Independent Oversight Review of the Sodium Bearing Waste Treatment Project-Integrated Waste Treatment Unit Federal Operational Readiness Review

June 2012

Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
U.S. Department of Energy

Table of Contents

Acronyms

ALARA	As Low As Reasonably Achievable
CAM	Continuous Air Monitor
C-ORR	Contractor Operational Readiness Review
CR	Core Requirement
CRAD	Criteria, Review, and Approach Document
CRO	Control Room Operator
CRR	Carbon Reduction Reformer
CWI	CH2M-WG Idaho, LLC
DMR	Denitration Mineralization Reformer
DOE	U.S. Department of Energy
DOE-ID	DOE Idaho Operations Office
D-ORR	DOE Operational Readiness Review
DSA	Documented Safety Analysis
EM	Office of Environmental Management
GAC	Granulated Activated Carbon
HEPA	High Efficiency Particulate Air
HSS	Office of Health, Safety and Security
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IP	Implementation Plan
IVR	Implementation Verification Review
IWTU	Integrated Waste Treatment Unit
LCO	Limiting Condition for Operation
LSS	Life Safety Systems
MSA	Management Self-Assessment
OFI	Opportunity for Improvement
OGC	Off-Gas Cooler
ORR	Operational Readiness Review
OSO	Outside Support Operator
POA	Plan of Action
PRC	Product Receiver Cooler
SAC	Specific Administrative Control
SAR	Safety Analysis Report
SBWTP	Sodium Bearing Waste Treatment Project
SMP	Safety Management Program
SSC	Structures, Systems, and Components
SSIS	Safety-Significant Instrumented System
STD	Standard
TSR	Technical Safety Requirement

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Federal Operational Readiness Review

1.0 PURPOSE

This report documents the U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), independent review of the Sodium Bearing Waste Treatment Project-Integrated Waste Treatment Unit (SBWTP-IWTU) DOE (Federal) Operational Readiness Review (D-ORR). The review was performed by the HSS Office of Safety and Emergency Management Evaluations and was intended to assess the effectiveness of the C-ORR process as implemented for the SBWTP-IWTU. This review also provides additional data regarding verification processes for the implementation of safety bases and safety basis controls at the Idaho Site.

The review was conducted at the Idaho Site from March 26 to March 30, 2012. This report discusses the background, scope, results, and conclusions of the review, as well as opportunities for improvement (OFIs) and items identified for further follow-up by HSS.

2.0 BACKGROUND

Activities and operations at the Idaho Site are divided into two primary contracts: the Idaho National Laboratory (INL) and the Idaho Cleanup Project (ICP). The DOE Idaho Operations Office (DOE-ID) provides direction and oversight for the design and operation of INL and ICP nuclear facilities for the DOE Headquarters Offices of Nuclear Energy (NE) and Environmental Management (EM), respectively. Included in the scope of the ICP are the Idaho Nuclear Technology and Engineering Center (INTEC) and the SBWTP-IWTU. Currently, the primary contractor responsible for the management and operation of INTEC and SBWTP-IWTU, as well as most other ICP facilities, is CH2M-WG Idaho, LLC (CWI).

DOE Order 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities*, specifies the conditions and circumstances under which a readiness review is required as part of a new nuclear facility startup process. 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 which is for the responsible contractor to perform an operational readiness review (ORR) of the new facility, followed by the DOE's ORR. DOE-STD-3006-2010 provides additional guidance regarding the steps necessary to carry out these successive reviews. Because the SBWTP-IWTU will be a newly started nuclear facility, both DOE Order 425.1D and DOE-STD-3006-2010 are applicable, and the ORR performed by EM followed the ORR performed by CWI, the responsible contractor.

In accordance with the guidance of DOE-STD-3006-2010, the CWI C-ORR team made their approved plan of action (POA) effective on February 14, 2011. During an ongoing management self-assessment (MSA) by the contractor, DOE-ID line management conducted an implementation verification review (IVR) of SBWTP-IWTU safety basis controls from October 31, 2011, to November 4, 2011. The IVR noted generally mature safety basis implementation processes used by the contractor; however, IVR findings identified weaknesses in translating safety basis controls into procedural steps, several cases of incomplete implementation, a conduct of operations issue related to procedural steps, and a number training and knowledge deficiencies.

CWI line management prepared a formal Readiness to Proceed Memorandum and issued it to DOE line management on February 27, 2012, thereby indicating that all prerequisites identified in the POA had been met. The contractor completed its ORR on March 9, 2012, and on March 12, 2012, the D-ORR team approved their implementation plan (IP). The D-ORR commenced on March 26, 2012, and was completed on April 6, 2012.

3.0 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, including independent oversight, of DOE Federal and contractor operations is an integral part of the Department'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 evaluation 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 HSS is responsible for implementing.

Commensurate with the purpose of DOE Order 227.1, HSS Independent Oversight assessed the performance of the D-ORR by evaluating the activities the D-ORR team used to determine how and to what degree SBWTP-IWTU met the Core Requirements (CRs), as set forth by DOE Order 425.1D and implemented through their approved POA and IP. By choosing a sampling of these CRs and conducting "shadow" oversight of the D-ORR team as they performed their review, Independent Oversight was able to compare the D-ORR team's methods to DOE Order 425.1D requirements and DOE-STD-3006-2010 guidance. In addition, the existence of any gaps between what Independent Oversight observed or found, and the D-ORR team's observations and findings, was independently assessed.

Also as a part of this review, Independent Oversight collected data regarding how this ORR process, as carried out by DOE, contributes to verifying appropriate implementation of safety basis controls. In September of 2011, Independent Oversight conducted an appraisal of the Idaho Site contractor and Federal IVR processes, which examined the extent to which such processes have been developed and employed; that effort was the first phase of a two part targeted review. The targeted IVR review examines Idaho Site IVR processes in the context of DOE Guide 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements*, Appendix D, *Performance of Implementation Verification Reviews (IVRs) of Safety Basis Controls*. The data collected during this review will be used as input to Phase 2 of the Independent Oversight report documenting that effort. Phase 2 of the IVR independent review, planned for later this year, will focus on Objectives 3 through 6 of criteria, review, and approach document (CRAD) HSS CRAD 45-39, Rev. 1, *Implementation Verification Review of Safety Basis Hazard Controls: Inspection Criteria, Activities, and Lines of Inquiry*.

4.0 RESULTS

DOE-ID Work Instruction, 03.WI.04.10, *Verification of Readiness to Startup or Restart Nuclear Facilities*, establishes the processes that implement DOE Order 425.1D. The work instruction addresses the DOE line management oversight process for verifying readiness to startup, as well as the requirements for performing a D-ORR. The process for verifying readiness to startup includes appointing a DOE

oversight lead who is responsible for evaluating the closure actions for pre-start findings and ensuring the development of approved corrective action plans for post-start findings. Additionally, the oversight lead is responsible for evaluating the POA, specifically the scope, prerequisites, and readiness review team members. Also, the oversight lead evaluates the adequacy of the contractor ORR (C-ORR) and its associated final report, and ensures that all pre-start findings are resolved prior to startup. Based upon this information, the oversight lead makes a recommendation for or against start of the D-ORR.

DOE-ID utilized a certification and verification plan, PLN-1994, *SBWT/IWTU Certification and Verification Plan*, Rev. 4, to document the planning and actions taken by the DOE Sodium Bearing Waste Treatment Integrated Project Team to verify both DOE-ID and the contractor's readiness to proceed. The certification and verification plan includes a description of the DOE oversight processes, which include daily project oversight, systems-specific oversight, functional area oversight, and an IVR. DOE's concurrence with the specific systems and functional areas was documented on the affidavits of affirmation. The certification and verification plan also addressed verification of DOE readiness, which was determined by an assessment against DOE-specific CRs 16, *DOE Qualifications – Field*, and 17, *DOE Qualifications – Field Management Systems*. Additionally, the DOE-ID Facility Operations Supervisor was required to conduct an assessment of CR 15, *Breadth, Depth of C-ORR*, verifying completion of prerequisites contained in the POA and the adequacy of the C-ORR, including closure of pre-start findings, a manageable list of open items, and a well-defined schedule for closure. The certification and verification plan was thorough and provided a good description of the oversight process and basis for readiness.

Work Instruction 03.WI.04.10 also describes the process for performing a D-ORR, including developing a POA. The POA, PLN-3737, was approved by the startup authority and made effective on February 14, 2011. The POA adequately describes the facility and major processes, including the boundary between the SBWTP-IWTU and the New Waste Calcine Facility (NWCF). Additionally, the POA defined which capabilities would be demonstrated, including the process flow path and the product handling capabilities. The operation of systems that would introduce process hazards were to be simulated in the field. The POA adequately addresses all of the CRs, provides a status of the documented safety analysis (DSA) SAR-219 and TSR-219, and includes an appropriate list of prerequisites. The POA adequately addresses the relevant requirements contained in the work instruction to comply with DOE Order 425.1D.

The D-ORR team conducted their review in accordance with their approved IP. The IP appropriately referenced DOE Order 425.1D, DOE-STD-3006-2010, and the approved POA. The IP included the scope and depth of review, prerequisites, review approach, reporting and resolution, schedule, and team composition. Appendix 3 of the IP contained the CRADs, including which of the CRs were being addressed by each of the CRADs. The CRADs were developed for each of the functional areas, and were found to be thorough and comprehensive. The IP tailored the breadth and depth to take into consideration recent independent reviews, but also appropriately stated that the area of conduct of operations would not be reduced in scope or depth due to its significance. In addition to the functional area reviews, the IP included the need to review the results of the DOE-ID IVR and contractor MSA, as well as the results of the C-ORR. The systems within the review scope included the superheater, denitration mineralization reformer (DMR) and additive hopper system, process gas filter, carbon reduction reformer (CRR), product receiver cooler (PRC), off-gas cooler (OGC), granulated activated carbon (GAC) beds, high efficiency particulate air (HEPA) filters, and other systems and processes. Both the D-ORR team and Independent Oversight noted that the Additive System was not demonstrated during the ORR process and this was identified as a D-ORR pre-start finding, citing a lack of administrative controls for explosive hazards. The IP allowed the possibility that not all systems would be demonstrated due to potential time constraints, but did not specify how these systems would be eventually assessed. Independent Oversight concurs with the D-ORR finding, FP.1-PRE-1, but believes the D-ORR should have also addressed the process for assessing the Additive System that had been omitted from the scope of the ORR. Doing so

would have helped ensure that an adequate independent review had been completed and that the industrial hazards (explosion) were mitigated. (See **OFI-1**.)

The D-ORR team members, including the team leader, deputy team leader, team coordinator, and 16 subject matter experts, were very experienced and included a number of members with previous readiness review experience. The D-ORR schedule included a significant number of operational activities (e.g., product transfer, canister transfer to the vault). Other evolutions included numerous operational drills, operational activities, simulator operations and scenario proficiency demonstrations, and maintenance activities. Additionally, a surveillance for SIF-2, the safety-significant high temperature protection system, was scheduled. However, though the pre-job briefing was held as scheduled, the actual surveillance was terminated at an early stage. (See **OFI-2**.)

The following sections discuss the observations made by Independent Oversight during its shadow review of the D-ORR process. As discussed above, Independent Oversight assessed the D-ORR in accordance with the requirements of DOE Order 425.1D, the guidance of DOE-STD-3006-2010, and other best practices, as implemented through the approved POA and IP. The results of this assessment are discussed below.

CR 1: Safety Management Programs

The D-ORR IP addressed the review of the safety management programs (SMPs), as defined in TSR-100, *ICP Standardized Technical Safety Requirements (TSR) Document*, and the subject matter experts were assigned to review each SMP. Independent Oversight shadowed many of the D-ORR team activities to review SMPs.

SMP-Radiological Protection

In review of the radiological protection SMP, the D-ORR evaluator demonstrated a strong technical background; observed numerous drills and evolutions; was well prepared for the evolutions, often having the applicable procedure in hand; and identified numerous areas for improvement. The evaluator identified pre-start findings related to radiation event response, procedural violations, and as low as reasonably achievable (ALARA)/radiation work permit (RWP) use and flowdown. Independent Oversight shadowed the continuous air monitor (CAM) performance check evolution, during which the D-ORR evaluator identified issues with procedural compliance and poor ALARA practices. The D-ORR evaluator was also present during operational drills involving radiological spills, and identified a number of issues that led to the pre-start finding on inadequate radiation event response.

SMP-Fire Protection

Due to scheduling complications, the evaluator for the Fire Protection SMP joined the D-ORR team just prior to the start of the D-ORR, and therefore, had to spend a considerable amount of time becoming familiar with the facility, support systems, and associated documentation during the D-ORR. The initial focus was spent verifying the implementation of the fire protection program through a detailed documentation review of the latest revision to the fire hazards analysis (HAD-434). Several areas of improvement were identified through this review and resulted from comparing controls identified in the HAD with those that had been implemented in the facility. In addition to the administrative issues with the HAD, an abnormal pressure level on the fire sprinkler piping was observed during facility walkdowns. The initial response from the facility was that the elevated water pressure may be attributed to the fire and jockey pump start/stop settings and would need further investigation. Independent Oversight considered the concerns noted during this portion of the D-ORR to be valid observations, and agreed that the associated safety implications were not significant enough to result in a pre-start finding.

SMP-Hoisting and Rigging

Independent Oversight observed hoisting and rigging activities during the additive feed operations. The crane operator and the outside support operator (OSO) demonstrated good communication, and the crane operator executed the crane movement activities in a careful and controlled manner. The operator referred frequently to the procedure during the evolution. The D-ORR team evaluators were well prepared and provided excellent coverage of the evolution. One D-ORR team evaluator recommended that the spotter's time near the load be minimized.

CR 4: Level of Knowledge

The level of knowledge of managers, operators, and operations support personnel was observed during operational demonstrations and simulations. At the beginning of the D-ORR, informative facility tours were provided by the CWI Vice President of the IWTU project, as well as other senior managers. Independent Oversight observed numerous evolutions and operational drills which demonstrated that control room operators (CROs) were very knowledgeable on both normal operating procedures and emergency action response procedures, and senior operational and engineering staff members were able to respond to requests for further technical direction as needed. During two of the evolutions, the valve lineup and the TSR/limiting condition for operation (LCO) scenario with maintenance work order, the OSO incorrectly identified some components, indicating a need for additional practice. The D-ORR schedule included three demonstrations of simulator operations and scenario proficiency. Independent Oversight observed one of these demonstrations, which was also observed by the D-ORR team and the Facility Representative (FacRep). Although the computer system locked up, requiring a reboot of the system, the CRO was able to demonstrate appropriate use of the procedure.

CR 5: Worker Safety and Health

In general, personnel exhibited a strong commitment to worker safety and health. The pre-job briefs emphasized the importance of performing work in a safe manner, and personnel were observed following health and safety requirements such as wearing safety glasses, using a 3-point hold on ladders, complying with the airlock protocol, frisking, complying with barricades, etc. During one of the drills, the D-ORR evaluator noted that one of the participants, who was assumed to be radioactively contaminated for drill purposes, was allowed to descend the stairs while her hands were wrapped and her glasses fogged.

The D-ORR team noted concerns with the walking surface at elevation 205 containing numerous tripping hazards, the plethora of heavy rolling stock that was not secured, and the potential for inadvertently using radios in restricted areas (some radios were even stored in the restricted areas). Independent Oversight concurs with these observations.

CR 6: Defined Safety Envelope and Defined Structures, Systems, and Components (SSCs)
CR 7: Safety SSC Operability Surveillance Program & Verification

The D-ORR IP assigned review activities associated with CR 6 and 7 to the engineering and nuclear safety functional areas. The D-ORR nuclear safety subject matter expert evaluated the objective of CR 6 through review of documentation, interviews, and observations of select activities. The D-ORR team partially observed the operational drill involving two adjacent linear temperature detector sensors being out of service. Observers were stationed in the control room, but no D-ORR team evaluators were located at the incident scene until well after the scenario had developed. Another evolution involving a safety-significant instrumented system (SSIS), a surveillance of the high temperature protection system, was included in the D-ORR schedule. The two instrument loops monitor off-gas temperature at the discharge

of the off-gas cooler, and if either loop trips, automatic actions include tripping the waste feed pump and shutting the mercury adsorber inlet valve. These actions will prevent the release of mercury and NO_x (nitrogen oxide) due to a loss of off-gas cooling. The pre-job briefing was conducted as scheduled and was observed by D-ORR team members. However, when the actual surveillance test was initiated the next morning, no D-ORR team members were present until the instrument technicians were ready to execute the Lock Out/Tag Out (LO/TO) on the proof test. At this point, the CWI nuclear safety leader recommended to the D-ORR evaluator that these surveillances be suspended due to the length of the surveillances (over several days) and the fact that they had recently been performed for the C-ORR team. The D-ORR evaluator concurred with this recommendation. Independent Oversight observed a tabletop demonstration of the proof test and loop test that was performed by the SBWTP-IWTU staff. The maintenance supervisor and instrument technicians provided an overview of the procedures. Independent Oversight believes that the tabletop demonstration was a reasonable compromise, but feels that performing the full surveillance would have been an improvement. (See **OFI-1** and **OFI-2**.)

CR 9: Operating Procedures

The D-ORR schedule included evolutions involving the main operational and emergency response procedures. These evolutions included canister placement into a cell using the transfer bell crane (TPR-7926), nitrogen (N_2) truck receipt and unloading (TPR-7921), product transfer from the DMR to the PRC (TPR-7905), additive feed operations (TPR-7904), off-gas filter and product gas filter transfer of product into the PRC (TPR-7905), PRC transfer of product into the canister (TPR-7911), canister transfer from the cell to the vault, and movement of the vault to the Product Storage Building (TPR-7912). The procedures for normal operations (TPR-7905), shutdown (TPR-7906), alarm response (EAR-284), emergency response (EAR-285), and LCO actions (EAR-300) were demonstrated during the operations drills. Additionally, the procedure for startup (TPR-7900) was demonstrated during the evolution to perform a valve lineup. Independent Oversight observed a majority of the operational evolutions and drills, and noted that the D-ORR evaluators were well prepared (appropriate procedures in hand), were able to see and hear the activities and operators during the evolutions, and asked probing questions without unduly interfering with the performance of the task. Operators demonstrated proficiency with the operating procedures, displayed professional communication, and sought assistance from supervisors as needed. Independent Oversight noted that many of the procedures had been recently revised.

CR 10: Emergency Response, Management, and Drill Program

Numerous operational drills were conducted during the D-ORR, including two scenarios with radiological spills, a TSR/LCO scenario, low oxygen (O_2) cascading alarms, and a GAC bed fire. Independent Oversight observed all of the operational drills. With one exception, described below, operations drills were graded Satisfactory during the C-ORR and D-ORR, and Independent Oversight concurs with the grades.

In general, Independent Oversight observed that the D-ORR team was well represented at both the control room and incident scene. The D-ORR team identified concerns with the radiological event response and the decontamination facilities, as well as concerns with the drill guides. During the second radiological spill scenario involving the canister pintle fill port, the D-ORR team provided coverage with several team members, and the FacRep also observed the activity. These individuals identified concerns with the drill in the area of radiation control performance; the radiation control technician (RCT) did not request assistance until after being prompted by the drill controller, did not adhere to standard drillmanship, and did not establish or control the contamination boundary.

The operational drill of the TSR/LCO scenario (performed on 3/27/2012) involved two adjacent linear temperature detector sensors being out of service. The linear temperature detector system is safety-

significant and prevents a ground-level release of mercury and NO_x by alerting operations of a potential thermal event within the GAC bed before a breach can occur. A drawing simulated the abnormal detector indications on "Zones" 9 and 10 of Tank A. Although the OSO knew to check the wires for signs of damage, he first went to the wrong tank (Tank B). The OSO walked around to Tank A, but did not look at the wires for Zone 9 and 10 until prompted by the controller. The OSO then reported the damaged wires to the control room. Although D-ORR evaluators were in the control room, no D-ORR evaluators were at the incident scene until after the drill had progressed to the development of the work package.

An operational drill that involved a pipe leak and subsequent release of sodium bearing waste feed material into the 4-pack was performed on 3/28/2012. The scenario proved to be challenging and was compounded by a simulated loss of ventilation and initiation of an Emergency Action Level (EAL) due to the volume of the spill. The facility post drill critique resulted in only one of the three controllers expressing their concern for the lack of command and control demonstrated by the Shift Supervisor (SS). Eventually, the other controllers agreed with this observation and the drill resulted in a grade of Needs Improvement (NI). The D-ORR evaluators agreed with this grade and favorably recognized the facility's ability to perform a self-critical and balanced critique. Independent Oversight also agreed with the grade and viewed this critique as a positive indicator, revealing the ongoing progress and maturity of the drill control program.

The facility response to the GAC bed fire drill was demonstrated with a high level of competence by the OSO, who was responsible for responding to the fire alarm. The OSO understood the design of the linear detection system panel and how the system monitors the wall temperature of the GAC vessel during a fire condition to prevent the accident scenario of over pressurizing and eventual breach of the vessel. However, the Fire Department did not participate in this drill. The interface between the Fire Department and the facility during the C-ORR was noted as needing improvement. Although not identified by the D-ORR, Independent Oversight believes that the Fire Department should have been scheduled to participate in this evolution to demonstrate their ability to address the areas for improvement that were identified by the C-ORR, including understanding the operation of the manual deluge system and the location of the respective control valves for the GAC beds.

CR 11: Startup Plan

The C-ORR had identified one objective as being not met – an adequate startup program had not been developed that included plans for graded operations and testing after startup to simultaneously confirm the operability of equipment, the viability of procedures, and the performance and knowledge of the operators. Independent Oversight interviewed the D-ORR team members responsible for the management area with regards to their assessment of the SBWTP-IWTU startup plan, PLN-3350. The D-ORR evaluators indicated that, although the startup plan had been revised to add additional details on the controlled approach to introducing radioactive waste feed, the startup plan still required additional management oversight and control of testing. This issue was identified as a pre-start finding by the D-ORR team.

CR 12: Conduct of Operations

Independent Oversight shadowed numerous activities involving conduct of operations and procedure use. These activities included an outside operator conducting rounds and surveillance requirements per form FRM-1102, daily TSR-219 instrument surveillance; and form FRM-1124, daily checklist. The OSO demonstrated good familiarity with the forms and responded appropriately when asked by the D-ORR evaluator about response to unexpected conditions, documenting corrections, etc. Independent Oversight also shadowed a valve lineup that used technical procedure TPR-7900, *Preparation for Startup*. The D-ORR team provided good coverage of this activity, identifying numerous discrepancies with the

procedure. The OSO incorrectly identified one of the valves initially, recognized his error, but then forgot to go back and verify the position of the valve that he had missed. Also, since the procedure was being simulated (i.e., valves were not actually opened/closed), the OSO did not mark on the procedure, as would typically be done, and, subsequently, lost his place in the procedure. This issue may have been alleviated if he had marked on the procedure. In general, good adherence, familiarity, and use of procedures were noted by Independent Oversight during the operational drills and performance evolutions. The procedural deficiencies were identified as a post-start finding by the D-ORR team.

CR 16: Management

Independent Oversight observed the DOE FacRep to be actively engaged in the complete ORR process. Independent Oversight specifically observed the FacRep shadowing multiple activities, including the radiological spill operational drill, simulator operations, the radiological spill operational drill involving the canister pintle, and the operational drill involving a response to a nitrogen gas leak inside the facility.

5.0 CONCLUSIONS

Overall, the D-ORR was executed as planned by an experienced, critical D-ORR team that followed the approved POA and IP. The D-ORR team observed a significant number of work activities and was well prepared to evaluate the observed evolutions. The degree of rigor applied to the D-ORR was appropriate for the initial startup of a one-of-a-kind process, and the assessment results are properly documented in both a detailed outbrief and final report. The findings and recommendations are well documented, and designation of findings is adequately justified.

Although the D-ORR was observed to be adequate in all respects, the Independent Oversight team did identify some areas for improvement. The C-ORR pre-start findings acknowledge that the implementation of safety basis controls was not complete, and the C-ORR IP included only a sample of the important maintenance and surveillance tests for the SSISs. However, the D-ORR team did not devote additional attention to evaluating these particular areas and the D-ORR IP was not revised to incorporate such follow up. (See **OFI-1** and **OFI-2**.)

6.0 OPPORTUNITIES FOR IMPROVEMENT

The D-ORR was executed by an experienced team and with an appropriate degree of rigor. However, this Independent Oversight review identified the following opportunities for improvement (OFIs) when conducting future ORRs. 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-1: EM and DOE-ID should consider enhancing the effectiveness of the ORR process by ensuring that D-ORR IPs incorporate a direct follow up of specific findings and lesser issues identified by the C-ORR.

OFI-2: EM and DOE-ID should consider ensuring that D-ORRs be designed to observe a complete vertical slice of as many safety-class and safety-significant system surveillances and calibrations as possible and consider the DOE guidance in DOE-STD-3006-2010 (repeated below).

With regard to the safety basis core requirement, DOE-STD-3006-2010, Appendix 3, *Readiness Review*

Writing Guide, provides useful guidance for completing a well-sampled review. In part, page 3-21offers the following:

> *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.*

7.0 FOLLOW-UP ITEMS

This assessment identified two items for follow-up by Independent Oversight:

- Maintain awareness of SBWTP-IWTU startup plan execution.
- Examine DOE-STD-3006 and associated policies regarding ORRs to determine if improvements can be made, specifically focusing on timing and the prescribed time of completion associated with such reviews. To this end, the HSS lead for developing readiness review guidance was contacted and intends to discuss expectations for ORR timing at the next ORR Workshop.

Appendix A
Supplemental Information

Dates of Review

Onsite Review: March 26 – March 30, 2012

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Appendix B
Documents Reviewed and Interviews and Work Evolutions Shadowed

Documents/Records Reviewed

- 03.WI.04.10, Work Instruction – Verification of Readiness to Startup or Restart Nuclear Facilities, Rev.6, 9/22/2010
- CCN 313202, Memorandum from William Lloyd to Frank McCoy; Subject: Readiness to Proceed Memorandum, 2/27/12
- DDS-1064, Configuration Data Sheet for IWTU SIF-2
- DOE Operational Readiness Review Implementation Plan for the Integrated Waste Treatment Unit, 3/12/12
- EAR-284, IWTU-Alarm Response, Rev 11, 3/25/12
- EAR-285, IWTU- Emergency Response, Rev 7, 3/24/11
- EAR-300, IWTU- TSR-219 LCO Actions, Rev 6, 3/22/12
- FRM-579, Integrated Waste Treatment Unit Safety Basis Implementation
- FRM-1102, IWTU – Daily TSR-219 Instrument Surveillance, Rev 6, 2/18/12
- FRM-1124, IWTU – Daily Checklist, Rev 7, 1/13/12
- INTED.D.006, ORR Emergency Response Evaluated Drill, Rev. 1, 3/12
- Integrated Waste Treatment Unit Contractor Operational Readiness Review Implementation Plan, Rev. 1, 2/12
- IWTUDR01, Operations Drill Guide: Respond to a GAC Bed Fire, 3/12
- IWTUDR09, Operations Drill Guide: Respond to a TSR/LCO Scenario, 3/12
- MCP-1519, ICP Projects Requirement Change Implementation, Rev. 8, 7/11
- MWO 00640179 01, Perform Proof Test on SSIS2, High Temperature Protection System, 3/12
- *PLN-1994, SBWT/IWTU Certification and Verification Plan, Rev 4, 3/16/12*
- *PLN-3350, IWTU-Startup Plan, Rev 6, 3/27/12*
- PLN-3485, Contractor Operational Readiness Review Plan of Action for the Integrated Waste Treatment Unit, Rev. 2, 2/11
- PLN-3722, Management Self-Assessment Plan for Startup of the Integrated Waste Treatment Unit, Rev. 4, 11/11
- PLN-3737, Idaho Cleanup Project Sodium-Bearing Waste Treatment Project Operational Readiness Review Plan of Action, R0, 2/14/11
- Report of the CWI Contractor Operational Readiness Review for Initial Startup of the Integrated Waste Treatment Unit (Conducted February 27 – March 9, 2012), 3/15/12
- Safety Evaluation Report for the Documented Safety Analysis and Technical Safety Requirements (SAR-219 Rev. 3 and TSR-219 Rev. 0) for the Integrated Waste Treatment Unit (CPP-1696) at the Idaho Nuclear Technology and Engineering Center, 2/11
- SAR-100, ICP Standardized Safety Analysis Report (SAR) Chapters, Rev. 8, 12/10
- SAR-219, Documented Safety Analysis for the Integrated Waste Treatment Unit, Rev. 3, TBD
- TPR-7900, IWTU – Preparation for Startup, Rev 4, 3/13/12
- TPR-7904, IWTU – Receiving and Adding Bed Material, Rev 4, 3/22/12
- TPR-7905, IWTU – Normal Operations, Rev. 3, 2/12
- TPR-7911, IWTU – Canister Filling and Handling, Rev. 6, 2/12
- TPR-7912, IWTU – Product Vault Handling, Rev. 9, 2/12
- TPR-7915, IWTU – Liquid Transfers, Rev. 6, 2/12 (with Document Field Change 129304)

- TPR-7921, IWTU – Liquid Nitrogen and Oxygen Storage Systems, Rev 8, 3/24/12
- TPR-7926, IWTU – Bell Crane Operation, Rev. 4, 2/12
- TSR-100, ICP Standardized Technical Safety Requirements (TSR) Document, Rev. 6, 12/10
- TSR-219, Technical Safety Requirements for the Integrated Waste Treatment Unit, Rev. 0, TBD
- HAD-434, Combination Fire Hazards Analysis/Fire Safety Assessment for the Integrated Waste Treatment Unit, Rev. 5
- MCP-3359, IWTU Combustible Loading Program, Rev. 3
- TSR – 219, Technical Safety Requirements for the Integrated Waste Treatment Unit, Rev. 1
- CPP- 1696 (Pre Fire Plan), 12-24-20122
- TSR-100, ICP Standardized Safety Requirements (TSR) Document , Rev. 7
- AC 5.100.6, Section H
- Manual 14a Safety and Health – Occupational Safety & Fire Protection
- Health and Safety Executive (HSE), Carbon Bed Adsorbers, Fire and Explosion Safety Issues (DIN SI5/62), Dated 2-4-2007
- Linear Heat Detector Analysis for Placement on IWTU GAC Vessels, EDF-9239, Rev. 0
- Fire Water Containment, EDF-10123, Rev. 0
- TPR- 7905, IWTU – Normal Operations, Rev. 11
- Evaluation of Fire Detectors for Use in the IWTU DMR and CRR Cells, EDF-9243, Rev. 19
- PLN-3350, IWTU Startup Plan, Rev. 6
- TPR-7906, IWTU – Shutdown, Rev. 3
- TPR-7904, IWTU- Receiving and Adding Bed Material, Rev. 3
- INL/INT-10-12550, INL Fire Department Emergency Response Baseline Needs Assessment, Rev. 1
- TPR-7904, IWTU Training, OSO Final OJT Checklist, Rev. 00
- Integrated Waste Treatment Unit, Granular Activated Carbon Bed Cooling Calculations, EDF-9104, Rev. 0
- Coal and Charcoal Storage, FM Property Loss Prevention Data Sheets, 8-10, 2003
- Structural Evaluation of IWTU GAC Vessel Under Postulated Fire Conditions, EDF-9008, Rev. 2
- Critical Spare Parts List for the Integrated Treatment Unit Project, EDF-10184, Rev. 0

Demonstrations (Observed D-ORR Team)

- D-ORR Team Meetings
- Operator Rounds and Surveillances
- CAM Performance Checks
- N_2 Truck Receipt and Unloading
- Additive Feed operations
- Life Safety Systems preventive maintenance performance
- Performance of a Valve Lineup
- Performance of a Level II Lockout/Tagout
- PRC Transfer of product into the canister
- Maintenance and Radcon Evolution: prefilter placement
- Performance of a mode change checklist
- Simulated lineup from the New Waste Calcining Facility
- Pre-job briefing for SIF-2 Work Order – Surveillance
- Performance of SIF-2 Work Order – Surveillance (suspended)

- Simulator operations and scenario proficiency demonstrations
- Operations Drill – Respond to a radiological spill
- Operations Drill – Respond to a radiological spill at the canister pintle fill point
- Operations Drill – Respond to a TSR/LCO scenario involving the linear temperature detector sensors
- Operations Drill – Low O2 cascading alarms
- Operations Drill – Respond to a Granular Activated Carbon Bed Fire
- Operations Drill – Radiological spill in the Off-gas blower area