording of the percent change rather than the actual measurement; however, percent change data does not support the identification of long-term adverse trends that could lead to component failure. (See **OFI-IEC-1**.)

Maintenance Procedures Conclusions

Maintenance procedures contained adequate work direction, coverage of the work hazards, review and sign-offs, and PMT. All reviewed procedures could be appropriately performed as written. Although maintenance procedures were not appropriately categorized as continuous use, use level categorization is being addressed through a previously initiated corrective action.

3.4.2 Work Control

This portion of the assessment evaluated IEC's planning, scheduling, coordination, and control of maintenance activities, emphasizing equipment availability and involvement of system engineers.

IEC is adequately planning, scheduling, coordinating, and controlling maintenance activities, and emphasizing equipment availability, per PDD-600 and MCP-101, as required by DOE Order 433.1B, att. 2, sec. 2.d. Training and qualification records reviewed for two maintenance planners, a maintenance manager, and the work planning manager were current; they included adequate work control-related training topics, such as MCP-101, demonstrating the adequate qualifications to plan, schedule, and coordinate IEC's maintenance work. The reviewed INTEC integrated maintenance schedule demonstrated adequate prioritization and management of maintenance planning and scheduling and was sufficiently detailed to coordinate activities and track progress. Seven observed INTEC plan-of-the-day scheduling meetings demonstrated effective operational coordination and teamwork to integrate and execute the scheduled maintenance.

Furthermore, IEC effectively controlled 15 reviewed maintenance WOs. The reviewed WOs, which were developed from a standard template (TEM-62, *Planned Work Order*), were specific to the planned maintenance, and were clear, concise, properly sequenced, and sufficiently detailed to enable safe work performance. Hazards and identified controls were appropriately tailored to the work scopes. Five reviewed maintenance WO status log forms demonstrated that an adequate process is in place to document the detailed status of work underway, including field changes, work interruptions and delays, daily/per shift job progress, and events/conditions encountered.

IEC also effectively controlled an observed maintenance evolution on a broken manipulator. IEC effectively performed the pre-job brief, workability walkdown, and repairs to a Central Research Laboratory's manipulator in the CPP-1608 repair shop to replace broken stainless steel actuator tapes. Observed work and review of the applicable WO and planned work traveler (Maximo work authorization

paperwork) demonstrated a rigorous work release process and appropriate use of human performance principles, such as three-way communication, questioning attitude, stop when unsure, self-checking, and peer checking. The observed maintenance evolution was adequately performed as prescribed in the procedure. However, the observed repairs and discussions with the repair technicians suggested a trend of excessive equipment failures and therefore a disproportionate use of resources for restoration of this commonly used manipulator type. The discussed frequency of repairs may suggest that operators may be stressing the manipulators over capacity for certain tasks, potentially making their actuator tapes susceptible to breakage during operation and contributing to excessive repair costs and operational downtime. When EA raised this issue to IEC management, they agreed that this requires further investigation. (See **OFI-IEC-2**.)

Cognizant system engineers (CSEs) are adequately involved in the planning and performance of maintenance related to their assigned systems, as required by DOE Order 420.1, *Facility Safety*, chapter V, sec. 3.d.(10). PDD-600 appropriately addresses CSEs' involvement in maintenance activities. Four reviewed CSE qualification records showed appropriate inclusion of training on work control, including MCP-101. Fifteen reviewed maintenance WOs and interviews of three CSEs demonstrated that the CSEs were adequately involved in reviewing and approving WOs before issuance. This included needs for PMT, drawing changes, outages/impairments, priority level, and need date validity. The CSEs were also properly involved in documenting and accepting completed work, including sign-off on completed PMT and return to service. Seven observed INTEC plan-of-the-day meetings, and two observed PMs, demonstrated that CSEs are adequately involved in the work planning, scheduling, coordination, and close-out of PM performance.

Work Control Conclusions

IEC is adequately planning, scheduling, coordinating, and controlling maintenance activities, and emphasizing equipment availability. Reviewed WOs and one observed work evolution demonstrated that IEC effectively controlled work. CSEs are actively and appropriately involved in maintenance activities. However, observed repairs and interviewed repair technicians suggested a trend of manipulator failures, resulting in high maintenance costs and downtime.

3.4.3 Preventive and Predictive Maintenance

This portion of the assessment evaluated IEC's use of PM and predictive maintenance (PdM) to ensure the safe, efficient, and reliable operation and functional performance of safety SSCs.

IEC adequately conducts PM activities, as required by DOE Order 433.1B, att. 2, sec. 2.e. PDD-600 and MCP-6201, *Preventive/Predictive Maintenance Program*, effectively describe the PM/PdM process, in which CSEs can successfully develop PM/PdM tasks and determine optimized intervals for maintaining SSCs, using appropriate engineering requirements, industry standards, and manufacturer recommendations. Six reviewed documents of Form 433.35*, Preventive Maintenance Justification*, demonstrated an adequate method to justify the addition of new PM tasks. Five reviewed PM WOs were detailed, properly sequenced, and controlled documents that adequately enabled the worker to accomplish the work safely and completely. The reviewed INTEC monthly PM performance metrics for 2022 demonstrated that these activities were adequately prioritized and completed in a timely manner with 100% (173 of 173 monthly PMs, on average) completed on time or within the grace period (25% of the scheduled interval). Observed pre-job briefs, workability walkdowns, and work performance for two PMs demonstrated that the work was thoroughly planned and properly completed on schedule per the applicable WOs.

While IEC adequately performs PM activities, contrary to MCP-6201, IEC has not implemented the formal PdM program throughout ICP facilities. (See **Deficiency D-IEC-2**.) Lack of implementing the formal PdM program may result in unexpected safety system equipment failures. An interview with ICP's Chief Engineer and PdM project engineer clarified that, since early 2022, they have been in the beginning stages of implementing the formal PdM program throughout ICP facilities, including INTEC. However, IEC did not provide evidence of described gearbox oil sampling, motor vibration and insulation resistance analysis, ultrasonic leak detection, and thermography camera use.

Preventive and Predictive Maintenance Conclusions

IEC adequately uses PM activities; however, it has not yet implemented its PdM program to ensure the safe, efficient, and reliable operation and functional performance of safety SSCs.

3.4.4 Corrective Maintenance and Post-Maintenance Testing

This portion of the assessment evaluated IEC's CM and PMT WO processes to ensure that safe, efficient, and reliable operation and functional performance of safety SSCs is accomplished when returned to service.

Corrective Maintenance

IEC has established and implemented an adequate CM WO process to properly maintain safety SSCs, as required by DOE Order 433.1B, att. 2, secs. 2.e and 2.f. MCP-101 adequately addresses CM WO processes to ensure the safe, efficient, and reliable operation and functional performance of safety SSCs. IEC backlog metrics demonstrate that IEC is effectively managing the CM backlog tasks consistent with facility operation priorities and relative importance of the equipment. IEC maintains an open CM WO backlog goal of less than 100% of the rolling average throughout the past calendar year, resulting in a continuing reduction of open CM WOs.

Nine reviewed CM WOs (five completed and four observed) demonstrated that repair work was adequately planned and performed. All nine reviewed CM WOs appropriately included precautions and limitations, a list of personal protective equipment (PPE), training and special skills required for workers, special tools and equipment required, waste stream disposition, initial conditions and prerequisites for walkdowns, pre-job briefs, operations release of work, work instructions, PMT, lockout/tagout requirements, return to service approvals, and closeout sections.

Post-Maintenance Testing

IEC has established and implemented an adequate PMT WO process to verify that safety SSCs perform their intended function when returned to service. Five reviewed WOs and interviews with the work planners and associated CSEs showed effective coordination in developing the PMT scope, initial conditions and prerequisites, job instructions, hold points, test requirements, acceptance criteria, and post-test restoration. The PMT WO sections demonstrated that testing results were properly documented, and the resulting data met the acceptance criteria. Deficiencies were documented during the testing process and corrected, and test results were formally reviewed and accepted for return to operability.

Corrective Maintenance and Post-Maintenance Testing Conclusions

IEC has established and implemented an adequate CM and PMT WO process to properly maintain safety SSCs and return SSCs to service.

3.5 Performance Measurement

This portion of the assessment evaluated whether IEC effectively uses performance measures to promote maintenance improvement.

Maintenance performance measurement is appropriately specified in PRD-600 and adequately described in MCP-6401, *Measurement, Analysis, and Reporting of Maintenance Performance*. MCP-6401 effectively establishes responsibilities for performance measurement and governs what measures will be evaluated. A review of the most recent two months of metrics showed that no PMs were delinquent and only 2 of 87 were in the grace period for critical PMs in December 2022. Maintenance backlog is being effectively managed as indicated by the downward trend in CM activities tracked (519 incomplete CM WOs in January 2022 down to 455 for December 2022). In addition, IEC reports a maintenance performance index to DOE-ICP, which is a collection of all performance measures, and IEC has been consistently exceeding its target goals.

Performance Measurement Conclusions

Performance measures are being effectively used to improve organization maintenance performance as demonstrated by the PM completion data and the improvement in the CM backlog.

3.6 Maintenance Personnel Training and Qualification

This portion of the assessment evaluated the effectiveness of IEC's training and qualification program for maintenance personnel.

IEC uses a systematic approach to training in accordance with DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, to develop, implement, and maintain an effective training and qualification program for maintenance personnel. IEC's hiring and selection process for maintenance personnel adequately ensures that DOE Order 426.2, att. 1, sec. 2, requirements regarding experience are met. Job analyses and task-to-training matrices are appropriately used as the basis for developing and updating maintenance training. Initial training and qualification of maintenance personnel employ an appropriate combination of classroom training, computer-based courses, on-the-job training (OJT), and self-study. OJT is effectively conducted by senior craft personnel who have completed qualifications for that function. Based on interviews and work observations, the maintenance training and qualification program is ensuring that the maintenance personnel have the knowledge and skills necessary to accomplish their job functions. Training records are effectively managed electronically in the TRAIN system. Training records were accessible and easily retrievable in TRAIN, meeting the DOE Order 426.2, att. 1, sec. 10 requirement that qualification records be maintained in an easily auditable format.

IEC adequately manages continuing training, primarily by establishing expiration dates for the training courses that are integral to the initial qualifications, and then by requiring maintenance personnel to retake the expiring courses at specified intervals. IEC effectively developed a continuing training plan (CTP) that covers all maintenance personnel. The CTP is applicable for a two-year period (e.g., calendar year 2023 through calendar year 2024) and appropriately defines the categories of training and activities that should be addressed by continuing training. The formal training that must be completed in a specified period of time and completion of some of the activities stated in the CTP (e.g., attendance at safety meetings) are documented in TRAIN. The documentation adequately demonstrates compliance with the DOE Order 426.2, att. 1, sec. 5.a(2) and sec. 6.c requirements, which state that continuing training must be administered on a cycle not to exceed two years.

Maintenance Personnel Training and Qualification Conclusions

IEC has a mature and effectively implemented training and qualification program for maintenance personnel.

3.7 Configuration Management Program and Change Control Process

This portion of the assessment evaluated IEC's configuration management program and implementing procedures for maintenance, repair, and modification of safety SSCs.

IEC appropriately established and implemented a configuration management program, as required by DOE Order 420.1, ch. V, sec. 3.c.4, using the guidance of DOE STD-1073-2016*, Configuration Management*, sec. 4.8. PDD-600 invokes PRD-115, *Configuration Management*, which specifies that there be an adequate process to control approved modifications and to prevent unauthorized modifications to safety SSCs. Additional implementing procedures (MCP-2811, *Nuclear Facility Change*; MCP-1308, *Field Design Change* [FDC]; MCP-123, *Unreviewed Safety Questions*) ensure proper control of safety SSC configurations. Interviewed maintenance planners demonstrated adequate knowledge and application of these processes. Interviewed CSEs also demonstrated adequate knowledge of the configuration management change control requirements and periodically conduct walkdowns on PM WOs to verify continued SSC functionality.

Three reviewed field change forms demonstrated an adequate implementation of the change control process with appropriate review and approval by CSEs, design authority verifications, USQ screening documentation, and applicable FDCs. As an example, the reviewed facility change form, FCF-9128, *Steam Spray Booth Ventilation Modification Transition to Permanent*, demonstrates effective change control. A temporary adapter plate installed on the steam spray booth exhaust filter housing transitioned to a permanent installation. FCF-9128 includes the required USQ screening documentation, which shows that no further USQ evaluation is required. The IEC engineering organization developed a field design change (FDC-12856, *CPP-659 Steam Spray Booth Exhaust Temporary Modification*), conducted appropriate reviews by the CSE and an independent design engineer, and revised the as-built drawing reflecting a permanent change. The observed modification was consistent with the as-built drawings.

Periodic management assessments were appropriately conducted to ensure that the actual physical configuration agrees with the design requirements and documentation. The reviewed conduct of engineering compliance assessment (IAS22549, *Conduct of Engineering Compliance, Rev-1*) adequately addressed configuration management and change control processes. This assessment appropriately included evaluation of drawings, nuclear facility change forms, and field design changes; the evaluation of the CSE's knowledge of configuration management topics resulted in identifying needed improvements.

Configuration Management Program and Change Control Process Conclusions

IEC appropriately established and implemented a configuration management program with change control procedures.

3.8 Procurement Process and Prevention of Suspect/Counterfeit Items

This portion of the assessment evaluated IEC's procurement process for parts, materials, and services required for maintenance activities and suspect/counterfeit item (S/CI) inspection process.

Procurement Process

IEC has established and implemented an effective procurement process to ensure the availability of parts, materials, and services for maintenance activities, as required by DOE Order 433.1B, att. 2, sec. 2.i. MCP-4021, *Acquisition of Materials and Parts*, and MCP-6301, *Maintenance Material, Equipment and Tool Use*, adequately address the implementation of the procurement process. Four reviewed purchase orders demonstrated that items and services met established requirements and performed as required in accordance with 10 CFR 830.122, *Quality assurance criteria*, *Criterion 7 – Performance/Procurement*. Purchase orders adequately included clauses addressing suspect counterfeit materials and labeling of electrical items and equipment. IEC has also effectively established and maintained the ICP qualified supplier list, which provides a list of acceptable items and services.

IEC is effectively storing procured parts and materials. A walkdown of materials and parts storage areas verified that items are effectively maintained in level B facilities. These facilities are temperature controlled to prevent damage, loss, or deterioration. The facilities are maintained in accordance with MCP-9436, *Identification, Control, Storage, and Transfer of Item Traceability*, and PRD-5084, *Handling, Storage, and Shipping*, which meet requirements of 10 CFR 830.122, *Criterion 5 – Performance/Work Processes*. Observed storage facility racks were adequately labeled to identify the location of materials and parts. Items were appropriately segregated by quality level (QL), and separate nonconformance report (NCR) areas were adequately maintained. Items were appropriately labeled with quality assurance acceptance tags, which included the QL number, Maximo number, purchase order number, contents, end user designation, storage level, and quantity. Acceptance tags were also effectively bar-coded for ease of identification. Two reviewed receipt inspection records demonstrated adequate receipt inspections for QL-3 items for visual damage, part number identification, S/CI identification, and electrical identification markings. The interviewed storage manager and reviewed qualification cards for supply chain inspectors demonstrated evidence of appropriate required training in applicable procedures including S/CI identification and control.

Prevention of Suspect/Counterfeit Items

IEC has established and implemented an effective S/CI inspection process, as required by DOE Order 433.1B, att. 2, sec. 2.k. MCP-9110, S*uspect/Counterfeit Item Identification and Control*, adequately addresses implementation of the requirements. IEC appropriately involves maintenance, engineering, and quality assurance engineering personnel in identifying, evaluating, notifying, and dispositioning S/CIs to prevent the use of S/CIs. A quality engineer has been appropriately designated as the S/CI SME for IEC and was the lead assessor for a reviewed S/CI bi-annual management assessment report (IAS 2165, *Suspect Counterfeit Items Management Assessment*) in December 2021. This management assessment appropriately verified the effective implementation of the ICP S/CI program and documented an effectiveness review of corrective actions from the previous 2019 S/CI surveillance/assessment. In addition, receipt inspection reports for QL-4 were appropriately revised to include S/CI inspection requirements based on changes to procurement procedures.

IEC has established and implemented an effective personnel training process (OICP1702, *Supply Chain Inspector Training*) for preventing entry of S/CIs into the DOE supply chain, and to ensure detection, control, reporting, and disposition of S/CIs. OICP1702 effectively includes an emphasis on S/CI identification by the supply chain inspectors during the receipt inspection process. An interviewed storage manager and S/CI SME explained that OICP1702 was implemented in 2020 to qualify warehouse supply chain inspectors. Two reviewed warehouse supply chain inspectors' qualification cards demonstrated completion of this training.

MCP-9110 is an effective process for S/CIs discovered in safety SSCs or any application whose failure could result in a loss of safety function or present a hazard to public or worker health and safety. MCP-9110 requires such discoveries to be reported through the DOE Occurrence Reporting and Processing System (DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*, att. 2, group 4, subgroup C). As an example, occurrence report EM-ID-IEC-INLPROGM-2023-000, *Suspect Counterfeit 8.8 Metric Bolts Discovered at ICP Facilities*, dated February 2, 2023, appropriately documented the discovery of 8.8 metric bolts that were missing the manufacturer's head mark and were determined to be suspect/counterfeit. The bolts were used around ICP facilities in tube and knuckle scaffolding and hand railing. All ICP facilities were appropriately notified of the suspect/counterfeit bolts. Work on scaffolding was appropriately restricted until it could be verified that no suspect bolts were in use. Subsequently, NCRs (190562, 190611, 190613, and 190615) were issued for the initial bolts found and additional bolts that were found during extent-of-condition reviews conducted on corrective action report (CAR) #190614. IEC has developed a lesson learned (IEC-LL-2023-2654, *Suspect Counterfeit Bolts Discovered at Idaho Cleanup Project*) that will be issued for distribution across the DOE complex.

Procurement Process and Prevention of Suspect/Counterfeit Items Conclusions

IEC has established and implemented an effective procurement process to ensure availability of parts, materials, and services for maintenance activities, including appropriate storage facilities for parts and materials. IEC has established and implemented an effective S/CI inspection and corrective action process.

3.9 Control of Maintenance Tools and Equipment

This portion of the assessment evaluated IEC's control of maintenance tools and equipment, including measuring and test equipment (M&TE).

IEC adequately controls maintenance tools and equipment, including the calibration and maintenance of M&TE used for data collection, inspections, and tests, as required by DOE Order 433.1B, att. 2, sec. 2.j. PDD-600 adequately addresses the control of maintenance tools and equipment, including their proper storage, issuance, and maintenance. For example, reviewed WO #590648, *(Y01) PM ON SLG-COM-ALL-1*, dated April 25, 2022, demonstrated that IEC adequately ensures the safety of all INTEC hoisting and rigging slings by having qualified inspectors examine the slings annually for required markings and damage. During a walkdown of the rigging storage cage in CPP-655, visual inspection of a random sample of five slings, which had passed the annual PM inspection, demonstrated that they appropriately met all inspection requirements. The rigging storage cage was securely locked and accessible only to authorized personnel with the key.

Furthermore, a walkdown of the tool crib for storage of quality significant materials in CPP-655 confirmed that observed consumables, tools, PPE, and PM kits were properly secured and maintained in good condition, as required by MCP-9436 and MCP-4022, *Material Management*. The walkdown of the tool crib and inspection of the posted Form 414.A93, *Quality Significant Material Storage Checklist for Facility Classification*, confirmed that the facility is properly classified as Level C (environmental exposure) indoor storage in accordance with MCP-9436. While IEC's observed control of maintenance tools and equipment in CPP-655 was adequate, EA observed several lots of rusting QL-2 and QL-3 steel plate in open air storage, which is inconsistent with MCP-4022. The continual exposure to the elements causes more rusting, which can affect the material's integrity. Additionally, this storage environment causes workers to routinely shovel snow away from stored items in winter to identify needed items for WOs. (See **OFI-IEC-3**.)

MCP-2391, *Control of Measuring and Test Equipment*, and PRD-5083, *Control of Measuring and Test Equipment*, establish an effective M&TE calibration program that complies with DOE Order 414.1D, att. 2, secs. 5 and 8. Three reviewed maintenance WOs that specify the use of M&TE appropriately included the M&TE calibration data sheets. The Battelle Energy Alliance (BEA) Standards and Calibration Laboratory (S&CL) at Idaho National Laboratory provides a full range of appropriate calibration services to INTEC to adequately calibrate and maintain the majority of INTEC's M&TE. BEA S&CL maintains a comprehensive database, which includes a master list of all INTEC portable non-radiation M&TE items that they calibrate, in accordance with SOW-3723, *Statement of Work for Calibration of Portable Non-Radiation Measuring and Test Equipment*. Two reviewed certificates of calibration were adequate with no concerns identified. However, 65 (10%) of the INTEC M&TE items in the database were designated as out-of-calibration. The assigned INTEC users of these M&TE items determined that most of them (48 of 65, or 74%) were owned by temporary subcontractors and the items had been removed from the site upon work completion. Due to retention of IEC M&TE items that no longer require BEA S&CL calibration, the BEA database overstates the number of IEC out-of-calibration M&TE.

A walkdown of the instrument shop in the Maintenance/Crafts/Warehouse Building (CPP-663) confirmed that calibration standards and other M&TE instruments were adequately controlled by a team of technicians. The reviewed database of instrument shop calibration standards used to calibrate M&TE demonstrated that these standards are adequately managed to a calibration schedule so that they remain accurate and are acceptable for use upon demand. Observation of the storage room for radiological source standards demonstrated that IEC had safely segregated the standards in its own locked, controlled, and appropriately posted area. Five observed out-of-service radiation detection instruments in the shop were properly tagged with "Out of Service – Calibrate Before Use" tags, as required by MCP-2391, and were adequately segregated from operations to prevent unsafe or inappropriate use. The observed staging racks in the instrument shop for delivery and return of M&TE to and from BEA S&CL for calibration demonstrated an adequate process to control and segregate M&TE due for calibration.

Control of Maintenance Tools and Equipment Conclusions

IEC adequately controls maintenance tools and equipment, including the calibration and maintenance of M&TE. However, weaknesses were identified regarding improper storage of steel plates and an outdated M&TE calibration database.

3.10 Facility Condition and Aging Inspections

This portion of the assessment evaluated IEC's facility condition inspections and aging inspections as performed by facility managers and CSEs.

Facility managers adequately perform and follow up on facility condition/functionality assessment surveys (CASs) to identify issues related to operability, reliability, and physical condition, as required by DOE Order 433.1B, att. 2, sec. 2.p. MCP-6102, *Conducting Real Property Condition and Functionality Assessments*, and GDE-4000, *Real Property Asset Management Guidance Document*, provide an adequate program and process for conducting periodic CASs on each real property asset at least once during a rolling five-year period. Eight reviewed facility CAS reports for inspections performed between October 2021 and September 2022 demonstrated appropriate documentation of operability, reliability, and condition concerns, and were thorough and effective at finding and following up on facility deficiencies. For example, the completed facility CAS reports for CPP-659 and CPP-666 appropriately raised concerns about various old and technically obsolete materials that required replacement or modernization; none of which were associated with safety systems. Seven deficient materials identified in the CPP-659 facility CAS report were verified to be properly entered into the IEC issues management system) for correction.

The Facility Information Management System (FIMS) administrator adequately reports and tracks facility CAS results to the DOE with a formal and effective process for resolution, properly uploading the facility CAS's descriptive data to the FIMS and the Condition Assessment Information System (CAIS). A sample detailed CAIS report for CPP-659 included a comprehensive backlog of approximately 32 needed repairs being reported and tracked based on inspections completed between 2016 and the present. Five reviewed SHRs appropriately included the listing of open WOs to address these needed repairs.

CSEs adequately perform assessments of SSC operability, reliability, and material condition, including inspections for aging-related degradation and technical obsolescence, as required by DOE Order 420.1, ch. V, sec. 3.c.(3), and DOE Order 433.1B, att. 2, sec. 2.m. MCP-1450, *Conduct of Engineering*, provides an effective process for the CSEs to assess assigned safety systems through annual SHRs. Three reviewed SHRs for CPP-659 and one reviewed SHR for CPP-666 appropriately adhered to MCP-1450. The 20 open SSC operability, reliability, and material condition issues identified in the reviewed SHRs were being appropriately tracked until closure in Maximo. The reviewed SHRs appropriately included system health scoring of selected attributes, which provides an effective visual representation of performance. A site walkdown of the aging CPP-659 process off-gas system (installed in 1981) demonstrated that needed repairs identified in one of the SHRs were completed, resolving 5 of the 20 open issues.

Facility Condition and Aging Inspections Conclusions

IEC adequately conducts facility condition inspections and aging inspections to identify issues related to facility operability, reliability, and physical condition, and determine whether the performance of SSCs is threatened.

3.11 Seasonal Preservation

This portion of the assessment evaluated IEC's seasonal preservation and verified that IEC uses seasonal facility preservation to prevent damage to safety SSCs.

IEC has an effective strategic seasonal preservation program as addressed in PLN-2583, *INTEC Winterization and Freeze Protection Plan*, and MCP-6013, *Seasonal Facility Planning*. MCP-2013, *Maintenance Seasonal Facility Planning*, provides appropriate implementation of MCP-6013. Seasonal facility planning is required to be initiated in August and completed by October 1 of each year. Checklists for each facility requiring walkdowns are adequate. INTEC-4158, *Maintenance Seasonal Facility Planning Action List*, effectively covers all INTEC facilities to ensure that all winterization activities are completed by October 31 of each year and contains an action checklist for April-June actions to transition from winter season. PLN-2583 and the implementing procedures require the development of extreme cold weather plans when the temperature is predicted to go below -15°F. These plans effectively mobilize the use of additional portable heaters to provide added protection for facility systems. Completed checklists demonstrated that all actions were appropriately completed in a timely manner. The seasonal preservation manager confirmed that no freeze events have been recorded this season and events have been minimal in recent years.

Seasonal Preservation Conclusions

IEC has effectively implemented a seasonal protection program through procedures, seasonal plans, and facility checklists to ensure that all actions are completed by October 31 of each year. The preparation of extreme cold weather plans for temperatures below -15°F provides appropriate added protection.

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.

DOE Idaho Operations Office Idaho Cleanup Project

Finding F-DOE-ICP-1: DOE-ICP has not completed assessments of IEC's NMMP at the required three-year periodicity. (DOE Order 433.1B, sec. 4.d)

6.0 DEFICIENCIES

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

Idaho Environmental Coalition, LLC

Deficiency D-IEC-1: IEC incorrectly identified several hundred non-safety items in the MEL as safety class SSCs. (DOE Order 433.1B, att. 2, sec. 2.c)

Deficiency D-IEC-2: IEC has not implemented the formal PdM program throughout ICP facilities. (MCP-6201)

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.

Idaho Environmental Coalition, LLC

OFI-IEC-1: Consider uniformly categorizing all hoist PM WOs and requiring that measurement data be recorded to support long-term trending.

OFI-IEC-2: Consider having operators record the circumstances surrounding manipulator breakdowns for further engineering analysis (e.g., trend/pareto failure root causes), implementing focused corrective actions to reduce the failure rate and repair costs.

OFI-IEC-3: Consider adding a tent or other enclosure to the exterior storage area behind CPP-655 for QL-2 and QL-3 steel to better protect the material from degradation.

Appendix A
Supplemental Information

Dates of Assessment

Onsite Assessment: February 21-23 and March 6-9, 2023

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William F. West, Deputy Director, Office of Enterprise Assessments
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