



**Independent Assessment of the  
UT-Battelle, LLC  
Management of Safety Issues  
at the  
Oak Ridge National Laboratory**

**September 2022**

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## Acronyms

ACTS	Assessment and Commitment Tracking System
CAIRB	Corrective Action Institutional Review Board
CAP	Corrective Action Plan
CONOPS	Conduct of Operations
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
FY	Fiscal Year
HFIR	High Flux Isotope Reactor
IMA	Issues Management and Analysis
ISO	International Organization for Standardization
NNFD	Non-reactor Nuclear Facilities Division
NQA	Nuclear Quality Assurance
NTS	Non-compliance Tracking System
OFI	Opportunity for Improvement
ORNL	Oak Ridge National Laboratory
OSO	DOE Oak Ridge National Laboratory Site Office
PAQ	Performance Assurance and Quality
RRD	Research Reactors Division
SAA	Satellite Accumulation Area
SBMS	Standards-based Management System
SNS	Spallation Neutron Source
SSR	Safety and Security Regulatory
USQD	Unreviewed Safety Question Determination
UT-Battelle	UT-Battelle, LLC

# **INDEPENDENT ASSESSMENT OF THE UT-BATTELLE, LLC MANAGEMENT OF SAFETY ISSUES AT THE OAK RIDGE NATIONAL LABORATORY**

## **Executive Summary**

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the management of safety issues at the Oak Ridge National Laboratory from April to June 2022. Specifically, this assessment evaluated the UT-Battelle, LLC (UT-Battelle) management of issues associated with the conduct of operations, safety basis implementation, radiological controls, and radioactive waste open after January 1, 2020.

UT-Battelle demonstrated effective issues management practices and adequately resolved and documented nearly all the issues reviewed by EA in a timely manner. EA identified the following strengths, including three best practices. Specifically, UT-Battelle personnel:

- Often use discretionary critiques, causal analyses, and informal effectiveness reviews to ensure that issues are resolved before they develop into significant safety concerns. (Best Practice)
- Biennially assess their management of issues by reviewing a representative sample of issues in certain areas and take action to improve the resolution of issues. (Best Practice)
- Coordinate other contractors' initiatives with their corrective action plans to build on ongoing improvement initiatives across DOE. (Best Practice)
- Have significantly improved their management of radioactive waste since an EA assessment in December 2019 identified several weaknesses.

However, EA also identified the following weaknesses and vulnerabilities, including one finding:

- Since fiscal year 2015, UT-Battelle has not adequately managed non-compliances regarding DOE requirements for continuing training to ensure that workers in the laboratory's Non-reactor Nuclear Facilities Division maintain proficiency to perform nuclear work. (Finding)
- Weaknesses in the UT-Battelle review of non-conformances regarding specifications for nuclear fuel, other than those associated with the fuel failure in November 2018, were not adequately resolved.
- UT-Battelle's trending and assessment of its conduct of operations and nuclear worker qualification programs and of the performance of two divisions reviewed is insufficient to identify issues before they potentially impact nuclear safety.
- UT-Battelle categorized the significance of some issues lower than that required by neglecting to consider the potential for more significant consequences and by not adhering to its requirement for categorizing assessment findings.
- Most of the formal UT-Battelle effectiveness reviews that EA assessed did not address similar issues that occurred after corrective action implementation.
- UT-Battelle does not monitor the age of issues, making it vulnerable to untimely responses.
- Documentation demonstrating completion of actions established during a few critiques and extent-of-condition and lessons-learned reviews was not included in the record.

In summary, UT-Battelle adequately manages nearly all safety issues. However, until the weaknesses identified in this report are addressed or mitigated, protections or layers of defense against nuclear safety events will be reduced. Resolution of the identified vulnerabilities will increase the resilience and effectiveness of the proactive issues management practices demonstrated by UT-Battelle personnel.

# **INDEPENDENT ASSESSMENT OF THE UT-BATTELLE, LLC MANAGEMENT OF SAFETY ISSUES AT THE OAK RIDGE NATIONAL LABORATORY**

## **1.0 INTRODUCTION**

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), assessed the UT-Battelle, LLC (UT-Battelle) management of safety issues at the Oak Ridge National Laboratory (ORNL). This assessment was conducted from April to June 2022 and included significant remote data collection and analysis. The onsite portion of this assessment, which was conducted May 16-18 and June 13-16, 2022, consisted of interviews, observations of meetings, and tours of nuclear facilities.

EA identified issues management as a targeted review area in fiscal year (FY) 2019. This assessment is the seventh review examining corrective action processes at DOE facilities. Results from these targeted reviews and from other EA assessments will be documented in a report that will contain EA's overall assessment on issues management across the DOE complex.

In accordance with the *Plan for the Independent Assessment of the UT-Battelle, LLC Management of Safety Issues at the Oak Ridge National Laboratory, April 2022*, this assessment evaluated UT-Battelle's management of issues associated with the conduct of operations (CONOPS), safety basis implementation, radiological controls, and radioactive waste open after January 1, 2020.

The DOE Oak Ridge National Laboratory Site Office (OSO) oversees UT-Battelle's management and operations at ORNL for the DOE Office of Science, including its management of safety issues.

## **2.0 METHODOLOGY**

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented 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.

EA used criterion 5 of objective 1 and the criteria of objective 3 of EA Criteria and Review Approach Document 30-01, Revision 1, *Contractor Assurance System*, February 15, 2018, to assess the flowdown and implementation of issues management requirements from DOE directives and invoked consensus standards.

EA examined key documents, such as procedures, quality assurance program descriptions, internal and external assessments, and 413 issues (identified in the ORNL Assessment and Commitment Tracking System [ACTS] by "ACTS" numbers), along with associated extent-of-condition reviews, causal analyses, corrective action plans (CAPs), and effectiveness reviews. The reviewed issues included: (1) those UT-Battelle identified which could have a "serious" impact on safety, (2) a representative sample of issues UT-Battelle identified as having a less-significant impact on safety, and (3) a sample of conditions that UT-Battelle screened (transferred) to other management systems for consideration or trending. These reviews enabled EA to determine whether issues impacting nuclear safety and exposure to radioactivity are adequately identified, screened, and corrected, using a graded approach, to prevent recurrence.

EA interviewed UT-Battelle personnel responsible for individual issues and implementation of issues management processes. Also interviewed were OSO subject matter experts responsible for overseeing

UT-Battelle’s CONOPS, safety basis implementation, radiological controls, and radioactive waste management. In addition, EA assessment team members attended teleconferences that UT-Battelle uses to identify trends impacting the ORNL mission.

The members of the EA assessment team, Quality Review Board, and management responsible for this assessment are listed in appendix A. EA’s comments on individual issues are provided in appendix B.

EA conducted a previous assessment of radioactive waste management at ORNL in December 2019. The current EA assessment examined the effectiveness of corrective actions for the UT-Battelle finding and deficiencies identified in the previous assessment, as documented in EA interim report *Assessment of Radioactive Waste Management at the Oak Ridge National Laboratory – April 2020*.

### 3.0 RESULTS

In this section, results are grouped into the following functions for issues management: the flowdown of issues management requirements; issue identification and categorization; issue resolution, including evaluations of the effectiveness of actions; and the timeliness of actions and closure of issues. Additionally, this section documents the results of EA’s review of the corrective actions for the UT-Battelle finding and deficiencies identified in the EA *Assessment of Radioactive Waste Management at the Oak Ridge National Laboratory – April 2020*.

#### 3.1 Flowdown of Issues Management Requirements

This portion of the assessment examined whether UT-Battelle has adequately invoked requirements in applicable consensus standards and DOE directives per the UT-Battelle contract with DOE and the DOE-approved UT-Battelle *Quality Assurance Program* description.

The UT-Battelle *Quality Assurance Program* commits to the International Organization for Standardization (ISO) consensus standard ISO 9001:2015, *Quality Management Systems*, and related DOE directives, except for DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*. OSO invoked special requirements in section H-15 of its contract with UT-Battelle for the UT-Battelle contractor assurance system at ORNL (which includes issues management) instead of DOE Order 226.1B. The procedures in the *Issues Management and Analysis* (IMA) subject area of the ORNL Standards-based Management System (SBMS) provide UT-Battelle’s overall expectations and processes for managing issues.

For operation of existing nuclear facilities, the UT-Battelle *Quality Assurance Program* commits to applicable portions of American Society of Mechanical Engineers consensus standard Nuclear Quality Assurance (NQA)-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications*. Issues management requirements in NQA-1-2000 are adequately provided on a project- or process-specific basis for the reviewed functional areas, except for the Research Reactors Division (RRD). Specifically, QP-1000, *RRD Implementation of Quality Assurance Program*, and RRD procedures do not flowdown (invoke) requirement 16 in NQA-1-2000 to correct conditions adverse to quality “as soon as practicable.” (See **Deficiency D-UT-Battelle-1.**) Consistent with the general discussion in section 3.4, RRD personnel have resolved issues under their cognizance in a timely manner despite QP-1000 omitting the NQA-1-2000 requirement.

Procedures in the SBMS *Event Reporting and Follow-up* subject area and the *Significance Determination Table* exhibit of the IMA provide direction on how to identify, determine the reporting level of, and categorize events that are required to be reported to DOE per DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*. Per the *Significance Determination Table* exhibit, high and

low reporting level occurrences, as defined in DOE Order 232.2A, are categorized as “serious” and “important” issues, respectively, and informational reports are “minor” issues. The IMA procedures only require causal analyses for serious and important issues and CAPs for serious issues. The IMA procedures provide guidance that an independent reviewer validating a CAP ensure “the issue [has] been evaluated for potential generic implications or lessons learned.” However, DOE Order 232.2A, attachment 1, section 4.b, states facility managers are responsible for determining the causes and generic implications for all reportable occurrences, including informational reports. (See **Deficiency D-UT-Battelle-2.**) Not flowing down this DOE Order 232.2A requirement into the IMA increases the likelihood that the causes and generic implications will not be determined or corrected for occurrences at the low reporting level or reported for information as required by DOE Order 232.2A.

### **Flowdown of Issues Management Requirements Conclusions**

UT-Battelle adequately flows down requirements for managing issues via its sitewide *Quality Assurance Program* description and project- and process-specific programs and procedures, with the following exceptions: (1) the NQA-1-2000 requirement to correct conditions adverse to quality “as soon as practicable” is not flowed down to the RRD, and (2) the responsibility for facility managers to determine the causes and generic implications for all reportable occurrences is not flowed down into IMA procedures.

### **3.2 Issue Identification and Categorization**

This portion of the assessment examined whether issues and trends are identified and properly categorized to meet the requirements for issues management per the UT-Battelle *Quality Assurance Program* description.

#### **3.2.1 Issue Identification**

UT-Battelle initiates and manages approximately 1,500 issues per year, demonstrating an overall willingness to identify and enter issues into ACTS. At ORNL, issues are “findings, deficiencies, or any other item of interest that warrants or demands management attention to correct and track to closure for the purpose of improving performance. Issues can also be defined as strengths and noteworthy practices.” Issues entered into ACTS are primarily “identified through various assessment processes or self-disclosing events.” The IMA does not discuss a means (e.g., a form or points of contact) for working-level employees that have limited computer access or do not perform assessments to readily identify issues. (See **OFI-UT-Battelle-1.**)

As discussed in section 3.5, the Environmental Protection Services Division and the Transportation and Waste Management Division conducted assessments of radioactive waste generation activities, proactively identifying issues after the last EA assessment in December 2019. Additionally, as reported in the 2018 *Management Assessment of Issues Management Implementation in the Assessment and Commitment Tracking System (ACTS)*, the Performance Assurance and Quality (PAQ) Division also reviewed the management of a representative sample (219) of ACTS records and identified four findings and two OFIs to help UT-Battelle improve its issues management. Moreover, after reviewing EA report *Assessment of the Management of Nuclear Safety Issues at the Los Alamos National Laboratory – April 2019*,” the PAQ Division conducted assessments in February 2020 and December 2021 (documented in ACTS items 22360 and 23494, respectively) of UT-Battelle’s management of nuclear safety issues “to determine if similar potential weaknesses exist [at ORNL] so that appropriate actions can be taken.” UT-Battelle took effective actions in response to these proactive PAQ Division assessments (e.g., training UT-Battelle personnel on the lessons-learned from the EA assessment at the Los Alamos National Laboratory) to improve the implementation of its issues management processes. These PAQ activities (biennial assessments of issues management, review of lessons-learned at other sites, and taking effective

actions based on these reviews) are cited as a **Best Practice** because they significantly contributed to the proactive issues management practices demonstrated at ORNL and these activities merit consideration by other DOE contractors to improve their issues management.

The proactive issues management practices demonstrated by UT-Battelle personnel enabled them to resolve nearly all the issues reviewed by EA in a timely manner, leaving only a few unresolved weaknesses and vulnerabilities in the management of safety issues. For example, UT-Battelle is vulnerable to undetected weaknesses in its CONOPS and nuclear worker qualification programs because UT-Battelle assessments of CONOPS and nuclear qualification programs have been limited reviews of associated procedures and records and have not included observations of the implementation of these programs that can identify issues before they potentially impact nuclear safety. (See **OFI-UT-Battelle-2.**) In October 2021 and February 2022, OSO assessments of the ORNL lockout/tagout program and CONOPS at the High Flux Isotope Reactor (HFIR) (see CONOPS ACTS items 23936.1, 23936.2, 23936.3 and 24802.1 in appendix B) identified SBMS program inadequacies as well as an increase in the number of lockout/tagout deficiencies and inconsistencies with tagging requirements that were not reported in the UT-Battelle CONOPS assessments.

The SBMS *Audits and Assessments* subject area defines finding as “a noncompliance to documented requirements (including procedural, contractual, or regulatory),” whereas an OFI is a “recommendation where the reliability, effectiveness, and/or efficiency of work activities may be improved.” Although action on OFIs is optional, the *Manage Issues* procedure of the IMA requires corrective actions for findings (i.e., non-compliances) to ensure their resolution. However, non-compliances identified during assessments were reported and entered into ACTS as OFIs, contrary to the procedure in the *Audits and Assessments* subject area, for approximately 5% of the reviewed CONOPS and radioactive waste management issues, allowing some non-compliances to persist. (See **Deficiency D-UT-Battelle-3.**) For example:

- ACTS item 18310.4 reported that learning objectives are vague and not clearly aligned with position tasks and qualification requirements which is contrary to DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*.
- ACTS item 22002.2 reported that the required reading program is not able to track the completion of required reading, which is contrary to DOE Order 422.1, *Conduct of Operations*.
- ACTS item 19141.57 reported that required inspections of hazardous waste were not performed.
- ACTS item 19141.62 reported omissions in the required log entries for a satellite accumulation area (SAA).
- Additional examples of non-compliances being incorrectly identified as OFIs are included in the EA comments in appendix B. (See Radioactive Waste Management ACTS items 19141.46, 19141.47, 19141.50, 19141.58, 19141.61, and 21542.3, and CONOPS ACTS items 18310.9, 21120.4, 21221.2, 21221.3, and 22002.3.)

An important mechanism for identifying safety issues is the evaluation of performance information for discernable trends. The PAQ Division adequately identifies and reports trends in operational and reportable events across ORNL every trimester and documents its assessment of issues management performance across ORNL in an assessment activity report in ACTS monthly. However, the management system owner for CONOPS and some line managers are not assessing performance for trends as rigorously within their areas of cognizance making UT-Battelle vulnerable to the possibility of undetected trends that could potentially impact nuclear safety. (See **OFI-UT-Battelle-2.**) For example:



- Periodic reports of performance indicators for the Non-reactor Nuclear Facilities Division (NNFD) and RRD provide data without assessment (e.g., without identifying conclusions drawn from this data) or actions taken.
- The last quarterly report issued for NNFD was for the fourth quarter of FY 2021.
- The management system owner for CONOPS relies on NNFD and RRD to assess the effectiveness of this program.

### 3.2.2 Issue Categorization

Per the *Screen Issues* procedure of the SBMS *Safety and Security Regulatory (SSR) Program* subject area, issues are screened “for nuclear safety, worker safety and health (WSH) safety and security regulatory (SSR) noncompliances” warranting reporting per DOE Order 232.2A or the DOE Non-compliance Tracking System (NTS). Per the *Manage Issues* procedure of the IMA, the assigned “issue owner determines significance level as serious, important, minor, or organizational trending following Significance Determination Table exhibit” considering the results of the SSR screening and methodology included in the exhibit. The *Manage Issues* procedure specifies more rigor for evaluating issues of greater significance and validating the effectiveness of corrective actions. For example, root cause analyses, extent-of-condition reviews, corrective actions to prevent recurrence, and effectiveness reviews are required for “serious” issues. Items screened for organizational trending are tracked (monitored) by management system owners and line management and are commonly entered into databases other than ACTS, such as the UT-Battelle Radiological Event Reports (RERs) database.

For the 3,189 issues entered into ACTS since October 1, 2019, UT-Battelle categorized 1.3% (42 out of 3,189) as serious, 21.7% (692) as important, and 77% (2,455) as minor. This distribution of issues across the serious, important, and minor significance levels and the issues EA reviewed demonstrate that UT-Battelle is proactively categorizing issues to often require use of its more rigorous issues management tools (e.g., causal analyses and effectiveness reviews) to ensure that issues are resolved. UT-Battelle issue owners also often elect to use these more rigorous tools when they are not required by the *Manage Issues* procedure (based on selected significance level of the issue). This practice of proactively using its more rigorous issues management tools is cited as a **Best Practice** because it has significantly contributed to UT-Battelle’s resolution of issues before they degrade or remove layers of defense (barriers) preventing significant safety-related consequences and merits consideration by other DOE contractors to reduce risk and attain superior performance.

Despite UT-Battelle’s proactive categorization of issues, EA identified that UT-Battelle categorized some issues with significant potential consequences and some assessment findings lower than required by the *Significance Determination Table* exhibit of the IMA. The rigor required by the *Manage Issues* procedure to ensure that issues and findings are adequately analyzed and corrected is not applied if they are categorized too low, allowing some of them and/or their causes to persist.

#### Categorization of Issues with Significant Potential Consequences

The *Significance Determination Table* exhibit of the IMA states, “Significance of an issue is determined to be serious, important or minor based on the potential consequences to the public, national security, personnel, environment or the laboratory.” However, the table of examples included in the exhibit, only lists significance levels for issues with actual consequences. During interviews, several UT-Battelle personnel (issue owners, matrixed quality assurance personnel) stated that they only use the table of examples in the exhibit when determining significance level, instead of the exhibit’s overall methodology that directs issue owners to consider potential consequences. EA identified the following five issues that required a higher categorization per the *Significance Determination Table* exhibit than was made based on the potential for significant consequence (see **Deficiency D-UT-Battelle-4** and **OFI-UT-Battelle-3**):

- ACTS item 24327.1 reported a researcher carrying a neutron monitor that was later found to be 10 Roentgen per hour (R/hr) on contact. There were no actual consequences from this event because the neutron monitor was carried by a long handle, away from the researcher and collocated workers. ACTS item 24327.1 did not meet DOE Order 232.2A reporting thresholds and was categorized as being minor in significance despite the potential for significant consequences. For example, had the neutron monitor been positioned close to the researcher or a collocated worker, personnel radiation exposure could have exceeded control levels within minutes. Although the issue was categorized as a minor issue, UT-Battelle performed an investigation including a causal analysis and completed extensive corrective actions.
- ACTS item 0.38648 reported that an administrative control (allocation) was unintentionally exceeded for a location. This administrative control is used to prevent exceedance of the fissile mass inventory limit for a facility based on DOE-STD-1027-2018, *Hazard Categorization of DOE Nuclear Facilities*. However, this item was categorized too low as a minor issue because the limit was not actually exceeded, despite the potential to exceed the inventory limit and, hence, the DOE authorization for UT-Battelle to operate the facility based on the approved safety basis. Per EPSTWM-AP-201, *Environmental Protection Services Division and Transportation and Waste Management Division Standard Operating Procedure for Documenting Problem Events*, cause codes were determined for this issue despite its categorization as minor.
- ACTS item 0.39839 was categorized as a minor issue despite reporting several failures of work controls for safely staging the correct test specimen in the HFIR pool. Specifically, ACTS item 0.39839 reported this test specimen and others were mislabeled, miscommunications between researchers and operators performing the test, work being performed to the incorrect radiological work package resulting in workers receiving a higher dose rate than expected, and an inadequate pre-job brief. These failures increase the potential for placing an incorrect specimen in the reactor, contrary to the requirements of DOE Order 422.1 for configuration control, and could have had additional adverse impacts on dose rates and material reactions.
- Two additional examples of issues with potential consequences requiring a higher categorization are included in the EA comments in appendix B. (See CONOPS ACTS items 0.39347 and 0.42906 and Radiological Controls ACTS item 0.41009.)

### **Categorization of Assessment Findings**

Assessment findings (non-compliances or non-conformances) are often categorized too low as minor issues, contrary to the *Significance Determination Table* exhibit, which directs “nonconformities related to requirements noted in management systems supporting the ISO-14001, ISO-9001, and [OHSAS]-18001 standards” to be categorized at least as important issues. The acting PAQ Division Director stated that UT-Battelle has previously taken action to mitigate the categorization of findings below important. Specifically, the *Manage Issues* procedure notes that “ACTS will prompt the issue owner or delegate for a DOE Cause Code for those issues identified as findings (including **nonconformances**) regardless of significance assigned (see Perform Causal Analysis procedure).” Additionally, the PAQ Division provided training to quality representatives (distributed within line management) to highlight that findings are required to be categorized at least as important issues. Although this training was effective at ensuring that findings against radiological control requirements have been correctly categorized since the second half of 2021, some issue owners and quality representatives across the rest of ORNL continue to often categorize findings too low. Specifically, the EA assessment team identified that since January 1, 2020, approximately 74% (430 of 582) of UT-Battelle-identified findings associated with CONOPS requirements, 22% (95 of 439) of safety basis implementation and radiological control findings, and 12% (13 of 106) of radioactive waste management findings were categorized as minor issues rather than at least important issues, contrary to the *Significance Determination Table* exhibit. (See **Deficiency D-UT-**

**Battelle-5.)** Comments on findings reviewed by EA are detailed in appendix B (see CONOPS ACTS items 0.36918, 0.39168, 0.39839, 0.40108, 0.40478, 14882.1, and 15124.11; Radioactive Waste Management ACTS items 16623.8 and 22286.2; Radiological Controls ACTS items 19870.1 and 23977.1; and Safety Basis Implementation ACTS item 23938.1).

### **Issue Identification and Categorization Conclusions**

UT-Battelle demonstrates a willingness to identify and enter issues into ACTS and to improve its issues management performance by biennially assessing the implementation of its processes and importing lessons-learned from other DOE sites. However, UT-Battelle misidentified some findings as OFIs, which the UT-Battelle *Manage Issues* procedure does not require to be corrected. Additionally, UT-Battelle's trending and assessment of its CONOPS, nuclear qualification programs, and NNFD and RRD performance are insufficient to identify implementation issues and adverse trends making UT-Battelle vulnerable to the possibility of undetected weaknesses that could potentially impact nuclear safety.

The distribution of issues categorized as serious, important, and minor and the EA review of issues demonstrate that UT-Battelle is proactively using its more rigorous issues management tools (e.g., causal analyses and effectiveness reviews) to ensure that issues are resolved. UT-Battelle issue owners also often choose to use these more rigorous tools to ensure issue resolution even though they are not required by the *Manage Issues* procedure. However, since January 1, 2020, UT-Battelle categorized some issues and findings too low (i.e., five issues with significant potential consequences and 74% of CONOPS findings, 22% of safety basis implementation and radiological control findings, and 12% of radioactive waste management findings identified by UT-Battelle assessments were categorized lower than required).

### **3.3 Issue Resolution**

This portion of the assessment evaluated whether the issues management system includes structured processes, using a graded approach based on risk, for identifying the causes, the extent of the condition and/or causes, and corrective actions for issues and for reviewing the effectiveness of actions taken to ensure that issues are resolved.

The *Manage Issues* procedure adequately sets minimum requirements for analyzing and resolving issues based on the assigned category. For example, a serious issue requires a root cause analysis, extent-of-condition review, CAP, validation of CAP adequacy by an independent reviewer, a review by the ORNL Corrective Action Institutional Review Board (CAIRB) for issues that represent a “potential liability and contractual or enforcement risk to UT-Battelle,” verification of corrective action completion by an independent reviewer, and an effectiveness review. Important issues require apparent cause analyses and corrective action, while noting that issue owners should consider using the issues management tools used for serious issues (e.g., a root cause analysis and extent-of-condition review). The *Manage Issues* procedure requires corrective actions for minor issues designated as safety and security regulatory issues. For other minor issues, corrective action or “an explanation of basis for closure of issue is entered in ACTS.” Except for safety and security regulatory issues, corrective action is not required for issues categorized for organizational trending.

Per the ORNL *Charter for the Corrective Action Institutional Review Board*, a quorum of at least four representatives of various ORNL organizations conduct a “review of corrective action plans (CAP) for lab-wide issues of significant operational risk, NTS Reports, high risk incidents of security concern (IOSCs), and DOE or other external assessments, ensuring the actions are aligned with the Laboratory's strategy and expectations. The CAIRB reviews the corrective action plans for achievability and effectiveness, while also considering other lab-wide priorities, actions, and impacts.” CAIRB discussions were clearly marked in reviewed CAPs (e.g., adjacent to specific actions) and demonstrated a thorough review and coordination of the actions within the CAP with lessons-learned and ongoing initiatives across

DOE (e.g., actions being taken by other DOE contractors shared within the Battelle Memorial Institute communities of practice). This coordination of CAP actions is cited as a **Best Practice** that merits consideration by other DOE contractors because it enables UT-Battelle to improve based on lessons-learned at ORNL and other sites and to more efficiently build on ongoing improvement initiatives across DOE.

UT-Battelle has implemented a graded approach to resolve nearly all reviewed issues. In particular, UT-Battelle made significant improvements in its processes and training for manually moving heavy loads in response to the inadvertent tipping of a 5,000-pound gamma detector, which resulted in superficial injuries to an employee. However, some issues have not been adequately resolved. Strengths and vulnerabilities in specific elements of UT-Battelle's management of issues are discussed below.

### **Management of Non-compliances with Continuing Training Requirements for Nuclear Worker Qualifications**

UT-Battelle has not adequately managed non-compliances regarding continuing training requirements for maintaining nuclear worker qualifications, contrary to DOE Order 426.2, NQA-1-2000, and NNFD-009, *NNFD Training Program Manual*. (See **Finding F-UT-Battelle-1.**) Specifically:

- ACTS item 17930 documented that the results of the FY 2015 assessment of the NNFD training and qualification program were not entered into ACTS until May 2019 and remained open through February 2020.
- The next triennial assessment (see ACTS item 18310) in FY 2018 identified that the continuing training plan required by NNFD-009 had not been developed for calendar years (CYs) 2017 and 2018 (see ACTS item 18310.7). The CAP for ACTS 17930 and 18310 was not developed until April 2019 which is not timely.
- The NNFD responses to ACTS items 17930 and 18310 assessments did not document any evaluations for nuclear work performed by potentially unqualified workers. Additionally, mitigating actions taken for nuclear workers who may not have received the continuing training required to maintain their qualifications was not documented. The CAP for ACTS items 17930 and 18310 only required issuance of the continuing training plan for CYs 2019 and 2020.
- During this assessment, EA identified that one of the NNFD continuing training plans for CYs 2021 and 2022 had not been issued and that the draft plan did not meet the minimum requirements in DOE Order 426.2 for continuing training.

Not conducting required continuing training is contrary to the systematic approach for nuclear worker qualification of DOE Order 426.2 as invoked by NNFD-009. This systematic approach is a key element of the NNFD-009 safety management program in providing nuclear safety at ORNL. During this EA assessment, the NNFD division head stated that NNFD would evaluate the adequacy of the continuing training program to ensure that NNFD nuclear workers are qualified to continue to perform nuclear work. NNFD is tracking this evaluation via ACTS item 25072.

### **Ongoing Electrical Safety Events**

To resolve weaknesses in the implementation of the UT-Battelle electrical safety program and its lockout/tagout processes, UT-Battelle developed corrective actions in response to specific issues (see CONOPS ACTS items 0.36663, 0.38414, 0.37190, 0.38584, 0.39033, 0.39168, 0.39724, 0.39797, 0.41137, 0.41099, 0.42396, and 0.42906 in appendix B) and, in October 2021, performed a common-cause analysis of some of these issues and initiated additional corrective actions. However, subsequently, the *Oak Ridge National Laboratory Contractor Assurance System (CAS) Report*, dated March 2022,

states, “Electrical-related events continue as an unfavorable trend” due to issues in other areas not addressed by the corrective actions from the common cause analysis. Additionally, the PAQ trending analysis for the second quarter of FY 2022 stated that hazardous energy events are the most common reportable occurrence at ORNL and that 31% of these events involve a worker or a worker’s tool contacting a source of electricity. (See **OFI-UT-Battelle-4**.)

## Critiques

Procedures in the SBMS *Critiques and Investigations* subject area provide direction on how “to gather facts related to an event in order to better understand why the event occurred and what can be learned from it to improve future performance.” Line managers are also encouraged to perform critiques of lower significance issues as “management discretion critiques,” using the procedures in the *Critiques and Investigations* subject area as a guide. The PAQ monthly metrics for April 2022 show that in FYs 2020, 2021, and to-date in FY 2022, line managers decided to conduct critiques for lower significance issues (i.e., management discretion critiques) for over 95% (i.e., 54 of 57) of the critiques conducted. This practice of conducting critiques for lower significance issues complements UT-Battelle’s proactive use of the rigorous issues management tools discussed in section 3.2.2 and is cited as another element of the corresponding **Best Practice** because it has significantly contributed to UT-Battelle’s resolution of issues before they degrade or remove layers of defense (barriers), preventing significant safety-related consequences.

For most of the critiqued issues, UT-Battelle line management effectively used procedures in the *Critiques and Investigations* subject area to establish the problem and its scope, immediate and mitigating actions, probable causes, and a potential CAP. However, completion of immediate and mitigating actions and initial actions to determine the scope or extent-of-condition were not documented in the ACTS items for several critiqued events or issues (see section 3.4).

## Causal Analyses

UT-Battelle qualifies personnel to conduct apparent and root cause analyses throughout its organization. This practice identifies causes for less significant issues because personnel who are proficient in causal analyses also determine the causes of issues even when a formal causal analysis is not required by the UT-Battelle graded approach. Causal analyses required by the UT-Battelle graded approach for serious and important issues adequately identified causes to support the development of corrective actions for nearly all issues reviewed by EA. However, UT-Battelle did not determine the causes and/or take corrective actions to prevent recurring weaknesses, leading to RRD personnel misinterpreting data in May 2018 and prematurely accepting out-of-compliance fuel for HFIR in January 2020. The *Manage Issues* procedure and NQA-1-2000 require causes to be determined and corrective actions to be taken for important issues and significant conditions adverse to quality. (See **Deficiency D-UT-Battelle-6** and CONOPS ACTS items 0.36918, 0.39347, 0.39348, and 0.39349.) Although formal evaluations subsequently determined that the non-conformances were acceptable as is, neglecting to correct the causes of these weaknesses in the UT-Battelle review of non-conformances allows them to persist.

An allowance in the *Perform Causal Analysis* procedure of the IMA may have contributed to **Deficiency D-UT-Battelle-6**. Specifically, the *Perform Causal Analysis* procedure states that an apparent cause analysis can be limited to the selection of a cause code of the DOE cause code analysis tree associated with DOE Order 232.2A as long as the causal analyst “provides short justification for selection of cause code in applicable ACTS field.” Cause codes are used to help identify trends, but they are not actionable by themselves because they do not specifically identify a cause of an issue. (See **OFI-UT-Battelle-5**.)

EA's review of root cause analyses identified that UT-Battelle causal analysts inconsistently identified causes as either direct, root, or contributing causes. (See **OFI-UT-Battelle-6.**) Resources are sometimes prioritized to focus on actions to resolve root causes, so inconsistent identification (labeling) of direct, root, and contributing causes can be problematic.

### **Extent-of-Condition Reviews**

As discussed above, the procedures in the SBMS *Critiques and Investigations* subject area provide direction or guidance for conducting management discretion critiques to determine the scope (preliminary extent of condition). The *Manage Issues* procedure requires formal extent-of-condition reviews for serious issues and requests issue owners to consider conducting an extent-of-condition review for important issues. UT-Battelle extent-of-condition reviews are "a determination of the breadth and depth of the condition or cause across the laboratory," so they are typically conducted following the causal analysis, which can be completed months after the issue is discovered. The formal extent-of-condition reviews that EA reviewed were adequate. However, as discussed in section 3.4, completion of scoping actions assigned during several critiques was not adequately documented.

### **Corrective Actions**

The *Manage Issues* procedure provides adequate direction to establish corrective actions, and UT-Battelle issue owners took adequate action to resolve nearly all issues reviewed. Comments on corrective actions for specific issues are in appendix B.

### **Effectiveness Reviews**

The *Perform Effectiveness Review* procedure of the IMA provides the requirements for conducting and managing the results of effectiveness reviews for serious issues. Although effectiveness reviews are only required for serious issues, the *Perform Effectiveness Review* procedure states that "it is routine for the affected organization to determine that corrective actions implemented were effective and corrected identified condition as intended. This can be done formally or informally as part of the organization's assessment program." For other issues (i.e., issues not categorized as serious), issue owners use the *Perform Effectiveness Review* procedure as guidance.

The issues reviewed by EA routinely included some assessment or review to ensure that serious and important issues were effectively resolved. Although the formal effectiveness reviews conducted for serious issues adequately reviewed the effectiveness of the CAPs to resolve the identified causes, six of eight effectiveness reviews evaluated by EA did not include an analysis of similar issues or observations of similar work that occurred after corrective actions were implemented. The plans for these effectiveness reviews stated that the similar issues would be evaluated. The *Perform Effectiveness Review* procedure of the IMA requires the issue owner to approve the plan and review the report of the effectiveness review to ensure that their scope and quality are adequate. However, the effectiveness review leads and the respective issue owners did not ensure that the plan was adequately implemented. (See **Deficiency D-UT-Battelle-7.**) Specifically:

- An effectiveness review performed in January 2022 for the fuel failure in November 2018 (ACTS item 0.37730) did not document related fuel fabrication events that were analyzed in 2020, after corrective actions for the fuel failure were implemented. A comprehensive review of the related fuel fabrication events and documentation for actions taken in response to the fuel failure in November 2018 is beyond this assessment. However, "based on a thorough review of this documentation, the Office of Enforcement, the Office of Science, and the Oak Ridge National Laboratory Site Office agree that UT-Battelle has satisfactorily addressed the actions delineated in the Consent Order" NCO-2021-01 for the November 2018 fuel failure so no further EA action is warranted at this time.

- The effectiveness review for a serious issue concerning a subcontractor’s failure to follow a UT-Battelle hazardous energy control procedure (ACTS item 0.39797) reviewed documentation and performed interviews to assess effectiveness without evaluating similar occurrences.
- Additional cases are discussed in the EA comments in appendix B. (See CONOPS ACTS items 0.36663, 0.37190, 0.39455, and 0.40048.)

### Issue Resolution Conclusions

UT-Battelle is proactively critiquing low significance issues/events at management discretion to help resolve these issues, and is adequately implementing its graded, structured approach for issue resolution. UT-Battelle took adequate action to resolve nearly all issues reviewed by EA, and the CAIRB is effectively integrating lessons-learned and ongoing initiatives across DOE into CAPs at ORNL. However, UT-Battelle management has not adequately resolved issues associated with the continuing training required for NNFN nuclear worker qualifications, and significant electrical safety events continue at ORNL despite actions taken by UT-Battelle. Six of eight effectiveness reviews reviewed by EA did not include an analysis of similar issues that occurred after corrective actions were implemented.

### 3.4 Timeliness and Closure

This portion of the assessment evaluated whether planned corrective actions are completed in a timely manner and that closure is adequately documented.

Nearly all issues reviewed by EA were resolved and adequately documented in a timely manner. A few issues that were not are discussed below, along with vulnerabilities identified in UT-Battelle’s management of safety issues.

#### Timeliness of Issue Closure

The PAQ trending analysis report for the second quarter of FY 2022 states that 41% of critiques in FY 2022 were convened within one to three days of the event and that “all lagging critiques have been at management discretion,” demonstrating that required critiques are being conducted in a timely manner. The PAQ report also identifies the top 10 directorates that have open issues that are overdue (i.e., issues that have an open action past the commitment set by the issue owner). However, the PAQ Division does not monitor the age of issues to ensure that they are being resolved in a timely manner. The date an issue was identified is not entered into a field within the ACTS database. Not monitoring the age of issues makes UT-Battelle vulnerable to issues (e.g., conditions adverse to quality) remaining open unnecessarily rather than being resolved “as soon as practicable” as required by NQA-1-2000. For example, issue owners can set untimely due dates (either initially or by excessively extending due dates) without being monitored or reported in the current PAQ trending analysis reports. (See **OFI-UT-Battelle-7**.)

EA identified a few conditions adverse to quality and significant conditions adverse to quality, as defined by NQA-1-2000, that were not resolved “as soon as practical,” as required by NQA-1-2000. In some cases, delays in entering issues into ACTS delayed their resolution. (See **Deficiency D-UT-Battelle-8**.) Specifically:

- As discussed in section 3.3, delays in entering the FY 2015 and FY 2018 training assessments of NNFN facilities and the findings identified during these assessments delayed resolution of these non-compliances. (See **Finding F-UT-Battelle-1**.)
- ACTS item 0.38488 documented an error regarding safety significant software. The issue was identified on July 15, 2019; the critique occurred on July 16, 2019; and the critique report was issued on August 7, 2019; however, the issue was entered into ACTS on June 8, 2020, almost a year after the

issue was identified, delaying verification of corrective action completion and the effectiveness review.

- Additional examples are discussed in the EA comments in appendix B. (See Radioactive Waste Management ACTS items 0.38648 and 22493.6, Radiological Controls ACTS item 0.41033, Safety Basis Implementation ACTS items 0.40777 and 18573.48, and CONOPS ACTS item 15124.11.)

The following factors may be contributing to the delays in entering issues into ACTS:

- The *Manage Issues* procedure of the IMA does not provide a definitive expectation on when an issue should be entered in and tracked via ACTS (e.g., within how many days after an issue is discovered or an assessment finding is issued). Instead, the *Manage Issues* procedure states, “This procedure starts when an issue has been identified and formulated into a concise issue statement.” During interviews, some issue owners and quality representatives stated that they enter issues in ACTS after the critique, development of the CAP, or issuance of the critique report.
- Some issues have been allowed to remain in a draft status in ACTS for up to a year (see Safety Basis Implementation ACTS item 0.38488 and Radioactive Waste Management ACTS item 0.39790). The number and age of draft issues are not monitored in PAQ trending analysis reports.
- During interviews, several issue owners and quality representatives described ACTS as a commitment tracking system and stated that it is not used to implement UT-Battelle issues management procedures. However, the *Manage Issues* procedure notes that the “ACTS database is the primary tool used to implement and document the issues management process.”

### Documentation of Issue Closure

The IMA *Corrective Action Plan Development and Documentation* exhibit states the expectations and requirements for documenting the resolution of serious and important issues. Minor issues can be closed with a description of the actions taken, or “if no corrective actions are specified, an explanation of basis for closure of issue is entered in ACTS.” Per the *Manage Issues* procedure, an “independent reviewer verifies closure of corrective actions” for serious issues. UT-Battelle issue owners provided adequate documentation to support them closing nearly all reviewed issues. However, approximately 3% (12 of 413) of the reviewed issues, including a concern on the adequacy of the transportation safety basis, did not have adequate closure evidence providing “a description of the work or of the documentation stating or showing that an action or issue has been completed,” contrary to the IMA *Definition* exhibit. Inadequate closure evidence indicates that the completion of corrective actions has not been verified, contrary to NQA-1-2000, requirement 16. (See **Deficiency D-UT-Battelle-9**.) Specifically:

- ACTS item 16623.5 describes procedures allowing radioactive material transportation routes that are not authorized by transportation safety documents. During interviews, UT-Battelle personnel provided data showing that the ACTS issue statement was not accurate. However, the inaccurate ACTS issue statement was not corrected or addressed in the disposition of this item.
- The results of actions established during a few critiques (e.g., actions to determine the scope of the issue and to mitigate the issue until corrective actions are taken) were not in the ACTS record or in the critique report. (See CONOPS ACTS items 0.42701 and 0.42906, Radioactive Waste Management ACTS item 22493.6, and Radiological Controls ACTS items 0.39487 and 0.41847.)
- Documentation demonstrating completion of actions referenced in a few extent-of-condition and lessons-learned reviews was not in the ACTS record. (See CONOPS ACTS items 0.39033 and 0.39455.)



- Additional examples are included in the EA comments in appendix B. (See Radioactive Waste Management ACTS item 0.40512, Radiological Controls ACTS item 0.41009, and Safety Basis Implementation ACTS items 0.39296 and 23912.3.)

### **Timeliness and Closure Conclusions**

Nearly all the issues reviewed by EA were resolved and adequately documented in a timely manner. However, a few conditions adverse to quality and significant conditions adverse to quality were not resolved “as soon as practical.” UT-Battelle’s practice of monitoring the status of corrective actions relative to due dates set and extended by issue owners without monitoring the age of issues allows corrective actions to be unnecessarily delayed without detection. Also, for a few of the reviewed issues, issue owners did not adequately document the results of actions established in critiques and lessons-learned and extent-of-condition reviews.

### **3.5 Follow-up of 2020 EA Finding and Deficiencies**

This portion of the assessment examined the completion and effectiveness of corrective actions for the finding and deficiencies regarding UT-Battelle’s management of radioactive waste as identified in EA interim report *Assessment of Radioactive Waste Management at the Oak Ridge National Laboratory – April 2020*.

Finding F-UT-B-1 identified that contrary to DOE Order 435.1, *Radioactive Waste Management*, UT-Battelle had not adequately “systematically planned, documented, executed, and evaluated” radioactive waste management activities in the Radiological Materials Analytical Laboratory and Low Activation Materials Development and Analysis Laboratory at ORNL. The previous EA assessment also identified several deficiencies and weaknesses related to Finding F-UT-B-1 in the management of small quantities of mixed low-level waste (MLLW) and low-level waste (LLW) generated in these radiological laboratories that were not addressed by corrective actions after UT-Battelle’s shipment of MLLW to the commercial LLW Bear Creek Processing Facility in August 2016.

UT-Battelle addressed this finding and the related four deficiencies and four weaknesses within ACTS item 22148.1. The following SBMS procedure changes were implemented as corrective actions:

- Added specific instructions regarding LLW staging requirements and accumulation of excess radioactive equipment and materials, including a requirement for generators to develop a plan to reduce or eliminate these excess materials.
- Added an operator aid for managing radioactive and mixed waste in radioactive waste staging areas and SAAs that can be posted for reference.
- Added a requirement that divisions generating radioactive waste conduct annual self-assessments on their conformance to requirements for managing radioactive and mixed waste in radioactive waste staging areas and SAAs with an emphasis on marking, control, and accumulation of excess material.

EA document reviews and field observations show that the actions taken by UT-Battelle have significantly improved its management of radioactive waste. However, it is too early to assess the implementation of several of the corrective actions taken in response to the previous EA assessment. For example, only one self-assessment has been performed by a waste generating division per the new procedural requirement, so it is too early to assess whether the waste generating divisions are adequately self-assessing their performance. During independent assessments, environmental protection officers and Transportation and Waste Management Division personnel have identified a significant number of deficiencies in the management of radioactive waste by waste generating divisions.

While reviewing changes made to training requirements in response to weaknesses identified in the previous EA assessment, EA identified potential ambiguities in the training requirements for SAA operators and alternates. In the SBMS *Training Requirements: Environmental and Waste Management* exhibit, the “Waste Management Training” matrix includes footnote six, which states, “Training applicable for all ORNL managed facilities.” Footnote seven states that “the requirement for this training is not a regulatory mandate,” implying it is a requirement UT-Battelle is self-imposing to ensure adequate radioactive waste management. However, some UT-Battelle personnel stated during interviews that footnote seven made the training for SAA operators and alternates optional. Subsequently, UT-Battelle revised footnote seven to state “Implementation of this training is determined by the line organization...,” which implies the line organization can determine the training is not required contrary to footnote six so the ambiguity concerning the training requirements for SAA operators and alternates persists.

The EA site lead will coordinate with OSO to review the UT-Battelle effectiveness review of the implementation of the actions taken. The UT-Battelle effectiveness review is currently scheduled for September 2022.

### **Follow-up of 2020 EA Finding and Deficiencies Conclusions**

Document reviews and field observations by EA show that the actions taken by UT-Battelle have significantly improved its management of radioactive waste. However, it is too early to assess the implementation of several of the corrective actions taken in response to the previous EA assessment.

## **4.0 BEST PRACTICES**

Best practices are safety-related practices, techniques, processes, or program attributes observed during an assessment that may merit consideration by other DOE and contractor organizations for implementation. The following best practices were identified as part of this assessment:

- UT-Battelle biennially assesses the implementation of its issues management procedures by reviewing the management of a representative sample of issues in certain areas (e.g., nuclear safety). UT-Battelle also incorporates lessons-learned from similar assessments across DOE into its assessments. UT-Battelle takes action based on its assessments to improve its issues management (resolution). Subsequently, this EA assessment identified that UT-Battelle resolved and adequately documented nearly all the issues reviewed in a timely manner.
- UT-Battelle often categorizes issues as serious and important, and its issue owners often choose to use discretionary critiques, causal analyses, and informal effectiveness reviews when not required to ensure that issues are resolved. This practice has significantly contributed to UT-Battelle’s resolution of issues before they degrade or remove layers of defense (barriers), preventing significant safety-related consequences.
- As part of its review of CAPs, the UT-Battelle CAIRB coordinates actions within the CAP with lessons-learned and ongoing initiatives across DOE (e.g., actions being taken by other DOE contractors shared within the Battelle communities of practice) to improve performance.

## **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 to manage the corrective actions and track them to completion.

#### UT-Battelle, LLC

**Finding F-UT-Battelle-1:** Since FY 2015, UT-Battelle has not adequately managed (resolved) NNFD non-compliances regarding continuing training requirements for maintaining nuclear worker qualifications or evaluated nuclear work performed by potentially unqualified workers to ensure nuclear facility safety. (DOE Order 426.2, NNFD-009, and NQA-1-2000, requirement 16)

## 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.

#### UT-Battelle, LLC

**Deficiency D-UT-Battelle-1:** The UT-Battelle RRD quality assurance program QP-1000 does not flowdown (invoke) the requirement in NQA-1-2000 to correct conditions adverse to quality “as soon as practicable” to projects and facilities managed by the RRD. (NQA-1-2000, requirement 16)

**Deficiency D-UT-Battelle-2:** The UT-Battelle *Manage Issues* procedure and the *Significance Determination Table* exhibit do not adequately flowdown the responsibility in section 4.b. of attachment 1 of DOE Order 232.2A that facility managers determine causes and generic implications for occurrences at the low reporting level or reported for information. (DOE Order 232.2A, attachment 1, section 4.b)

**Deficiency D-UT-Battelle-3:** UT-Battelle incorrectly identifies some non-compliances as OFIs rather than findings. A finding as defined in the *Audits and Assessments* subject area is a condition adverse to quality that is required to be corrected. The *Manage Issues* procedure requires corrective action for a finding but not for an OFI. (*Audits and Assessments, Definition* exhibit and NQA-1-2000, requirement 16)

**Deficiency D-UT-Battelle-4:** UT-Battelle has not appropriately categorized some issues based on the potential for more significant consequences. (IMA, *Significance Determination Table* exhibit)

**Deficiency D-UT-Battelle-5:** UT-Battelle often categorizes assessment findings as minor issues which is lower than required by its procedure. (IMA, *Significance Determination Table* exhibit)

**Deficiency D-UT-Battelle-6:** In separate instances, UT-Battelle did not determine the causes and/or take corrective actions for weaknesses in the UT-Battelle review of non-conformances for HFIR fuel as required. (IMA, *Manage Issues* procedure and NQA-1-2000, requirement 16)

- Deficiency D-UT-Battelle-7:** UT-Battelle effectiveness review leads and issue owners are not adequately reviewing the scope and quality of the plans and reports of effectiveness reviews. Six of eight reports reviewed neglected to evaluate similar issues that occurred after corrective action implementation as specified in the effectiveness review plans. (IMA, *Perform Effectiveness Review* procedure)
- Deficiency D-UT-Battelle-8:** UT-Battelle has not corrected a few conditions adverse to quality and significant conditions adverse to quality “as soon as practicable” as required. (NQA-1-2000, requirement 16)
- Deficiency D-UT-Battelle-9:** UT-Battelle closed 3% of issues in ACTS reviewed by the team that did not meet UT-Battelle’s documentation requirements for closure. (IMA, *Definition* exhibit and NQA-1-2000, requirement 16)

## 7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified seven OFIs 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.

### UT-Battelle, LLC

- OFI-UT-Battelle-1:** Consider encouraging employees to identify safety issues in ACTS and providing a means for them to readily do so (e.g., developing a form for employees to use to identify issues and/or a point of contact).
- OFI-UT-Battelle-2:** Consider having line managers and management system owners:
- Annually assess performance (implementation) and issues related to the work and systems under their purview for discernable trends.
  - Document the results of these assessment activities in ACTS.
  - Share (present) the results of these assessments and the status of actions being taken for adverse trends broadly within the laboratory for awareness.
- OFI-UT-Battelle-3:** Consider revising the *Significance Determination Table* exhibit to clarify what potential consequences warrant higher categorization (e.g., indications of systemic or broad weaknesses in a safety management program and/or significant reduction or the lack of controls that could preclude a safety-related event) and/or include examples of issues with potential consequence.
- OFI-UT-Battelle-4:** Consider having an independent, third party assess electrical safety at ORNL and review the EA lessons-learned report on electrical safety scheduled to be issued in the fall of 2022.
- OFI-UT-Battelle-5:** Consider revising the *Perform Causal Analysis* procedure to require apparent cause analysts to include a statement describing the cause when cause codes are used to

determine the cause (i.e., rather than only listing the code as the cause). Clearly stated causal statements inform corrective action owners of the intent of their assigned corrective action and increase the likelihood of efficiently correcting the cause.

**OFI-UT-Battelle-6:** Consider defining direct, root, and contributing causes in the *Perform Causal Analysis* procedure.

**OFI-UT-Battelle-7:** Consider the following changes to improve the UT-Battelle management of issue resolution timeliness:

- Monitoring (reporting) issue age relative to timeliness goals.
- Revising the IMA to require the issue owner's manager to approve corrective action due dates, including extensions, greater than the UT-Battelle goal.
- Establishing criteria and/or an approval process for designating long-term corrective actions that would no longer be included in metrics that monitor the timely resolution of other issues.
- Having UT-Battelle senior management periodically (e.g., annually) review the status of long-term corrective actions to ensure their progress and priority (resources and funding) are adequate to support ORNL's mission.

## **Appendix A Supplemental Information**

### **Dates of Assessment**

Remote Assessment: April – June 2022

Onsite Assessment: May 16-18 and June 13-16, 2022

### **Office of Enterprise Assessments (EA) Management**

John E. Dupuy, Director, Office of Enterprise Assessments

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

Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments

David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments

Kevin M. Witt, Director, Office of Nuclear Safety and Environmental Assessments

Kimberly G. Nelson, Acting Director, Office of Worker Safety and Health Assessments

Jack E. Winston, Director, Office of Emergency Management Assessments

Joseph J. Waring, Director, Office of Nuclear Engineering and Safety Basis Assessments

### **Quality Review Board**

William F. West, Advisor

Kevin G. Kilp, Chair

Joseph W. Demers

Lori A. Gray

Michael A. Kilpatrick

### **EA Site Lead for Oak Ridge National Laboratory**

Sarah C. R. Gately

### **EA Assessment Team**

Joseph E. Probst, Lead

Sarah C. R. Gately

Frank A. Inzirillo

Kevin L. Tempel

## Appendix B Comments on Individual Issues

An assessment team from the U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted a detailed review of 413 issues identified in the Oak Ridge National Laboratory (ORNL) Assessment and Commitment Track System (ACTS) by “ACTS” numbers. Specifically, the EA assessment team reviewed 143 radioactive waste management issues, 125 safety basis implementation and radiological controls issues, and 145 conduct of operations (CONOPS) issues. EA’s comments on individual issues are documented in this appendix. The significance level assigned by UT-Battelle, LLC (UT-Battelle) for each issue is in parentheses and precedes the comments. The significance levels are “serious,” “important,” “minor,” and “organizational trending.” Opportunities for improvement (OFIs) are also entered into ACTS.

The procedures in the *Issues Management and Analysis* subject area of the ORNL Standards-based Management System (SBMS) provides UT-Battelle overall expectations and processes for managing issues. EA’s comments on the identification of issues, their categorization, and the timeliness of their resolution are based on the invoked requirements in applicable consensus standards and DOE directives per the UT-Battelle contract with DOE and the DOE-approved UT-Battelle *Quality Assurance Program* description.

<b>Radioactive Waste Management Issues</b>	
<b>ACTS Number</b>	<b>Comment</b>
0.38648	(Minor) There was an exceedance of the administrative fissile equivalent mass (FEM) limit allotment of 60 grams in Buildings 4501/4505. This violation of the fissile mass inventory allotment was categorized as minor because the DOE-STD-1027-2018, Change Notice 1, <i>Hazard Categorization of DOE Nuclear Facilities</i> , inventory limit was not actually exceeded. However, a higher categorization should have been considered due to the potential for exceeding the limit. No interim compensatory measures were identified to prevent recurrence while other corrective actions were developed and implemented. An interim action to develop a method to display current inventory status described a conceptual process for “inventory sharing” (ACTS item 0.38648.2). However, this approach was expert knowledge-based instead of a formally documented and controlled process. This interim corrective action took six months to close, which is excessive to address an inventory control deficiency. A new procedure, which took nearly two years to implement, appropriately addressed the issue (ACTS item 0.38648.1).
0.39743	(Minor) Changes to spreadsheets were not communicated to those who rely on impacted compliance calculations to make onsite waste movement decisions. This issue was categorized as minor despite uncommunicated software changes potentially impacting radiological material management. Also, the closure statement for this item indicates that all future changes will be communicated to the Transportation and Waste Management Division management, contrary to the requirement in the <i>Corrective Action Plan Development and Documentation</i> exhibit, which says, “Closure evidence for a corrective action or an issue must be tangible and objective.”

0.39790	(Minor) There was an error with a calculation in an excel spreadsheet due to a forced computer update that an end user was not made aware of. There was a five-month delay from event occurrence to formally opening an ACTS item. The item was opened in draft form in ACTS three weeks after the event and inadvertently left in that state for nearly five months until it was identified and corrected.
0.40512	(Important) This issue involved updated U-235 fissile equivalent mass factors that were not immediately identified and incorporated into use. For action #4, ACTS items 0.40844 through 0.40847 were listed as closure evidence. Those four ACTS items were subsequently deleted because they were considered duplicate items. (Upon identification during this EA assessment, ACTS was updated with the correct closure item numbers.) Action #5 was closed by an email requesting waste management staff to register for SBMS updates. An email request for action does not ensure completion or provide evidence of completion. (Proper closure evidence was provided and updated in ACTS during this EA assessment.)
0.42496	(Minor) There have been multiple offsite shipments of hazardous materials in which a staff member lacked training or adequate knowledge of the SBMS requirements related to those shipments. Inadequate training and/or failure to meet SBMS requirements for offsite shipments of hazardous materials should be categorized higher than a minor issue. Action item 0.42496.2 was closed by publishing a safety bulletin article in an employee general newsletter "ORNL Today." Although the article was well written and informative, there is no assurance that the intended audience received it without a verification feedback mechanism associated with a required reading or similar process.
0.42627	(Minor) Isotope Cf-249 was not accounted for in a Building 7920 radioactive waste characterization calculation. (The calculation has since been revised to include the missing isotope. A thorough review of this issue was still in progress, and corrective actions were yet to be developed.) An issue potentially impacting radiological inventory control warrants categorization higher than minor.
16623.5	(Minor) This item described procedures allowing radioactive material transportation routes that are not authorized by the transportation safety documents. Interview responses asserted that the ACTS issue statement was not accurate. However, the inaccurate ACTS issue statement was not corrected or addressed in the disposition of this item.
16623.8	(Minor) This item stated that it is unclear whether roles and responsibilities for technical safety requirements are established and defined for management and operators responsible for radioactive material movements. This finding should have been categorized as an important issue instead of minor. The <i>Significance Determination Table</i> exhibit requires "nonconformities related to requirements noted in management systems supporting the ISO-14001, ISO-9001, and [OHSAS]-18001 standards" to be categorized at least as important issues.
18573.45	(Minor) This item involved unauthorized movement of hazardous material. Action item #2 was closed by publishing a lessons-learned article deep within an employee general newsletter. There is no assurance that the intended audience received it without a verification feedback mechanism associated with a required reading or similar process.



19141	This item is for an assessment of waste generator area inspections and compliance validations at Spallation Neutron Source (SNS). While satellite accumulation areas (SAAs) and used oil collection areas were being assessed, eight of 45 active areas (18%) were not inspected because they were inaccessible during the assessment. There was no attempt to revisit them at a later/more convenient time for that assessment period. Often, the storage areas that are most difficult to access are the ones that would benefit the most from being assessed.
19141.46	(OFI) There was an assessment OFI to ensure that all SAA operators are aware of the requirement to maintain an SAA logbook. A missing SAA logbook is a procedure non-compliance and a finding instead of an OFI. A “reminder” to maintain a logbook is not an adequate action item to establish a logbook and does not allow for proper closure evidence of corrective action.
19141.47	(OFI) There was an assessment OFI to ensure that SAA operators and alternates are current in their SAA training. Required training that is not current is a finding instead of an OFI. Sending an email request to complete training is not adequate closure evidence; proof of training is proper evidence.
19141.50	(OFI) An assessment OFI identified that hazardous waste and non-hazardous waste in SAA #4505 were comingled and stored on the same shelf. The OFI recommended segregating one from the other on separate shelves and clearly marking the shelves to avoid confusion. The comingling of hazardous and non-hazardous waste is a procedure non-compliance and is a finding instead of an OFI.
19141.57	(OFI) An assessment OFI identified that closure documentation for 90-day waste accumulation areas indicated missing inspections. Inspections of these areas are required every seven days and on the day of closure. Missing or undocumented required inspections is a finding instead of an OFI.
19141.58	(OFI) An assessment OFI identified that SAA operators and alternates did not have current training. Training that is not current is a finding instead of an OFI.
19141.61	(OFI) An assessment OFI identified that an SAA operator did not have the current “RCRA Satellite Accumulation Area at ORNL” training, as required by the division. Required training that is not current is a finding instead of an OFI.
19141.62	(OFI) An assessment OFI identified that an SAA log did not include all waste additions to the SAA container. Missing SAA log entries is a procedure non-compliance and a finding instead of an OFI.
21542.3	(Minor) This issue was initiated because of unidentified items in waste containers. This is a procedure non-compliance and a finding instead of an OFI. Subsequently, the December 2019 DOE EA radioactive waste management assessment cited this issue as a deficiency (see ACTS item 22148.1 and associated corrective action 22148.1.9). This issue was then reevaluated, and corrective actions were developed, referencing ACTS item 23929 for more information. ACTS items 21542.3, 22148.1.9, and 23929 all cross reference each other for actions and closures, making it difficult to track where the actions and their closures actually occur. Tracking related subsequent issues, actions, and their closures under multiple ACTS items can, and in some cases has, led to confusion and potential errors.

22148.1.7	(Important) This ACTS item established a procedural requirement for waste generators to perform periodic self-assessments of their radioactive/hazardous waste staging and accumulation areas, implementing a corrective action from the December 2019 DOE EA radioactive waste management assessment. This appropriate action to encourage ownership and improve performance is early in the implementation process, and effectiveness cannot yet be determined. The current weakness in ownership was evident during onsite interviews, where laboratory waste generators could not provide examples of where they took responsibility to initiate an ACTS item for one of their waste-related issues.
22286.2	(Minor) This item resulted from an external audit issue with the operating procedure for preparing and reviewing waste profiles for shipment to the Nevada National Security Site. This finding should have been categorized as important instead of minor.
22493.6	(Minor) This issue involved two discretionary critiques resulting from an offsite shipment of radiological material to another DOE site. There was a nearly three-month delay from the initiating event to opening the ACTS item, which is not timely. The critique report indicates that the corrective actions will be tracked in ACTS; however, there is no documented evidence that they were.

<b>Safety Basis Implementation and Radiological Controls Issues</b>	
<b>ACTS Number</b>	<b>Comment</b>
0.38488	(Minor) This ACTS item documented that the SCALE software tool for calculating exposures from atmospheric spread of radioactive material had an error introduced in 2015 that caused all calculations involving non-naturally occurring material (such as plutonium) to be incorrect. The critique for this issue occurred on July 16, 2019, and the ACTS item began to be entered into the system on July 25, 2019, but was not finalized until June 8, 2020. At this time, three corrective actions were opened. Waiting almost 11 months to finalize the ACTS item can affect the timeliness of actions taken.
0.39296	(Minor) This ACTS item documented the discovery that two individuals who were qualified as unreviewed safety question determination (USQD) managers and approvers had not completed their two-year requalification due to a tracking system error, and therefore had signed USQDs while not qualified to do so. All affected USQDs were reviewed and determined to be acceptable. An extent-of-condition review found that 20 individuals were affected by the tracking system error, although only three of them were in positions that used the qualification. There was no documentation in ACTS that USQDs performed by the third individual were reviewed for acceptability.

0.39487	(Important) This ACTS item documented several radiation control issues that occurred in the same week during radioactive material handling in Building 3047. The critique report identified five follow-up corrective actions that were not yet complete at the time the report was finalized. Some of these actions were assigned to staff within the Non-reactor Nuclear Facilities Division (NNFD) by the NNFD head, the issue owner. These actions were captured in ACTS. Other actions were assigned to individuals outside of the division but were not captured in ACTS. Therefore, no documentation was provided to demonstrate that the actions assigned outside of NNFD were completed.
0.39994	(Important) This ACTS item documented a hot particle found in the clean area of Building 7935, which was reported as Occurrence Reporting and Processing System (ORPS) report SC-OSO-ORNL-X10NUCLEAR-2020-0003. Although the issue was categorized as important and a cause code is required, the critique report section "Potential Causal Factors" said "none identified" and the official cause entered was "(A5B2C08) Incomplete/Situation not covered."
0.40048	(Serious) This ACTS item documented a fire in Building 4508 caused by an oven and leaking hydraulic fluid. The effectiveness review focused on the corrective actions taken and did not discuss whether similar fires had occurred during the time between when the corrective actions were completed and when the effectiveness review was performed.
0.40777	(Minor) This ACTS item documented a spill of Pm-147 in Cave B in Building 7920 due to a shattered high-density polyethylene (HDPE) bottle that had been in use for a while, causing it to become brittle. The spill occurred on October 8, 2020; the critique occurred on November 17, 2020; and the ACTS issue was finalized on December 28, 2020. Corrective actions for this item, including evaluating replacements for the HDPE bottles and the use of trays under them, were closed past their due dates. As similar work was still ongoing in Building 7920, the delay in addressing the issue could have resulted in additional spills.
0.41009	(Minor) This ACTS item documented a hand and foot beta contamination monitor at Building 4501 found with a setpoint of 500,000 decays per minute (dpm) instead of 5,000 dpm; the monitor had been in that state since 2018. Routine survey data confirmed this incorrect setting did not result in increased contamination outside of Building 4501. However, this item should have been categorized greater than a minor issue based on the potential consequences of workers leaving Building 4501 with contamination levels 100 times above the required setpoint. One of the corrective actions was to evaluate similar instruments to verify that they had the correct setpoints; however, neither closure evidence nor a full description of the action taken were included in ACTS.
0.41033	(Important) This ACTS item documented a personnel contamination during processing of tungsten rings in Building 3025E, which was reported as ORPS report SC-OSO-ORNL-X10NUCLEAR-2021-0001. Corrective action 0.41033.5, to evaluate two procedures for clarification, was extended six times and took over a year to complete, although similar activities continued to be performed. Although this action was untimely, additional corrective actions taken provided assurance that the event would not recur.

0.41847	(Important) This ACTS item documented the discovery of contamination on a researcher's shoes and pants, even though the researcher had been working in a radiological buffer area that should not have transferrable contamination. The critique report identified four follow-up corrective actions; however, none of the actions were captured in ACTS, so no documentation was provided to demonstrate that they were completed.
18573.48	(Minor) This ACTS item documented a dropped shield block at the SNS facility on June 22, 2021. The subject matter experts performed an extent-of-condition review of the remaining shield blocks to determine whether they had the same lifting fixtures that caused the drop, concluding their review on July 30, 2021. Once the extent-of-condition review was complete, the ACTS item was opened on July 31, 2021. Waiting until after the extent-of-condition review to open the ACTS item risks losing the details of the initial event.
19870.1 23977.1	(Minor) These two ACTS items documented findings from self-assessments of isolated instances where documentation of data related to instruments and surveys did not meet procedure requirements. This issue was categorized as a minor issue, contrary to the requirement that findings be categorized as important. After training in 2021, the Nuclear and Radiological Protection Division categorized similar findings as important in ACTS items 24041.1, 24109.3, 24411.1, and 24117.1.
22492.12	(Minor) This ACTS item documented an airborne contamination alarm caused by radon, due to ventilation being down for maintenance, and was also documented in RER-REDC-4097. The event occurred on May 7, 2020 and all actions were completed quickly, but the item was not closed out until September 2, 2020, when the issue owner received an automated reminder that it was still open. The issue was closed before the closure due date.
23938.1	(Minor) This ACTS item was written to capture a finding that the basement doors leading to the equipment hatch in Building 3525 were materially degraded and left in the open position. Contrary to the <i>Significance Determination Table</i> exhibit, this finding was categorized as a minor issue. However, further review of this issue after UT-Battelle issued the assessment report demonstrated that the issue was not a finding because the doors were a defense-in-depth barrier rather than secondary confinement doors.
24327.1	(Minor) This item documented an inadvertent radiation exposure at SNS. A neutron monitor was placed in the beam line as part of a fault study to detect if the beam "choppers" were properly aligned. A researcher entered the cave to remove the neutron monitor to prepare for the next phase of the study, and, due to the small space, did not bring the required RadEye G meter to check the neutron monitor before carrying it out of the cave. When the researcher screened the neutron monitor, the RadEye G meter alarmed. A radiation control technician later surveyed the neutron monitor and found that it read 10 R/hr on contact and 92 mrem/hr at 30 cm. This issue was categorized as a minor issue, but a full consideration of the potential consequences would have warranted a higher categorization. Although the issue was categorized as minor, UT-Battelle performed a causal analysis and took extensive corrective actions.

23912.3	(Important) Some of the specific administrative controls identified in ORNL/NNFD safety basis documents did not meet the expectations of DOE-STD-1186-2016, <i>Specific Administrative Controls</i> . The corrective action specifies an evaluation of safety basis documents. The closure evidence provides the evaluation document that makes specific recommendations, but there is no evidence of follow-up actions to implement any of the evaluation recommendations.
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<b>CONOPS Issues</b>	
<b>ACTS Number</b>	<b>Comment</b>
0.36663	(Serious) This ACTS item documented a trend in electrical safety events. Two effectiveness reviews were completed, as the first effectiveness review found some actions to be partially effective and new actions were added. Neither of the effectiveness reviews discussed whether additional electrical safety events had occurred during the time between the corrective actions being completed and when the effectiveness review was performed.
0.36918	(Minor) In May 2018, during the evaluation process for homogeneity defects for outer fuel plates at the High Flux Isotope Reactor (HFIR), data was misinterpreted for outer fuel plates. Given the potential consequence of this item, it should have been categorized greater than a minor issue. No actions were taken to address the cause of this misinterpretation.
0.37190	(Serious) While calibrating a glovebox fan in Building 3525, a technician inadvertently contacted an energized 120-volt terminal. This issue is an example of an ongoing adverse trend in hazardous energy control. The effectiveness review performed for this issue consisted of document reviews and interviews. No performance-based observations of field activities or reviews of ACTS items were conducted after corrective action implementation.
0.37730	(Serious) This item reported fuel damage of outer fuel elements at HFIR. The effectiveness review of corrective actions did not document the existence of fuel-related issues that were documented in the ACTS system after the implementation of corrective actions.
0.38414	(Important) Two work crews were unaware that they were working on the same hot water system. It was determined that one of the crews was on the wrong system and would not have been protected against potential high-energy exposure if the other crew had removed their locks, which prevented this exposure. This issue is an example of an ongoing adverse trend in hazardous energy control.
0.38584	(Serious) A UT-Battelle subcontractor electrician felt a mild shock while working on a lighting fixture. A critique, root cause, extent-of-condition, and effectiveness review were completed. This issue is an example of an ongoing adverse trend in hazardous energy control.
0.39033	(Serious) Subcontractor electricians did not disconnect and safely secure the wiring circuits associated with their work, which resulted in contact with an energized circuit. This issue is an example of an ongoing adverse trend in hazardous energy control. Some actions listed in the lessons-learned review were not entered into ACTS (e.g., an action for a requirement for retraining every three years).

0.39168	(Minor) While removing remnants of a lighting circuit, a UT-Battelle electrician cut into an energized circuit. Given the potential for injury to the electrician, this item should have been categorized higher. This issue is an example of an ongoing adverse trend in hazardous energy control.
0.39347	(Important) In December 2019, this item reported that the re-review (an action from ACTS item 0.36918) of 20 plates of outer fuel element O-475 determined that the plates should have been rejected. Instead, these 20 plates were accepted by UT-Battelle and welded into fuel element O-475 and stored at the Y-12 National Security Complex (Y-12). The selected cause code “(A2B5C02) Fabricated item does not meet requirements” does not address why the plates were incorrectly accepted, and no action was documented to preclude recurrence. Additionally, the January 2022 effectiveness review for the failed fuel element in November 2018 (0.37730) did not address this issue.
0.39348	(Important) In January 2020, this item reported that the re-review (an action from ACTS item 0.36918) of 10 plates of outer fuel element O-442 determined that the plates should have been rejected. Instead, these 10 plates were accepted by UT-Battelle and welded into fuel element O-442 and stored at Y-12. The selected cause code “(A3B1C06) Wrong action selected based on similarity with other actions” does not adequately address why the plates were incorrectly accepted, and no action was documented to preclude recurrence. Additionally, the January 2022 effectiveness review for the failed fuel element in November 2018 (0.37730) did not address this issue.
0.39349	(Important) In January 2020, this item reported that “attributes of various lots of U <sub>3</sub> O <sub>8</sub> powder, used in fuel elements, were found to be out of compliance” and “noted that these conditions were accepted by the RRD Task Leader prior to use of the powder, however they were not included on a nonconformance report.” Subsequently, the non-conformances were accepted via a non-conformance report, and the cause code “(A2B5C02) Fabricated item does not meet requirements” was identified as the cause. However, this cause code does not adequately state why the non-conformances occurred to ensure that appropriate corrective actions are taken or why the RRD Task Leader accepted the non-conformances without the required non-conformance report. The January 2022 effectiveness review for the failed fuel element in November 2018 (0.37730) did not address this issue.
0.39455	(Serious) A vessel over-pressurization resulting in damage to a laboratory drying oven occurred in February 2020. Walkdowns in other laboratories looking for the extent-of-condition were done in February and March 2021, and the extent-of-condition report was finalized in April 2021, 14 months after the event. Corrective actions did not address all aspects of the event. The effectiveness review performed for this issue consisted of document reviews and interviews. No performance-based observations of field activities or reviews of ACTS items were conducted after corrective action implementation. The extent-of-condition report identified issues with calibrations and annual preventive maintenance that were not entered into ACTS for resolution.

0.39724	(Important) Subcontractors, assuming the site had been checked and seeing no markings, proceeded to install anchors for guy wires. However, the site had not been marked, and the anchors were installed within a few inches of the buried gas line. This issue is an example of an ongoing adverse trend in hazardous energy control. Given the potential for injury if gas lines were hit, this item should have been categorized as serious.
0.39797 0.41099 0.42396	<p>0.39797 (Serious) On May 7, 2020, a subcontractor removed three wall panels prior to the electrical Log-Tag-Verify (LTV) process, exposing the subcontractor to unguarded 110-volt terminal blocks. The root cause and corrective actions focused on the roles and responsibilities of the technical project officer (TPO). The effectiveness review performed in June 2021 focused on documents, emails, and some interviews and concluded that actions were generally effective. There was no assessment of field performance.</p> <p>0.41099 (Serious) In February 2021, subcontractor electricians performed troubleshooting inside a cabinet without LTV protection. As a result, they were exposed to a 480-volt electrical source. The root cause analysis focused on the role of the TPO.</p> <p>0.42396 (Important) On November 9, 2021, UT-Battelle electricians discovered multiple subcontracted non-qualified electrical workers performing work on energized equipment. A root cause analysis again focused on the role of the TPO. The causal analysis from this event did not reference the lack of effectiveness of the corrective actions for the previous events.</p> <p>These issues are examples of an ongoing adverse trend in hazardous energy control.</p>
0.39839	(Minor) HFIR operators staged a test specimen in the HFIR pool despite confusion about the label on the test specimen and a communication/understanding breakdown between the personnel who assembled the test specimen and the HFIR operators. Given the potential impact of loading an incorrect experiment in the reactor and several failures in work control for safely staging the correct specimen in the HFIR pool, this item should have been categorized as a serious issue.
0.40108	(Minor) During an evaluation of operator aids, the NNFD director identified operator aids that could be perceived as providing direction instead of an operating procedure. Given that this item was identified as a finding, it should have been categorized greater than minor.
0.40478	(Minor) After a 24-hour pre-startup full hydraulic flow test, a performance degradation of the outer fuel element was identified. This issue identified a potential inadequacy in the safety analysis (PISA 0.40522) because a weld inspection process (by computed tomography), which had been credited with identifying weld issues contributing to this degradation, had failed. Computed tomography was introduced as a result of one of the corrective actions for the November 2018 fuel failure (0.37730). However, the effectiveness review for the November 2018 fuel failure did not address this issue.
0.40563	(Serious) A researcher performed work without the protection of an LTV in place. This issue is an example of an ongoing adverse trend in hazardous energy control.

0.41127	(Important) A hydrogen gas leak occurred during the filling of a hydrogen storage vessel. The event analysis attributed the failure to both aging and premature equipment failure. No actions were identified to verify the cause of the hose failure or to inspect other hoses of the same lot used in hydrogen operations. The issue was appropriately categorized because actions from a previous hydrogen leak were in place and mitigated serious consequences.
0.41137	(Serious) A UT-Battelle researcher who was not qualified as an electrical worker opened a control cabinet to perform troubleshooting without an LTV in place. This issue is an example of an ongoing adverse trend in hazardous energy control.
0.41151	(Serious) A furnace fire in Building 7920 occurred on February 20, 2021. The extent-of-condition was approved in October 2021, eight months later. The extent-of-condition listed actions such as having the facility system engineer review operations' work plans and including abnormal condition response actions in the pre-job briefing, which were entered into ACTS item 24874. However, no cross reference was provided to ACTS item 0.41151.
0.41537	(Serious) A 5,000-pound gamma detector tipped over while workers were moving it between two rooms when a wheel got caught in a floor drain depression. Fortunately, only one worker sustained a superficial injury. However, UT-Battelle management recognized the potential for significant consequences due to the issues or weaknesses in their programs and took a wide range of actions to prevent recurrence.
0.42701	(Serious) The HFIR experienced a phase voltage fluctuation that caused a safety system actuation, and the reactor automatically shut down. The corrective actions did not address all aspects of the event as described in the critique, given that some systems did not function properly. Specifically, unnecessary load shedding occurred (by design, load shedding should not have occurred), and only one of two emergency diesels started.
0.42906	(Important) UT-Battelle electricians incorrectly assumed that the conductors in the conduit they were working on were de-energized. While cutting a conduit, the electricians observed sparks. Given the potential for injury to the electricians, this item should have been categorized as a serious issue. This issue is an example of an ongoing adverse trend in hazardous energy control. Corrective actions in the event critique included flagging energized circuits, revising the UT-Battelle statement of work to contractors, and reviewing previous corrective actions addressing marking of wiring/conduits for the presence of energy. These actions were not entered into ACTS.
14882.1	(Minor) This item identified an incorrect runout relative to datum for the HFIR control rod drive system. Given that this item was identified as a finding, it should have been categorized greater than minor.
15124.11	(Minor) This item identified non-compliant glovebox operator training. Given that this item was identified as a finding, it should have been categorized greater than minor. This item was opened on November 8, 2012, and remains open, which is not a timely resolution.



17930	(Minor) The results from the fiscal year (FY) 2015 training assessment were not entered until May 2019, after the next triennial assessment. Similar issues were identified in the FY 2018 training assessment. Many deficiencies and findings were categorized as minor, contrary to the requirements of the <i>Significance Level Determination Table</i> exhibit. Actions for ACTS item 17930 were included in the 2018 assessment corrective action plan. Actions to address the 2015 deficiencies and findings were not closed until 2019 or later, which is not a timely resolution.
18310	(Important) The FY 2018 training assessment of Building 3525 identified findings associated with the training program that called into question, at the time, the qualification of personnel under DOE Order 426.2, <i>Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities</i> . This assessment was conducted in May 2018. A corrective action plan was developed nearly a year later in April 2019, and an ACTS item was opened nearly fifteen months later in September 2019, which is not timely.
18310.4	(Minor) This item identified that learning objectives are vague and do not clearly state tasks associated with approved task lists, qualification cards, and exams. This item was incorrectly identified as an OFI, whereas non-compliances with DOE Order 426.2, attachment 1, chapter I, are findings. A similar item from the FY 2015 assessment was categorized as a finding. Additionally, an email was incorrectly used as closure evidence.
18310.7	(Important) A continuing training (CT) plan had not been developed for calendar year (CY) 2017 – CY 2018, contrary to NNFD-TRN-903, <i>Continuing Training and Requalification, rev 1</i> . The corrective action developed a CT plan for CY 2019 – CY 2020, without taking any action to address the missed previous CT cycle. The CY 2019 – CY 2020 CT plan was not put into effect until July 2019.
18310.9	(Minor) This item identified that lesson plans do not contain sufficient detail to ensure consistent and repeatable training. This item was incorrectly identified as an OFI, whereas a non-compliance with DOE Order 426.2 requirements for a systematic approach to training is a finding.
18311.1	(Important) This issue from the FY 2018 training assessment of Building 7920 identified that no documentation exists of in-class course evaluations by cognizant managers. The assessment was performed from March to April 2018, but the ACTS item was not opened until September 2019, over fifteen months later, which is not timely.
21120.4	(Minor) After a review of the list of qualified suppliers, UT-Battelle identified no formal documentation to identify whether the suppliers' quality programs were reviewed, contrary to the requirements of <i>Weld Program Manual</i> , sec. 1.4.6. This non-compliance was incorrectly identified as an OFI instead of a finding.
21221.2	(Minor) This item reported welding equipment being improperly configured and/or a torch being misaligned. This non-compliance with the requirements of DOE Order 422.1, <i>Conduct of Operations</i> , attachment 2, 2.b was incorrectly identified as an OFI instead of a finding.
21221.3	(Minor) This item reported the lack of relevant information prior to fabrication and insertion of irradiation capsules into HFIR. This non-compliance with the requirements of DOE Order 422.1, attachment 2, 2.b was incorrectly identified as an OFI instead of a finding.

22002.2	(Minor) This item identified that contrary to the requirements of DOE Order 422.1, attachment 2, 2.n.(3), the UT-Battelle required reading program does not track due dates for required reading. This non-compliance was incorrectly identified as an OFI instead of a finding.
22002.3	(Minor) This item identified that contrary to the requirements of DOE Order 422.1, attachment 2, 2.n.(2), there have been delays in entering new employees into the required reading program. This non-compliance was incorrectly identified as an OFI instead of a finding.
22856.1	(Minor) This item reported a finding that four of ten operator aids in the status log are not compliant with NNFD-011, <i>Conduct of Operations</i> . Given that this item was identified as a finding, it should have been categorized greater than minor.
23936.1	(Important) A DOE Oak Ridge National Laboratory Site Office (OSO) assessment identified that SBMS does not require inspections of lockout/tagout (LOTO) procedures to be conducted by an authorized employee, in addition to those who use the procedures, as required by 29 CFR 1910.147.(c)(6)(i) (A).
23936.2	(Important) An OSO assessment identified that SBMS does not require management to conduct annual certifications showing that inspections of LOTO procedures are accomplished in accordance with 29 CFR 1910.147.(c)(6)(i) (A).
23936.3	(Minor) An OSO assessment identified that “The High Flux Isotope Reactor had two instances of deficient LOTO activities within the last year, this represents an increasing trend when compared to previous years.”
24802.1	(Important) An OSO assessment of HFIR equipment tagging identified many inconsistencies with tagging requirements that were contrary to DOE Order 422.1. Labeling of HFIR equipment has been inconsistently implemented, which has resulted in situations where equipment identification does not match facility documentation or the master equipment list.