

**Independent Oversight Review of the
Idaho Cleanup Project Integrated Waste Treatment Unit
Contractor Readiness Assessment at the Idaho Site**



August 2014

**Office of Environment, Safety and Health Assessments
Office of Independent Enterprise Assessments
U.S. Department of Energy**

Table of Contents

1.0 Purpose.....	1
2.0 Scope.....	1
3.0 Background.....	1
4.0 Methodology.....	2
5.0 Results.....	3
6.0 Conclusions.....	11
7.0 Opportunities for Improvement.....	11
8.0 Follow-up Items.....	12
Appendix A: Supplemental Information.....	A-1
Appendix B: Documents Reviewed, Interviews, and Work Evolutions.....	B-1

Acronyms

AMWTP	Advanced Mixed Waste Treatment Project
C-RA	Contractor Readiness Assessment
CAS	Contractor Assurance System
CR	Core Requirement
CRAD	Criteria, Review, and Approach Document
CWI	CH2M-WG Idaho, LLC
DOE	U.S. Department of Energy
DOE-ID	DOE Idaho Operations Office
DSA	Documented Safety Analysis
EM	DOE Office of Environmental Management
ENG	Engineering
F&I	Feedback and Improvement
ICP	Idaho Cleanup Project
IEA	Office of Independent Enterprise Assessments
INL	Idaho National Laboratory
IP	Implementation Plan
IWTU	Integrated Waste Treatment Unit
MCP	Management Control Procedure
LSS	Life Safety Systems
MSA	Management Self-Assessment
NE	DOE Office of Nuclear Energy
NOP	Normal Operating Pressure
NOT	Normal Operating Temperature
NS	Nuclear Safety
NTS	Nonconformance Tracking System
OFI	Opportunity for Improvement
ORPS	Occurrence Reporting and Processing System
ORR	Operational Readiness Review
OSO	Outside Support Operator
PISA	Potential Inadequacy in the Safety Analysis
PDD	Process Description Document
POA	Plan of Action
PRD	Program Requirements Document
RA	Readiness Assessment
SAA	Startup Approval Authority
SAC	Specific Administrative Control
SAR	Safety Analysis Report
SBWTP	Sodium Bearing Waste Treatment Project
SMP	Safety Management Program
SSC	Structure, System, and Component
SSIS	Safety-Significant Instrumented System
STD	Standard
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
WP&C	Work Planning and Control

Independent Oversight Review of the Idaho Cleanup Project Integrated Waste Treatment Unit Contractor Readiness Assessment at the Idaho Site

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Independent Enterprise Assessments (IEA) was established in May 2014 and assumed responsibility for managing the Department's former Office of Health, Safety and Security (HSS). A former HSS Independent Oversight office, now called the IEA Office of Environment, Safety and Health Assessments, conducted an independent oversight review of the Integrated Waste Treatment Unit (IWTU) facility contractor readiness assessment (C-RA) at the Idaho Site from January 14-20, 2014. The C-RA activity that IEA observed officially concluded with a final report being issued on March 9, 2014, following a period during which it was suspended. This assessment was intended to assess the effectiveness of the C-RA process as implemented for the IWTU restart.

This report discusses the scope, background, methodology, results, and conclusions of the assessment, as well as opportunities for improvement (OFIs) and items identified for further follow-up by IEA.

2.0 SCOPE

The Independent Oversight program comprises one element of DOE's multi-faceted approach to oversight, as described in DOE Policy 226.1, *Department of Energy Oversight Policy*. Effective oversight of DOE Federal and contractor operations is an integral part of DOE's responsibility as a self-regulating agency to provide assurance of its safety and security posture to its leadership, its workers, and the public. The Independent Oversight program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent oversight assessment of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management performance in safety and security and other critical functions as directed by the Secretary. DOE Order 227.1, *Independent Oversight Program*, defines the Independent Oversight program, which IEA is responsible for implementing.

For the IWTU C-RA, the review team planned to assess a set of Core Requirements (CRs), as identified in their approved plan of action (POA). To evaluate the readiness assessment, IEA selected a sample of the CRs and observed and reviewed aspects of the C-RA assessment. Specifically, IEA assessed the following CRs:

- CR 1: Safety Management Program (SMP) – Waste Management
- CR 1: SMP – Work Planning and Control (WP&C)
- CR 6 & 8: Safety Basis Documentation, Implementation, and Maintenance
- CR 7: Safety System Surveillance
- CR 14: Feedback and Improvement (F&I).

3.0 BACKGROUND

The Idaho Site includes the Idaho National Laboratory (INL), the Idaho Cleanup Project (ICP), and the Advanced Mixed Waste Treatment Project (AMWTP). The DOE Idaho Operations Office (DOE-ID)

provides direction and oversight for the design and operation of the Idaho Site nuclear facilities for the DOE Headquarters' Office of Nuclear Energy (NE) and Office of Environmental Management (EM). NE is responsible for INL facilities and general site operations, and EM is responsible for ICP and AMWTP facilities. Within DOE-ID, the two line management organizations are responsible for oversight of these nuclear facilities and their activities. The Deputy Manager for Operations Support is ultimately responsible for contractor oversight of the NE facilities, and under the Deputy Manager for ICP, oversight of the EM facilities is the responsibility of the Assistant Manager for Nuclear Safety and Performance. Currently, Battelle Energy Alliance, LLC; CH2M-WG Idaho, LLC (CWI); and Idaho Treatment Group, LLC are, respectively, the primary contractors responsible for the management and operation of INL, ICP, and AMWTP facilities. The IWTU facility, part of ICP, is operated by the ICP primary contractor, CWI.

In June 2012, the filter and solids collection system of the IWTU facility failed during the initial plant heatup phase of operations. The facility had not yet introduced the radioactive source term into the system; therefore, no hazardous radioactive materials were released. During the event, the IWTU experienced a pressurization of the off gas system. This pressurization resulted in a Rapid Shutdown System (RSS) trip during thermal startup. The subsequent investigation largely attributed the overall cause to carbon dust generated in the IWTU steam reforming process. As a result, the facility shut down. Recovery has involved both operating and design changes, along with modification of the existing safety basis documents. Many of the design changes were driven by positive Unreviewed Safety Question (USQ) determinations that resulted from several indications of Potential Inadequacies in the Safety Analysis (PISAs). IEA has been kept informed of the progress in implementing the many modifications to the facility, and to maintain awareness, visited the facility in November 2013 with the Defense Nuclear Facilities Safety Board staff.

DOE Order 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities*, specifies the conditions and circumstances under which a review to verify the readiness of a facility to startup or restart is required. DOE Standard (STD) 3006-2010, *Planning and Conducting Readiness Reviews*, provides standardized methods and approaches for planning and conducting such readiness reviews that are applicable to both contractors and DOE. DOE-STD-3006-2010 describes acceptable methods for meeting the requirements of DOE Order 425.1D; one of these methods is for the responsible contractor to perform a readiness assessment (RA) of the facility or activity, followed by, or performed concurrent with, an RA by the DOE. DOE-STD-3006-2010 provides additional guidance regarding the steps necessary to carry out these successive reviews. Both DOE Order 425.1D and DOE-STD-3006-2010 are applicable to the restart of the IWTU, and CWI is the contractor responsible for coordinating and executing the C-RA in advance of the DOE-RA.

The CWI C-RA team approved plan of action (POA) went into effect on January 14, 2014. After completing a management self-assessment (MSA) and approving the associated report on December 22, 2013, the CWI C-RA team lead prepared a formal Readiness to Proceed Memorandum and issued it to DOE line management on January 14, 2014, thereby indicating that all prerequisites identified in the POA had been met. The CWI C-RA team began carrying out their assessment in accordance with their implementation plan (IP), and after a temporary suspension, ultimately completed the assessment on March 7, 2014.

4.0 METHODOLOGY

Commensurate with the purpose of DOE Order 227.1, IEA assessed the performance of the C-RA by evaluating the activities the C-RA team used to determine how and to what degree the CRs were met for IWTU, as set forth by DOE Order 425.1D and implemented through the approved POA and IP. By

choosing a sampling of these CRs and conducting “shadow” oversight by conducting concurrent assessment activities with the C-RA team as they performed their assessment, IEA was able to compare the C-RA team’s methods to DOE Order 425.1D requirements and DOE-STD-3006-2010 guidance. In addition, gaps between what IEA observed and what the C-RA team found were independently assessed.

5.0 RESULTS

The following sections discuss the observations made by IEA during its assessment of the IWTU C-RA process. As noted above, IEA assessed the C-RA in accordance with the requirements of DOE Order 425.1D, the guidance of DOE-STD-3006-2010, and other best practices, as implemented through their approved POA and IP.

5.1 Readiness Assessment Planning

Plan of Action

The POA was approved by the Startup Approval Authority (SAA), the DOE-ID Deputy Manager for the Idaho Clean-up Project, on January 8, 2014. The POA document is compliant with DOE Order 425.1D and is consistent with DOE-STD-3006-2010 provisions. However, DOE-STD-3006-2010 indicates that POAs should be prepared approximately six months before a C-RA commences; SAA approval of the POA only a few days before the start of the C-RA on January 14, 2014 does not conform to the DOE-STD-3006-2010 provision. (See **OFI-IWTU-CRA-01**.)

Initially, the C-RA POA required that the IWTU facility reach normal operating pressure (NOP) and normal operating temperature (NOT) prior to commencing the C-RA. With the expectation of having reached NOP/NOT, the C-RA was scheduled to begin on January 14, 2014. However, a number of technical issues and challenges prevented the facility from reaching the NOP/NOT milestone by the required date. Therefore, just before start date, the POA was revised to remove the prerequisite that the facility be at operating at NOP/NOT. Nevertheless, the decision to proceed with the C-RA without the systems being at NOP/NOT allowed the assessment to commence. DOE-ID approved the change on January 1, 2014. Allowing the C-RA to proceed, provided the C-RA team with opportunities to observe troubleshooting and maintenance activities that would not likely have been observed had normal operating conditions been achieved. This also gave the C-RA assessors the opportunity to gain a broader perspective of IWTU organizational performance.

After the C-RA began, the facility unsuccessfully attempted to correct issues related to heating the systems to NOP/NOT during the next 10 days. The C-RA team lead suspended the C-RA with concurrence of the SAA until IWTU was able to demonstrate that normal operating conditions could be sustained. The C-RA team issued an interim report on February 10, 2014. The C-RA resumed on March 3, 2014. Once all elements of the POA and the IP were assessed, the C-RA team issued a supplemental report on March 9, 2014. IEA determined that the approach of suspending and later resuming the C-RA was consistent with DOE-STD-3006-2010, Section 9.4, *Unsuccessful Assessments*.

Implementation Plan

According to the Contractor Requirements Document (CRD) for DOE Order 425.1D, Section e, *Requirements Applicable to Readiness Assessments*, the RA team must develop an RA IP. The Order further requires that the IP document the evaluation criteria and review approaches based on the scope given in the RA POA.

IEA conducted a detailed review of the C-RA POA IP and found it compliant with the POA approved by the SAA. The format and content of the IP are consistent with DOE-STD-3006-2010, Section 9.2.1, except as noted in Section 5.2 of this report under *Feedback and Improvement (F&I)*.

Contractor Readiness Assessment Scope

DOE Order 425.1D and the DOE STD 3006-2010 allows RAs to be tailored to suit the specifics of the restart activity, but must be based, in part, on the status of and changes to the facility, operating procedures, safety basis documents, hazards, operating conditions, and personnel. The Order further requires that each CR be evaluated and a justification must be provided for any CR that is excluded. The C-RA POA for this restart activity included an evaluation of all 14 CRs with appropriate tailoring to address changes to the facility and corrective actions taken since the June 16, 2012, over pressurization event. IEA determined that the scope defined in the DOE-approved C-RA POA met the expectations of DOE Order 425.1D.

Approximately 25 facility modifications were made, along with several documented safety analysis (DSA) changes. The purpose of the C-RA was to demonstrate that the IWTU facility and staff are ready to safely resume initial facility start-up testing. CWI took some corrective actions and made some facility modifications, based on lessons learned from the June 2012 over pressurization event, that were directly related to reducing the likelihood of another over pressurization event. Other corrective actions and modifications were broader in scope than the over pressure event and addressed broader aspects of facility safety. Therefore, it would have been appropriate to expand the scope of the C-RA to systematically provide a more thorough assessment of the readiness of IWTU to restart. However, the formal scope of the C-RA was limited to factors related to the over pressurization event. Nonetheless, IEA observed that the C-RA assessment team engaged in broader lines of inquiry and did not limit their inquiries to the narrow scope of the assessment.

Team Qualifications

Team Lead. The team lead selected by CWI has over 35 years of experience in the nuclear field and has led several readiness reviews. He has led multiple Operational Readiness Reviews (ORRs) and C-RAs leading to the successful startup of nuclear and hazardous facilities at the Idaho Site, Oak Ridge National Laboratory, Hanford Site, and Portsmouth Site. He has also mentored the recovery of troubled facilities. He led the development of the senior supervisory watch program for the DUF6 Portsmouth facility hot functional test program and conducted senior management watch assessments of operations and maintenance.

The team lead is familiar with the systems and processes at IWTU and has demonstrated his leadership skills in both the commercial nuclear power sector with the Tennessee Valley Authority, in the DOE complex, and as a United States Naval officer. The team leader is an independent contractor and not previously affiliated with CWI. While conducting the C-RA, the team leader exhibited strong leadership and methodically guided the C-RA team.

Senior Advisor. The C-RA senior advisor has over 45 years of experience in the operation, regulation, and management of DOE, commercial and naval nuclear facilities including power and production reactors, chemical processing facilities, and laboratories. This experience has included management and senior executive positions with DOE, Department of Navy, and the U.S. Nuclear Regulatory Commission (NRC), as well as private sector companies. The senior advisor is currently a senior executive with a DOE prime contractor responsible for nuclear safety. He has led independent reviews at DOE's Hanford Site, Brookhaven National Laboratory, West Valley Demonstration Project, Savannah River Site, and Los Alamos National Laboratory. In addition, he has led ORRs for nuclear facility startups – recently

including those for the Oak Ridge National Laboratory High Flux Isotope Reactor Startup, the Brookhaven National Laboratory High Flux Beam Reactor Decommissioning, the ICP IWTU Initial Startup, the Hanford River Corridor Project Building 324 Stabilization RA, and the Separations Process Research Unit Intrusive Decontamination and Decommissioning Resumption (Readiness Evaluation).

Contractor Readiness Assessment Team Members. Each C-RA team member exhibited the technical knowledge and experience in the respective area assigned for assessment. In addition, each team member has experience in performance-based assessment processes and methods. The team members are independent of the IWTU line organization and able to fully support the C-RA team leader and assigned area(s) of responsibility.

Based on team member resumes and direct observation of C-RA performance, the C-RA team meets the expectations of DOE Order 425.1D and DOE-STD-3006-2010.

5.2 Conduct of the Assessment

IEA conducted oversight of the C-RA team by shadowing and concurrently observing a number of test and mock operational activities, both prior to and during the TI-102 phase of restart. The IEA results are organized in accordance with the CRs IEA selected for assessment, as outlined in Section 3.0 above. The following sections summarize IEA's observations.

CR 1: Safety Management Program – Waste Management Program

DOE-STD-3006-2010, Section 9.3, *Conduct of Readiness Assessment*, states in part that the RA should verify the adequacy of the SMP infrastructure to ensure that the readiness conditions to start nuclear operations are maintained through the operating cycle. IEA's evaluation of the Waste Management C-RA Criteria, Review, and Approach Document (CRAD) determined that this CRAD is consistent with the examples in the readiness standard and structured to acceptably meet the expectation of the readiness standard for SMP evaluation. The CRAD not only covers the elements of CR 1 for the Waste Management SMP, but covers elements of CR 3, 4, and 12, (training and qualification, manager knowledge, and conduct of operations, respectively) from a waste management perspective. The approach described in the CRAD for gathering evidence to support a determination of waste management readiness is reasonable and consistent with the scope of the C-RA.

The C-RA CRAD Approach section for this SMP includes a review of waste management program procedures to confirm that they have been developed, approved, and implemented for IWTU operation. The Approach section also lists other pertinent types of reviews, qualification records, performance indicators, and applicable permits that should be assessed to adequately evaluate the Waste Management SMP. In addition, interviews of suggested key waste management personnel and management are listed in the section.

IEA conducted extensive interviews with the C-RA team member evaluating Waste Management. There were no waste management field activities occurring at this stage of facility operations. Therefore, the C-RA team evaluated the SMP based on document reviews and interviews.

The C-RA team member reviewed all waste management program procedures against DOE waste management requirements. He interviewed waste management leadership including the Vice President of Waste Management and the IWTU ES&H Manager. He also interviewed all of the waste management staff supporting IWTU. During the course of these interviews, training/qualification requirements were directly verified in the presence of the C-RA team member.

The team member demonstrated knowledge of the IWTU waste management program and identified a pre-start finding related violation of DOE Order 435.1 requirements for failing to identify a disposition path for one of the IWTU waste streams.

Overall, the waste management portion of the SMP CR was thoroughly and effectively evaluated by the C-RA team member and was conducted in a consistent manner with DOE Order 425.1D and DOE-STD-3006-2010.

CR 1: Safety Management Program – Work Planning and Control

DOE-STD-3006-2010, Section 9.3, *Conduct of Readiness Assessment*, states that the “adequacy of the SMP infrastructure to ensure that the readiness conditions to start nuclear operations are maintained through the operating cycle should be included in the Readiness Assessment (RA).” Another SMP included in the C-RA POA was the CWI Work Planning and Control (WP&C) SMP.

IEA’s evaluation of the WP&C C-RA CRAD determined that it is structured to acceptably meet the expectation of the readiness standard for SMP evaluation. The approach described in the CRAD for gathering evidence to support WP&C C-RA conclusions is reasonable and consistent with the scope of the C-RA, which is tailored to the corrective actions taken as a result of the DOE-ID assessment performed in October 2013 (REP-EM-10/23/2013-96158).

According to the assigned C-RA team member, all IWTU WP&C program and procedure documents were evaluated, including Management Control Procedure (MCP)-101, *ICP Integrated Work Control Process*; Process Description Document (PDD) -600, *Maintenance Program*; Program Requirements Document (PRD)-600, *Maintenance Program Requirements Document*; and IWTU’s Maintenance Manual (Manual 6), which contains all of the CWI procedures for maintenance. During interviews by IEA, the C-RA team member exhibited a strong understanding of the WP&C processes and procedures in place at IWTU.

IEA accompanied the C-RA team member on interviews with maintenance managers and numerous direct observations of work activities. In each case, the C-RA team member asked challenging questions when work documents or activities did not appear to conform to established requirements for WP&C. For example, during replacement of components on the IWTU Superheater, the C-RA team member raised concerns over the sequence used to perform the workability walkdown. MCP-101 requires that the workability walkdown be performed following approval of the final work package and before the pre-job briefing. However, the work package associated with the Superheater was walked down before several changes were made in the final version of the approved package. For this same work evolution, the Quality Organization questioned whether torqueing requirements applied to the mounting screws for the parts being replaced. No one involved, including the systems engineer, could answer the question. As a result, a torque sheet was obtained and the screws were torqued to requirements in a CWI torque sheet. However, the work package was not modified to add the torqueing step. This is an example of performing work outside the scope approved work package. The C-RA team member relayed this to IWTU management who understood the issue. In addition to the interviews observed by IEA, the C-RA team member stated that he had interviewed a representative sample of staff and management involved in WP&C, including two maintenance planners, a preventative maintenance coordinator, a maintenance job supervisor, and a craft electrician.

During the course of the C-RA, the team member also reviewed approximately 30 completed work packages prepared and completed since the June 16, 2012, IWTU over pressurization event. Most work packages were prepared and implemented in accordance with established requirements. However, for a few work packages it was difficult to follow the work actually performed by the package, because there

were numerous hand written field changes to the work packages. This and other opportunities for improvement related to WP&C were effectively conveyed to the contractor management by the C-RA team member as observed by IEA. IEA selected a sample of 25 completed work packages from those completed since the June 2012 over pressurization event. No additional issues were identified.

One particular IWTU opportunity for improvement that was identified during the observation of the C-RA Maintenance Manager interviews was that IWTU management does not require post-job briefs to be conducted following work activities, with two exceptions (see the Feedback and Improvement portion of this section). The *Task Evolution Feedback Form* is available to the workers to complete. The C-RA team member and team leader considered this issue to be a Feedback and Improvement (CR-14) issue and may also consider it under the topic of Safety Conscious Work Environment (SCWE). The C-RA team leader further stated that the issue would likely be identified as an OFI in the C-RA report, but it was not addressed in the interim nor supplemental C-RA reports. (See **OFI-IWTU-CRA-02.**)

Overall, the WP&C portion of the SMP CR was thoroughly and effectively evaluated by the C-RA team member and was conducted in a consistent manner with DOE Order 425.1D and DOE-STD-3006-2010.

CR 6 & CR 8: Safety Basis Documentation, Implementation, and Maintenance

DOE Order 425.1D Section 4.f.(6) discusses the core requirements to adequately describe the “safety envelope” of a facility through approved, implemented, and maintained documentation. For IWTU, this documentation is the DSA (Safety Analysis Report [SAR] -219 and SAR-100) and Technical Safety Requirement (TSR) (TSR-219 & TSR-100), which serve as the safety basis of the facility. DOE Order 425.1D Section 4.f.(8) discusses the core requirements to define and implement a program to control facility modifications, and the need for the safety bases to appropriately describe all facility systems and procedures that have been modified.

The C-RA IP defined Objectives Engineering (ENG) 3, ENG 4, Nuclear Safety (NS) 1, and NS 2 to guide the assessment of these CRs. Also, as discussed in Section 5.1 of this report, the C-RA POA limited or tailored the assessment Objectives such that they focused on the assessment of the CRs only as they related to the modifications that had been made to the facility following the June 2012 over pressurization event. As a result, the C-RA team significantly limited the breadth of their assessment of the IWTU safety basis documentation of systems, processes, accident analyses, and overall safety envelope.

IEA observed that the C-RA team sought to accomplish their defined Objectives through an appropriate variety of assessment activities, including documentation reviews of the DSA, TSR, Unreviewed Safety Question (USQ) determinations, design changes, and hazard analyses. The C-RA team determined the IWTU safety basis documentation to be appropriately verified, approved, and implemented, with an approved USQ process and program in place to maintain it. However, IEA found indications that this determination may not have been unequivocally supported. In particular, both the C-RA team and IEA observed a few cases in which the unmitigated event frequencies or consequences of postulated events were reduced by assuming that multiple failures of equipment or operator actions were necessary for the event to occur, or that unqualified facility design features were present to mitigate releases. For example, in the SAR-219 Chapter 3, Section 3.3.2.3, *Hazard Evaluation*, Table 3-10, the analysis of the 3.b.xii hazard appears to rely on the presence of “building ventilation” among other credited systems to determine a Low consequence category and Risk Class III. However, the elevated release provided by the stack, which is associated with building ventilation, is not a qualified safety structure, system, and component (SSC). In this case, the assumption that the credited building ventilation system component (the stack) is available during this event is not protected by TSR controls.

The C-RA team determined, through interviews, that these scenarios were explicitly discussed with DOE-

ID and accepted; and per the Safety Evaluation Report (SER), DOE has agreed that the safety documents provide adequate protection from consequences “associated with the planned IWTU SBW operations.” It appears that the primary basis for accepting this methodology is the limited life of the facility’s mission (i.e., the IWTU plan for operations is limited to 1.3 years based on results of corrosion studies, which is significantly shorter than the typical 30 to 40-year mission life of nuclear facilities). Also, the C-RA team noted that DOE-STD-3009-94 makes an allowance for using a “graded approach” in this type of scenario. IEA acknowledges the arguments for accepting the analysis. However, considering the rare use of the allowed DOE-STD-3009-94, Chapter 3, “graded approach” provision in this way, IEA also believes that it would have been useful for a focused, independent, third-party to provide an opinion at some point during the hazard analysis, review, approval, or readiness assessment processes. (See **OFI-IWTU-CRA-03.**)

In addition to reviewing the safety basis documentation, the C-RA team also interviewed key personnel, such as the Nuclear Safety Manager and Nuclear Safety Analysts, and observed a reasonable sample of maintenance/surveillance tests. IEA attended interviews held by the C-RA assessor and observed the conduct of testing.

The C-RA team concluded, and IEA agrees, that the safety basis for IWTU has been appropriately revised and implemented following the over pressurization event. However, as noted, IEA believes there is an opportunity to improve the DSA change, implementation, and assessment process for future activities. Nevertheless, IEA determined that the C-RA team adequately assessed the IWTU safety basis to CR 6 & CR 8, in accordance with its defined prerequisites, and in preparation for this restart.

CR 7: Safety System Surveillance

DOE Order 425.1D Section 4.f.(7) discusses the core requirement to have a program in place to periodically reconfirm the condition and operability of vital safety systems. The C-RA IP defined Objectives ENG 1 and ENG 2 to guide the assessment of this CR. IEA observed that the C-RA team assessors sought to accomplish these Objectives by using an appropriate variety of assessment activities, including a review of surveillance procedures, maintenance work packages, and the TSR Surveillance tracking database. The C-RA team determined this surveillance program documentation to be appropriately aligned with the surveillance requirements, as derived from the facility safety basis and its supporting analyses. IEA agrees with this determination. The C-RA assessors also interviewed key personnel, such as cognizant engineers, operations managers, and control room operators. By concurrently interviewing some of the same personnel, IEA was able to determine that appropriate staff was interviewed and that adequate lines of inquiry were used to find that staff had the necessary knowledge and understanding of safety SSC surveillance and implementation.

In addition to the document reviews and interviews, the C-RA assessors observed system walkdowns and the performance of SSC maintenance and testing activities. In particular, the C-RA team observed the surveillance loop test of the High Temperature Protection System (SIF-2). IEA found that the C-RA team appropriately observed the SIF-2 surveillance loop test as a sample of the surveillance testing program at IWTU. However, as noted in the May 2012 Independent Oversight report, *Independent Review of the Sodium Bearing Waste Treatment Project-Integrated Waste Treatment Unit Contractor Operational Readiness Review*, when appropriate, a C-RA should observe a complete vertical slice of as many safety-class and safety-significant system surveillances and calibrations as possible in accordance with the guidance of DOE-STD-3006-2010. (See **OFI-IWTU-CRA-04.**)

The C-RA team concluded, and IEA agrees, that a surveillance program, its associated implementing procedures, and knowledgeable personnel are in place for IWTU. IEA determined that the C-RA team adequately assessed the IWTU surveillance program to this CR, in accordance with its defined

prerequisites, and in preparation for this restart.

CR 14: Feedback and Improvement

DOE Order 425.1D has 14 CRs which are evaluated to verify the readiness of personnel, procedures, programs, and equipment within the scope of the readiness review to safely start nuclear operations. One such CR is F&I (CR-14). The order states that an effective F&I process (also known as the Contractor Assurance System [CAS]) is one that identifies, evaluates, and resolves deficiencies and recommendations made by contractor line management and independent contractor audit/assessment groups. The F&I process should also resolve issues and recommendations made by external review teams and audit organizations. CWI has defined its F&I program in PDD-155, *Feedback and Improvement*, to consist of the employee feedback process, an assessment program, the issues management program, and the performance measurement program.

The C-RA team conducted their assessment of the CWI F&I program on a graded basis. Because the CWI F&I program was fully assessed during the 2012 IWTU Contractor Operational Readiness Review (C-ORR), the scope for this CR was adjusted to focus on ensuring the implementation of the F&I process (primarily lessons learned and corrective actions) resulting from the June 16, 2012, IWTU over pressurization event. IEA found the criteria and approach described in the C-RA IP for this CR to be appropriate, except as noted below.

The Criteria section for this CR is appropriate and slightly broader than the associated Approach section. The Criteria section includes all elements of the CWI CAS. The criteria states, *“The feedback and improvement process (CAS), including corrective action and lessons learned, has been effectively implemented for issues from the pressurization event and thereafter.”*

The Approach section (which defines what documents will be reviewed, the personnel that will be interviewed, and the activities that will be observed by the C-RA team) limited document reviews to lessons learned and corrective actions. Other elements of the CAS were not slated for review, but are needed to fully meet the stated criteria, including the issues management system and IWTU occurrence reports and Nonconformance Tracking System (NTS) reports. According to the C-RA team member assessing F&I, the only occurrence report reviewed was the one related to the over pressurization event. However, neither the interim nor supplemental C-RA reports listed this as a document reviewed. In addition, the team member did not review the NTS database for evidence supporting the criteria.

In addition to review of selected corrective action and lessons learned documents resulting from the June 16, 2012, over pressurization event, the Approach section of this IP CRAD required interviews and observation of an issue screening meeting, Senior Review Board meeting, and post-job briefings. IEA accompanied the C-RA team member assigned to this CR during several interviews and discussed the results of the C-RA team member’s document reviews and field activities. The C-RA team member conducted a thorough assessment of the F&I CR in most areas and reviewed all the pertinent CWI program and procedure documents for F&I, including MCP-8, *Performing Management Assessments and Management Reviews*, PDD-155, *Feedback and Improvement*, and MCP-3003, *Performing Pre-Job Briefs and Documenting Feedback*.

Consistent with the F&I C-RA CRAD in the IP, the team member reviewed a selected sample of corrective action and lesson learned documents including corrective action status closure and effectiveness review documentation. He also reviewed a sample of selected documents that resolve issues from the MSA conducted prior to the start of the C-RA. While observing a C-RA team member interviewing the IWTU Maintenance Manager, IEA learned that field observation of post-job briefings by the C-RA team could not be accomplished because conducting post-job briefs with workers had been

discontinued by IWTU management, except in the cases where the job foreman believes that the worker feedback received from workers will be of a substantial quantity, or if predetermined or As Low As Reasonably Achievable (ALARA) thresholds for a job are exceeded.

During an additional interview with the C-RA team member evaluating F&I, the team member stated that the issue of discontinuing the post-job briefing process was not within the scope of the C-RA. The team member believed that the issue was more of an Integrated Safety Management System (ISMS) program issue. However, as previously stated, PDD-155 includes worker feedback as part of F&I. Neither the interim nor supplemental C-RA reports addressed this issue.

The limitation of some document reviews (discussed above), and not accomplishing field observations identified in the IP, are minor examples where the IP was not fully implemented as written. (See **OFI-IWTU-CRA-05**.)

IEA views discontinuing post-job briefings as a questionable practice. Management actively obtaining and encouraging worker feedback through a timely and effective post-job brief process is an important element of an effective F&I process. IWTU management has made available a feedback form that workers can choose to complete. However, when management fails to actively seek post-job feedback from workers (on both good areas and those that can be improved), workers may feel that their feedback is not particularly important. The C-RA team agreed with the issue raised by IEA, but determined that the issue should be an Opportunity for Improvement versus a finding because the C-RA team concluded that the lack of an effective post-job worker feedback process was not a systematic failure to implement an adequate F&I program. (See **OFI-IWTU-CRA-02** and the discussion of WP&C in this Section.)

IEA reviewed all IWTU lessons learned posted on the CWI lessons learned website issued by IWTU since the June 2012 over pressurization event. Of the eight posted lessons learned, four lessons learned were related to the topics under the scope of the IWTU C-RA; one lessons learned was associated with the event itself; two were related to IWTU work control; and the last one involved the need to alter line management oversight as facility conditions change. Each lessons learned document included helpful discussion and analysis of the issue, and all except one included recommended actions. The C-RA team member concluded that the IWTU lessons learned were an effective F&I tool. Based on the lessons reviewed, IEA agreed with team member's conclusion.

In addition to the sample of corrective action closure packages reviewed by the F&I C-RA team member, the rest of the C-RA team evaluated the basis for closure and effectiveness of the corrective actions taken to address the issues resulting from the June 16, 2012, IWTU over pressurization event in their assigned CR areas. These evaluations were forwarded to F&I C-RA team member for inclusion in that section of the C-RA report. IEA considers this to be an acceptable method to verify that all actions necessary to support restart have been appropriately closed.

IEA also conducted a review of the DOE Occurrence Reporting and Processing System (ORPS) and the NTS databases and found 20 IWTU ORPS reports that were made on June 16, 2012, and thereafter. In addition, there are 9 NTS reports, 8 of which are nuclear safety related. An analysis of these documents did not reveal any repeat events or ineffective corrective actions. However, an occurrence was reported on May 2, 2012 (EM-ID—CWI-IWTU-2012-007) involving an inadequacy in TSR-level controls for fire protection in the Granular Activated Carbon (GAC) Beds. A "lessons learned" from Section 26 of that occurrence report was that "*All facilities should reinforce with personnel the need to question system or equipment conditions that are different than those planned for.*" The need for achieving and maintaining a questioning attitude by management and staff was a significant corrective action resulting from the June 16, 2012, over pressurization event at IWTU. (See **OFI-IWTU-CRA-05**.)

Overall, this CR was thoroughly and effectively assessed by the C-RA team member and was conducted in a consistent manner with DOE Order 425.1D and DOE-STD-3006-2010; however, some aspects of the review were too limited in scope or not fully consistent with the planning documents.

6.0 CONCLUSIONS

Overall, the C-RA was executed as planned by an experienced, critical C-RA team that followed the approved POA and IP. The C-RA team observed a significant number of work activities and was well prepared to evaluate the observed evolutions. The degree of rigor applied to the C-RA was appropriate, and the assessment results are properly documented in detailed final reports. The findings and recommendations are well documented, and, for the most part, designation of findings is adequately justified.

Nevertheless, IEA identified several ways that the planning and implementation of the C-RA could have been improved. Those opportunities for improvement are detailed in Section 7.0 of this report.

7.0 OPPORTUNITIES FOR IMPROVEMENT

IEA identified the following OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

OFI-IWTU-CRA-01: Ensure that future C-RA POAs are prepared at least six months in advance to ensure adequate time to prepare and to prevent the RA from impacting the schedule for determining readiness.

OFI-IWTU-CRA-02: Ensure that future CRA final reports include OFI issues identified during the CRA that may affect operational excellence (e.g., the lack of an adequate worker feedback process).

OFI-IWTU-CRA-03: In situations where an atypical methodology is used for a hazard analysis, broaden the POA-prescribed scope of the C-RA such that more scrutiny can be placed on those specific elements of the analysis and/or arrange for a third-party assessment of DSA hazard and accident analysis assumptions to evaluate the process and quality of the safety basis.

OFI-IWTU-CRA-04: Ensure that the C-RA observes a complete vertical slice of a sufficient number of safety-class and safety-significant system surveillances and calibrations to provide confidence in the processes. The provisions of safety basis CR, DOE-STD-3006-2010, Appendix 3, *Readiness Review Writing Guide*, should be considered in designing a well-sampled review, particularly the following provision of the standard:

Note: A vertical slice of at least two safety-related functions should be subject to comprehensive evaluation, from the identified hazard through implementation of the selected control. In addition, in conjunction with the Maintenance functional area, at least two SSCs will be subject to a vertical slice, from determination of the safety function, required surveillances and calibrations, development of the TSRs and subsequent procedures, and the records of accomplishment determining that the SSCs were operable. If the selected safety functions involve

SACs, those also should be subject to the vertical slice approach to ensure they are appropriate and adequately implemented.

OFI-IWTU-CRA-05: Improve processes and management oversight to ensure that future contractor readiness reviews fully address the CR scopes and take a broad perspective on the scope of the evaluation of related assurance processes.

8.0 FOLLOW-UP ITEMS

IEA identified two items for follow-up:

- Consistent with the POA, the C-RA team will return to complete the review when the IWTU facility has commenced operations. IEA will follow up with the C-RA team to assess the final conclusions of the C-RA team's review.
- IEA will review the DOE-RA when it commences so as to continue to maintain awareness of the RA process for the IWTU restart.

Appendix A Supplemental Information

Dates of Review

Onsite Review: January 14-20, 2014

Office of Independent Enterprise Assessments Management

Glenn S. Podonsky, Director, Office of Independent Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Independent Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments

Quality Review Board

William A. Eckroade
Thomas R. Staker
William E. Miller
Michael A. Kilpatrick

Office of Independent Enterprise Assessments Site Lead for the Idaho Site

Aleem E. Boatright

Office of Independent Enterprise Assessments Reviewers

Aleem E. Boatright - Lead
Glenn W. Morris

Appendix B

Documents Reviewed, Interviews, and Work Evolutions

Documents/Records Reviewed

- SAR-219, Documented Safety Analysis for the Integrated Waste Treatment Unit, Rev. 3
- TSR-219, Technical Safety Requirements for the Integrated Waste Treatment Unit, Rev. 0
- Safety Evaluation Report for the Documented Safety Analysis and Technical Safety Requirements (SAR-219 Rev. 7 and TSR-219 Rev. 3) for the Integrated Waste Treatment Unit (CPP-1696) at the Idaho Nuclear Technology and Engineering Center, 2/11
- TSR-100, ICP Standardized Technical Safety Requirements (TSR) Document, Rev.
- SAR-100, ICP Standardized Safety Analysis Report (SAR) Chapters, Rev.
- MCP-1519, ICP Projects Requirement Change Implementation, Rev.
- FRM-579, Integrated Waste Treatment Unit Safety Basis Implementation
- EAR-300, "IWTU—219 LCO Actions," Rev. 11, December 17, 2013
- FRM-579, "ICP Project Change Implementation Strategy," November 21, 2013
- Model Work Order 636523, (MO6) SSIS Proof Test for SIF-2 Components, December 5, 2013
- FRM-1102, "IWTU—Daily TSR-219 Instrument Surveillance," June 3, 2012–June 5, 2012, and June 17, 2012–June 19, 2012

Interviews (Observed C-RA Team)

- IWTU Maintenance Manager
- IWTU Project Director
- IWTU Shift Manager (2)
- IWTU Maintenance Foreman (2)
- IWTU Nuclear Safety Manager
- IWTU Chief Engineer
- IWTU Control Room Operators
- IWTU Outside Operators
- IWTU Test Engineers
- C-RA Team Assessors
- C-RA Team Advisor

Work Evolutions and Demonstrations (Observed C-RA Team)

- C-RA Team Meetings
- High Temperature Protection System Proof Test on SIF-2
- Maintenance and Troubleshooting on the IWTU Superheater
- Maintenance activity to remove a pressure relief valve
- Multiple System Walkdowns