

**Independent Oversight Review of  
Management of Safety Systems at the  
Oak Ridge Transuranic Waste Processing Center  
and Associated Feedback and Improvement Processes**



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## Acronyms

CAAS	Criticality Accident Alarm System
CAP	Corrective Action Plan
CAR	Corrective Action Report
CAS	Contractor Assurance System
CBM	Condition Based Maintenance
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CPE	Cask Processing Enclosure
CRAD	Criteria, Review and Approach Document
CSE	Cognizant System Engineer
CY	Calendar Year
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DSH&Q	Director of Safety, Health and Quality
DWOL	Duty Waste Operations Lead
EM	Office of Environmental Management
ESQD	Engineering, Safety and Quality Division
FOD	Facility Operations Division
FR	Facility Representative
FRA	Functions, Responsibilities, and Accountabilities
FY	Fiscal Year
GB	Glovebox
HEPA	High Efficiency Particulate Air
HSS	Office of Health, Safety and Security
HVAC	Heating, Ventilation, and Air Conditioning
IR	Incident Report
ISMS	Integrated Safety Management System
JCO	Justification for Continued Operation
KSA	Knowledge, Skills, and Abilities
LCO	Limiting Condition for Operation
LOI	Line of Inquiry
MAP	Master Assessment Plan
MII	Management Item Form
NCR	Nonconformance Report
NMMP	Nuclear Maintenance Management Program
NNSS	Nevada National Security Site
OFI	Opportunity for Improvement
OJT	On-the-Job Training
OREM	Oak Ridge Environmental Management
ORNL	Oak Ridge National Laboratory
ORPS	Occurrence Reporting and Processing System
PBVS	Process Building Ventilation System
PdM	Predictive Maintenance
PEP	Performance Evaluation Plan
PvM	Preventive Maintenance
QA	Quality Assurance
R2A2	Roles, Responsibilities, Accountabilities, and Authorities
RAP	Reliability Assurance Program
REF	Reference
RWP	Radiation Work Permit

SAC	Specific Administrative Control
S/CI	Suspect/Counterfeit Items
SME	Subject Matter Expert
SMP	Safety Management Program
SR	Surveillance Requirement
SS	Safety Significant
SSC	Structures, Systems, and Components
SSO	Safety System Oversight
SSOC	Safety System Oversight Coordinator
TQP	Technical Qualification Program
TRU	Transuranic
TSR	Technical Safety Requirement
TWPC	Transuranic Waste Processing Center
UET	Use Every Time
USQ	Unreviewed Safety Question
WAI	Wastren Advantage, Incorporated
WIPP	Waste Isolation Pilot Plant

# **Independent Oversight Review of Management of Safety Systems at the Oak Ridge Transuranic Waste Processing Center**

## **1.0 PURPOSE**

The U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the management of safety significant (SS) structures, systems and components (hereinafter referred to as safety systems) at the Oak Ridge Transuranic Waste Processing Center (TWPC). The review was performed by the HSS Office of Safety and Emergency Management Evaluations and was carried out within the broader context of an ongoing program of targeted assessments of safety systems, with an emphasis on the implementation of management of safety systems across the DOE complex at sites that have hazard category 1, 2, and 3 facilities. The purpose of this Independent Oversight targeted assessment effort is to evaluate processes for monitoring, maintaining, and operating safety systems to ensure their continued reliable capability to perform intended safety functions.

This review also provides data for an ongoing HSS effectiveness review of the Department's implementation of Commitment #16 of the DOE implementation plan for Defense Nuclear Facilities Safety Board Recommendation 2004-1 regarding verification of Federal nuclear safety assurance capability. Independent Oversight accomplished this review by performing assessments that included activity-level observations.

This targeted review was performed at the Oak Ridge TWPC during the periods of April 2-5, April 15-19, and May 19-23, 2013. This report discusses the background, scope, methodology, results, and conclusions of the review, as well as opportunities for improvement (OFIs) and findings identified during the review.

## **2.0 BACKGROUND**

The Oak Ridge Environmental Management (OREM) Site Office was created in October 2012 and reports directly to the Office of Environmental Management (EM) at DOE Headquarters. Until its formation in 2012, DOE line management of Oak Ridge EM projects was the responsibility of the Oak Ridge Operations Office. OREM serves as DOE line management for EM projects at the East Tennessee Technology Park (formerly the K-25 Plant), Oak Ridge National Laboratory (ORNL), the Y-12 National Security Complex, and the TWPC. TWPC is managed and operated for DOE by Wastren Advantage, Incorporated (WAI). The purpose of TWPC is to treat, package, and ship transuranic (TRU) waste for disposal. The mission of the facility is to treat specific tank and solid debris TRU wastes currently stored at various facilities on the Oak Ridge Reservation to satisfy transportation and disposal criteria for the applicable DOE waste repositories: the Waste Isolation Pilot Plant (WIPP) in New Mexico for the TRU waste, and the Nevada National Security Site (NNSS) in Nevada for low level waste.

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. The independent oversight program is described in and governed by DOE Order 227.1, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspector guides, and process guides.

In a memorandum from the Chief Health, Safety and Security Officer to DOE senior line management dated November 6, 2012, HSS identified “Safety Class or Safety Significant Structures, Systems and Components (SSCs)” as an Independent Oversight targeted review area for 2013. The memorandum also stated that the areas would be further defined in supporting Independent Oversight Review Plans. In addition, the HSS memorandum stated that the performance of DOE line oversight would be evaluated during the targeted reviews to provide input to the overall evaluation of DOE Federal nuclear safety assurance capability.

### **3.0 SCOPE**

For this review, Independent Oversight reviewed the documented OREM processes for contractor oversight, including safety system oversight (SSO), and WAI processes for management of safety systems; observed work activities to verify the effectiveness of overall implementation, including technical safety requirement (TSR) and maintenance program implementation; observed the performance of maintenance and operations activities in the TWPC Process Building (also known as the Main Building); observed relevant meetings; reviewed oversight, feedback and improvement program and performance documents; and interviewed key OREM and WAI personnel. Independent Oversight selected the Process Building Ventilation System (PBVS) as the safety system to be evaluated during the review. The Process Building contains waste handling, treatment, and packaging processes for transportation to one of two DOE disposal sites (WIPP or the NNSS), depending on the constituents in the waste. The PBVS is an integral part of the Process Building confinement design. The documented safety analysis (DSA) takes credit for the PBVS to reduce the consequences of a fire or deflagration in the Process Building Glove box, Box Breakdown Area, and Hot Cell Process areas and Process Building staging areas outside of these enclosures by providing confinement to potential airborne radioactive material and preventing release of radioactive material from the Process Building. The system is composed of a series of redundant duct systems, dampers, banks of filters, exhaust fans/blowers, and associated instrumentation.

The PBVS is a SS system with active safety features to provide a confinement system and ensure that the air in the building flows from clean areas to progressively more contaminated areas. From the highest contaminated areas, the air is exhausted through banks of filters that include two high efficiency particulate air (HEPA) filters per bank, and then out the building stack.

In some cases, Independent Oversight considered additional systems as necessary to obtain a clearer perspective for responding to some of the criteria, review and approach documents (CRADs).

### **4.0 METHODOLOGY**

The targeted review of the management of safety systems evaluated the effectiveness of processes for operating, maintaining, and overseeing the performance of the SS PBVS at TWPC. The review consisted of an evaluation of the procedures and processes used to demonstrate ongoing operability and reliability of this safety system. The review focused on the implementation of the facility’s safety basis as it relates to the selected safety system and did not evaluate the adequacy of the DSA. The review also evaluated the effectiveness of DOE SSO for the selected system.

The following sections of HSS CRAD 45-11, Rev. 3, *Safety Systems Inspection Criteria, Approach, and Lines of Inquiry*, were used to define the scope of this targeted review:

- Maintenance
- Surveillance and Testing
- Operations
- Cognizant System Engineer (CSE) and SSO
- Safety System Feedback and Improvement.

The review team also used elements of HSS CRAD 45-21, Rev. 1, *Feedback and Continuous Improvement Inspection Criteria and Approach – DOE Field Element*, to collect and analyze data on site office oversight activities associated with management of TWPC safety systems.

## 5.0 RESULTS

### 5.1 Maintenance

Maintenance of SS SSCs is addressed in the TWPC's DOE-approved nuclear maintenance management program (NMMP), *Nuclear Maintenance Management Program (CM-A-MT-004, R2)*, in accordance with DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*. Revision 2 of the NMMP for TWPC was approved in a letter from the DOE Oak Ridge Office of Environmental Management to WAI dated January 30, 2012. DOE Order 433.1B recognizes maintenance as a safety management program (SMP) in accordance with 10 CFR 830.204. Chapter 17 of the DSA identifies the SMPs for the TWPC, but maintenance is not explicitly identified as one of those programs. DSA Table 5.2, *Specific Administrative Controls and Safety Management Programs*, identifies specific administrative controls (SACs) and SMPs that correspond to identified controls, but does not identify maintenance as a required SMP. TSR Section 5.6 also identifies the TWPC SMPs. Section 5.6.5, *Initial Testing, In-Service Surveillance, and Maintenance*, includes maintenance as an SMP and references Section 10.0 of the DSA (with the same title) as a description of the program. Together, these documents imply that maintenance is in fact an SMP, but the path to reaching this conclusion is unclear. As a result, the reviews and activities required for SMPs may not be consistently applied. (See Section 7, **OFI WAI-Maint-1**.)

The maintenance program for the PBVS (also called the Main Building Ventilation System) is supported by the following implementing procedures:

- CM-A-MT-001, *Reliability Assurance Program Description* – This administrative document describes the Reliability Assurance Program (RAP) and the implementation strategy for reliability centered maintenance practices at TWPC. The document also describes the corrective maintenance (CM) and PvM programs.
- CP-P-MT-013, *Maintenance Work Control* – This procedure contains the requirements for developing, approving, and executing activity-specific work activities, including system modifications and non-routine CM.
- CM-I-MT-009, *Maintenance Pre and Post Job Brief* – This work instruction describes the process for performing pre-job briefs and post-job briefs for maintenance activities so that job participants are prepared, the work scope is defined, hazards and environmental impacts are understood and controlled, and any last-minute questions are answered.
- CM-UET-MT-500, *Main Building Ventilation System Supply Maintenance* – This procedure provides guidance for the PBVS Supply Air Handling Units (AHU-004 and AHU-005). The procedure includes both PvM and routine CM activities.
- CM-UET-MT-506, *Main Building Ventilation System Maintenance* – This procedure provides specific guidance and for maintenance of the PBVS, including PvM and routine CM activities.

- CM-P-MT-507, *Main Building Ventilation System Blowers Maintenance* – This procedure provides specific actions and guidance for maintenance of the PBVS blowers. Analysis from equipment condition monitoring (i.e. temperature and vibration monitoring of bearings) incorporates predictive maintenance (PdM) into the blower PvM program. This procedure also includes performance of certain routine CM activities, such as shaft bearing cleaning and repair, if indicated by monitoring to be necessary.

Together these form an adequately structured program and set of processes to assure appropriate system maintenance and reliability.

At the work process and control level, work documents for maintenance and modifications at TWPC exist in two forms, routine maintenance procedures, and job specific work packages. For many typical routine maintenance activities, procedures have been developed in accordance with CM-P-AD-061, *Document Preparation, Review and Approval*. CM-P-AD-061 requires the hazards and controls identified in associated activity hazard analysis to be placed with the procedure, along with necessary work steps and the requirements for data recording and post-maintenance testing (if any). Samples of these documents were found to contain the appropriate hazards identification and controls. Several of the PvM procedures also include options for conducting routine CM if the PvM determines that it is necessary. Non-routine activities that include system modifications or maintenance work that is outside the typical routine are controlled by work packages developed in accordance with CM-P-MT-013 *Maintenance Work Control*. Samples of these work packages were also found to contain the appropriate hazards identification and controls.

During the onsite review, no PBVS modifications or major maintenance activities were conducted. However, the Independent Oversight review team observed several PBVS preventive maintenance (PvM) and routine monitoring activities, including associated pre- and post-job briefs. In addition, a quarterly SS fire protection system PvM was observed to gain additional perspective on maintenance program activities, and WAI maintenance management, planners, and specialists were interviewed regarding their roles and responsibilities and knowledge of systems and requirements. Reviews of maintenance program documents, including selected completed maintenance work/procedure packages, were conducted to determine whether the program was being adequately implemented. The results of interviews and reviews found that, with the exception of items discussed in the following paragraphs, the maintenance program meets the requirements of DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, and is consistently implemented in accordance with the established program.

The TWPC maintenance organization conducts two forms of pre-job briefs using work instruction CM-I-MT-009, *Maintenance Pre and Post Job Briefs*. For modification and non-routine work activities (e.g., jobs that require development of a work package), a job-specific pre-job brief is conducted using CM-I-MT-009, Attachment B, *Maintenance Pre-Job Brief Form*. Independent Oversight directly observed two of these pre-job briefs and found them to adequately prepare the workers for the job to be performed.

The second form of the pre-job brief is conducted as part of the daily maintenance meeting held at the beginning of the work day. Attachment B of CM-I-MT-009 is also used to document the “Daily Pre-job Brief,” which covers most of the routine work activities conducted each day but does not cover an exchange of job-specific information between workers and supervision. The discussions during the observed Daily Pre-job Briefs were of a general nature, with minimal worker engagement, and may not include adequate detail to ensure workers’ readiness to perform the specified work activity. Section 2.0, *Discussion*, of TWPC procedure CM-I-MT-009 reads in part:

A pre-job brief ensures job participants are prepared, the work scope is defined, hazards and environmental impacts are understood and controlled, and any last minute questions are



answered. The pre-job brief allows an increased interaction between workers and supervision to exchange job-specific information and increase awareness of potential error “traps” prior to work being performed. Additionally, a detailed discussion of “what could go wrong” is typically followed by what action will be performed to prevent errors during the pre-job brief.

The observed Daily Pre-job Briefs were not consistent with the above stated intent (see Section 7, **OFI WAI-Maint-2** and section 8, **Finding WAI-Maint-1**).

During interviews, the TWPC Maintenance Manager stated that he expected additional discussions between workers before the start of work to cover specific aspects of the job. This expectation is not documented as part of the TWPC pre-job briefing process, and the contractor could not provide any examples of management’s reinforcement of that expectation. (See **OFI WAI-Maint-3**.)

Specific Post-job Briefs are conducted for non-routine work and were observed to be acceptable for the purposes of obtaining worker feedback. A daily post-job meeting is also held with all maintenance staff to provide an opportunity for worker feedback covering routine work. Although the observed daily post-job briefing did not include any appreciable worker feedback, a review of several other samples of completed daily post-job review documents found feedback related to improving work execution/procedures steps that was subsequently incorporated into work document changes. One observed benefit of the daily Post-job Brief was that all of the maintenance staff has an opportunity to hear feedback on all work performed, not just the work related to their specific job. Independent Oversight views this application of post-job briefs as a good practice.

One of the observed maintenance activities was the SS PBVS blower PvM (required twice monthly). The PvM, conducted using CM-P-MT-507 and CM-REF-MT-003, is intended to monitor and trend important attributes (e.g., bearing temperature and vibration) of these blowers (B-011, B-012, and B-013). Like many of the PvM procedures, CM-P-MT-507 allows certain routine CM to be performed in conjunction with the PvM, such as adding lubricant oil if needed. Both of the procedures were with the maintenance specialists (in-hand) and were followed to execute the blower PvM. During interviews with the Maintenance Manager and maintenance specialists, it was noted that the predictive elements of this blower PvM confirm an anticipated need to replace the bearings on one of the blowers (B-012) later in 2013 (see also Section 5.4). At one point during observation of the PBVS blower PvM, procedure CM-REF-MT-003, Attachment B, *Rotating Equipment Inspection Checklist*, required the bearing temperatures to be recorded by using the infrared temperature gun, “in accordance with data points Attachment D through Attachment H above.” However, the sketch of the blowers indicating the points where the bearing temperature data was to be taken was on Attachment J. Independent Oversight questioned the maintenance specialists about the “in hand” procedure. Since they could not perform the procedure explicitly as written, the specialists stopped the PvM activity and reported the issue to the Maintenance Manager. The Maintenance Manager directed that a change to the procedure be initiated to correct the discrepancy. Based on the implementation date of April 2, 2012, this PvM has been executed incorrectly approximately 26 times and is an example of failing to implement verbatim compliance with procedures. (see **Finding WAI-Maint-1**).

Independent Oversight also observed a quarterly fire protection system PvM, along with the CSE for the SS Process Building Fire Suppression System and the OREM SSO Engineer. At one point during the performance of the PvM, pressure readings of discharge flow pressure were taken during turbulent flow conditions. Under these conditions, the gauge indications varied by 10 to 15 psi. The reading was recorded as 99 psig on a gauge graduated in 5 psi increments. The reviewer questioned the maintenance specialist about the method for measuring the turbulent flow pressure and the accuracy with which one could read that particular gauge. The specialist stated that he attempted to take an average of the varying indicated pressures, but that was just his practice. The specialist also stated that no specific direction had

been provided. The issue was discussed during the post-job brief as an area that required follow-up to ensure that the readings were taken consistently. (See **OFI WAI-Maint-4.**)

Requirements are established for procurement and verification of items and services. A Procurement Management Plan (CM-A-PC-002) has been established to address the responsibilities and requirements for the preparation, review, and control of procurement documents and the control of purchased materials, equipment, and services. CM-P-PC-002, *Procurement of Items and Services*, provides specific requirements for procuring materials and equipment used in maintenance activities, and CM-P-QA-004, *Material Receipt Inspection*, provides the requirements and processes for the TWPC quality organization to conduct receipt inspections of SS parts and equipment. Processes for ensuring supplier quality are included in procedure CM-P-PC-004, *Procurement Quality Assurance*. Acceptable supplier evaluations and qualifications result in the supplier being placed on the TWPC Approved Supplier List.

TWPC design incorporates standardization and redundancy of equipment and allows for minimization of spare parts inventory. Critical spare parts for SS SSCs are ordered in advance or lead times are researched to evaluate appropriate times for procurement to minimize cost while ensuring reliability. Spare parts and consumables are stored in accordance with manufacturer's requirements, and access is controlled to maintain the inventory and integrity of spare parts. Independent Oversight inspected PBVS SS parts in storage and the associated documentation and found that the parts had been appropriately procured, receipt inspected, and stored.

The TWPC RAP contains performance goals for the maintenance program in support of the condition based maintenance (CBM) approach employed at TWPC that monitors equipment conditions to minimize the cost and radiation exposure associated with industry-typical maintenance activities. Measuring key performance indicators for a CBM approach and comparing them to current goals provides useful information on the effectiveness of the program. The current performance goals are:

- achieve >90% Equipment Availability
- achieve at least 90% planned PvM completion
- average cycle time for unplanned/reactive CM work orders is < 8 days

The performance metrics are published monthly in the TWPC Waste Processing Center Maintenance Department Monthly Report. Independent Oversight reviewed the reports for March and April 2013 and noted that equipment availability was 97 and 89 percent, respectively. A closer look at the method of computing the availability numbers revealed that the metric was conservatively determined. The equipment downtime used in the calculation includes any out-of-service period, whether planned or unplanned, and all corrective or preventive maintenance. For example, for the months of March and April 2013, all of the downtime was related to implementation of a system modification and the execution of PvM. The average cycle time for unplanned/reactive CM activities for the months of March and April 2013 was 5.7 days, better than the goal of 8 days.

The performance for completion of planned PvMs was reported at 98 percent for both March and April, suggesting a strong execution of PvMs and minimal backlog. However, further review by Independent Oversight showed that the performance is calculated based on the total number of PvMs (planned versus completed) since contact handled and remote handled processing began in 2005 and 2008, respectively. The current number of planned and completed PvMs is more than 3000 each. The published monthly reports for March and April show that with 67 open PvMs, the performance is 98 percent, significantly exceeding the goal. However, this calculation allows a large number of PvMs (over 300) to remain open while still achieving the goal of greater than 90 percent. This long-term performance metric is not effective for current or timely tracking and trending of PvM performance. A rolling average for a more limited time period may be a more effective indicator of performance. (See **OFI WAI-Maint-5.**)

The PBVS SS SSCs are periodically inspected by operations and maintenance specialists in accordance with maintenance and surveillance requirements. The walkdowns are typically documented in completed procedure performance packages.

The TWPC process for ensuring that suspect/counterfeit items (S/CI) are not introduced into the facility credits various barriers to screen out and prevent those items from installation or use. Barriers in place within the design and procurement system include prohibitive requirements in engineering design and procurement specifications, and thorough receipt inspection. In addition, key TWPC staff members (maintenance/operations specialists, engineers, managers) receive specific classroom training on recognizing S/CI during field activities. The TWPC quality organization provides this training, which covers mechanical fasteners and electrical components. Independent Oversight determined that all required personnel had attended the training. In 2010, two workers were recognized in a quarterly safety briefing for their good questioning attitude involving two breakers that appeared to be suspect. After a week of investigation, the breakers were ultimately cleared for installation, but the questioning attitude of these workers and their recognition by management are noted as good practices.

Overall, the observed TWPC maintenance activities were properly planned, scheduled, and performed. The maintenance program and procedures are adequate to ensure the successful accomplishment of safety system maintenance and an acceptable level of safety system reliability. The PvM program is effective and includes appropriate elements of PdM to conduct trending and predict failures of critical equipment. Worker involvement and engagement in the planning and execution of work were also found to promote safe execution of work. However, certain required activities, such as pre-job briefs and consistent/correct procedure execution, were not always performed adequately.

## **5.2 Surveillance and Testing**

Independent Oversight reviewed the DSA sections for derivation of TSRs, the limiting conditions for operation (LCOs), and surveillances, and found alignment of the safety basis documentation with the test acceptance criteria for the PBVS and the glovebox (GB)/Box Breakdown Area (BBA) exhaust systems.

A review of the implementing procedures confirmed that the surveillances were consistent with the DSA and TSR, except that the minimum exhaust velocity at the BBA exhaust hood face was being measured at a minimum of 310 feet per minute (fpm), rather than the surveillance requirement of a minimum of 260 fpm. This discrepancy results from application of a correction factor from a table provided by the calibration laboratory to adjust the actual anemometer reading to an expected response to the calibration source, thus protecting the fundamental safety requirement of 260 LFPM above the sorting table. The rounds covered the daily and weekly surveillances, and the maintenance procedures addressed the monthly, quarterly, and annual or longer surveillances. The round sheets appropriately identified the LCO and SAC measurements (e.g., parameters shown in bold print were LCOs or SACs) and were consistent with the stated TSR surveillance requirements, except for the 310 fpm anemometer readings. The maintenance procedures (CM-UET-MT-506, *Main Building Ventilation System Maintenance*; CH-P-MT-401, *Glovebox and Box Breakdown Area Supply and Exhaust Systems Maintenance*; and CM-UET-MT-512, *Fire Suppression System*) also appropriately addressed the key parameters and periodicity as stated in the surveillance requirements. Independent Oversight observed the conduct of operator rounds and the performance of a quarterly fire suppression system surveillance, and also reviewed documentation of past surveillances for those that could not be observed. The completion of surveillances and required periodicities are tracked through the Operations Required Surveillance Tracking database, in accordance with procedure CM-P-OP-202, *Operations Required Surveillance Tracking*.

Independent Oversight observed an operator conducting two sets of rounds: the operability rounds at 8:00 am, and the 2:00 pm rounds. Before conducting the rounds, the operator pulled controlled copies of

procedures UT-UET-OP-506, *Main Building Ventilation and HEPA System*, CH-UET-OP-008, *Box Breakdown Area and Glovebox Differential Pressure Requirements/Ventilation*, and CM-X-OP-006, *Round Sheets*, from the Control Point Library (which is the system used to ensure latest versions of controlled documents are used) and reviewed the appropriate radiation work permit (RWP). When asked, the operator confirmed that he was qualified to conduct the rounds (later verified through review of training records); he also demonstrated familiarity with procedures and the location of equipment, and appropriately recorded data. The operating procedures appropriately specify the prerequisites to determine operability. The key parameters (e.g., flow, pressure) are measurable, and acceptable ranges are noted on the rounds sheets. The operator took appropriate action (notified Shift Superintendent, red-circled discrepancy) when one of the readings was out of specification.

Independent Oversight examined the evidence of the performance of previous surveillances, including calibration data. The surveillances were conducted within their required periodicity and satisfactorily met the safety requirement, with the exception of the calibration requirement for the anemometer used to measure the exhaust air flow rate across the BBA hood, as further discussed below. Surveillance Test data included HEPA filter efficiency; calibration data for HEPA differential pressure gauges; PBVS ventilation flow indicator transmitters; glovebox exhaust flow transmitter; low flow alarm functional test; glovebox inlet flow functional test; glovebox supply air damper position; annual fire hydrant flow test; monthly, quarterly, and annual fire suppression system PvM; replacement of supply pressure gauge; and fire suppression system valve lineup. The test equipment used to conduct the surveillances was within the calibration due date.

Per SR 4.4.4, “Calibrate or replace the Box Breakdown Area hood face exhaust air flow anemometer to ensure that instrument error is less than or equal to +/- 12 fpm annually,” the instrument used to measure the BBA hood face exhaust air flow must be calibrated annually or replaced annually to ensure that the instrument error is less than or equal to 12 fpm. Independent Oversight reviewed data provided by WAI for calibration of the anemometer, and determined that the anemometer could not be calibrated (i.e., no calibration ports allowing adjustment of the gauge readout to be accurate and consistent with the input from the standard) and that the testing performed by ORNL resulted in a correction chart for the anemometer flow readings. The correction chart provided by the calibration laboratory indicated that an anemometer reading of 310 fpm correlated to the calibration standard velocity of 260 fpm. Consequently, the round sheets used 310 fpm as the surveillance value, instead of 260 fpm. Not only could the instrument not be calibrated to less than or equal to +/- 12 fpm, it was reading a significantly higher flow rate than it was actually seeing, a difference of 50 fpm at the flow rate of 260 fpm. The contractor interpreted the annual testing of the anemometer by the calibrations laboratory and application of a look up table correction factor to be equivalent to calibrating the instrument response, so they did not consider this to be a TSR violation, and OREM concurred with this determination. While this procedural correction factor protects the fundamental safety requirement for 260 FPM on the sorting table, because the instrument read out does not indicate to be within the TSR specified range of the calibration standard input and is not directly adjustable, it does not appear to satisfy the requirement that the instrument be calibrated annually to respond within +/- 12 FPM of the calibration standard flow rate in accordance with TSR 4.4.4 as it is currently written. If the instrument were to be used in any other location for any other purpose the correction factor written into the BBA area procedure would not intrinsically be applied, resulting in an inaccurate determination of the air flow. A potentially unsafe condition due to use of an inaccurate and un-calibrated instrument would result. Independent Oversight considers that the “as found condition” did not meet the written TSR surveillance requirement for annual calibration or replacement to ensure instrument accuracy. Independent Oversight therefore considers this to be an apparent TSR violation as it is currently written. (See **Finding WAI-S&T-1.**)

In summary, surveillances are addressed by daily rounds/procedures or maintenance procedures. The surveillances performed by daily rounds are consistent with the safety basis, and the maintenance

procedures adequately address the other surveillances. However, the contractor did not demonstrate compliance with SR 4.4.4, as written; the anemometer reading cannot be adjusted to match the specified tolerance relative to the calibration standard without a procedural application of a correction chart, and was not replaced with a calibrated spare prior to review by Independent Oversight.

### 5.3 Operations

To ensure that operations are conducted such that vital safety systems can perform their intended safety functions, Independent Oversight reviewed system operating procedures, the training and qualification of operations personnel, and the control of safety equipment. The contractor has implemented DOE Order 422.1, *Conduct of Operations*, and issued a conduct of operations matrix on July 7, 2011, which DOE subsequently approved. Chapter 11 of the Safety Analysis Report, Operational Safety, also addresses conduct of operations, with emphasis on the operations organization, operating procedures, and operating practices.

The conduct of operations matrix references procedure CM-P-AD-061, *Document Preparation, Review and Approval*, for the procedure development process. Per this procedure, the contractor uses two types of procedures: “Management Control” and “Operations Technical.” The Operations Technical procedures can be either “Use Every Time” (UET) or “Reference” (REF). The UET procedures require direct use and verbatim compliance, either in-hand or present for the user to actively reference while performing action steps. REF procedures are not required to be in-hand or present for the user to actively reference while performing action steps, but they may be open and referenced during the work.

Independent Oversight observed a demonstration of *Cask Processing Enclosure Ventilation Differential Pressure Requirements*, RH-REF-OP-112, which is a REF procedure. The prerequisite to ensure a current valve lineup was completed. Before beginning the demonstration, the Shift Superintendent confirmed that all personnel had exited the area, waste was covered, and no one was on breathing air. In order to demonstrate the procedure, the operator had to first stop the blowers, steps 5.4.1 and 5.4.2. He completed the steps and confirmed with the Shift Superintendent that the blowers had stopped. Good three-way communication was evident throughout the performance of the procedure. The operator then returned to the portion of the procedure for starting exhaust blower B-192B and proceeded through the steps in order, communicating with the Shift Superintendent as needed on the status of the equipment. The operator proceeded in an orderly fashion, demonstrating good familiarity with the equipment. The procedure steps were completed in order. After starting the exhaust blower, he proceeded to the steps for starting supply unit AC-193, which was also successfully demonstrated. This was a good demonstration of a procedure and confirmed that the procedure could be performed as written.

Independent Oversight requested an operator to walk through portions of two UET operating procedures, UT-UET-OP-506, *Main Building Ventilation and HEPA System*, and CH-UET-OP-008, *BBA and GB Differential Pressure Requirements/Ventilation*. Both procedures state that “operations personnel perform the following steps, unless otherwise noted.” During the walkthrough of the first procedure, the operator demonstrated familiarity with the location and operation of equipment for the procedural steps performed in the field (i.e., simulated closure of filter housing outlet manual isolation damper); however, he did not realize that some of the steps (e.g., step 5.5.5) were to be performed by the Shift Superintendent. When contacted by the operator, the Shift Superintendent clarified the performance of the steps. The procedure addressed normal operation, abnormal conditions, and non-LCO conditions. The TSR-related steps were carated (< >), and the operator was knowledgeable of the required actions associated with TSR conditions.

The walkthrough of the second procedure, CH-UET-OP-008, *BBA and GB Differential Pressure Requirements/Ventilation*, included system startup, normal operations, and abnormal conditions within

the BBA and the GB. The procedure states that the waste operator performs activities in accordance with the procedure but still refers to the Duty Waste Operations Lead (DWOL), although this position was replaced by the Shift Superintendent. (See **OFI WAI-OPS-1**.) Verbatim compliance with the procedure as written would have prevented the procedure's execution until it had been changed. (See **Finding WAI-Maint-1**.) The operator was familiar with the location and operation of equipment and was knowledgeable of the LCO controls and their safety significance (e.g., the BBA and GB exhaust systems were required to protect against a deflagration), as well as the required response to an LCO condition. When asked about the prerequisites, he indicated that the Control Point Library maintained a notebook for manual valve lineups, which included the current valve lineup for the PBVS. The other prerequisites are verified through rounds and the Operations Required Surveillance Testing database.

The Shift Superintendent was interviewed on the *Atypical Events* procedure, CM-P-EM-101, and the *Emergency Events* procedure, CM-P-EM-100. The Shift Superintendent referred to the Emergency Binder Index, which contains these procedures and is kept at the Shift Superintendent's control area. The Shift Superintendent was knowledgeable of the procedures and provided appropriate responses to the scenarios of loss of site power, fire inside the process building, loss of two air handling units, and loss of three main building ventilation trains. He also discussed the use of the alarm panel for evacuation, fire, and general emergency. Both procedures still reference the DWOL position, rather than Shift Superintendent. (See **OFI WAI-OPS-1**.)

Independent Oversight observed operations within the BBA area to repackage waste. The Process Building and the BBA were in operation mode, and the exhaust velocity at the exhaust hood face was measured with the anemometer and verified to be within specification. The operators wore personal protective equipment (bubble suits with breathing air). Radiation control activities included recording airborne and smear reading every 15 minutes. A visual examiner operator was stationed outside of the BBA, had the appropriate procedure (CH-UET-OP-003, *Glovebox Operations*) open on the desk, and was in visual and audible contact with the operators. The operations included removing the drum ring and lid, removing the inner lining, size-reducing the inner lining, and packaging the waste. The operations were conducted in a careful, controlled, and procedurally compliant manner.

Independent Oversight also observed several operational activities, including supervisor turnover, shift turnover, plan of the day, pre-job brief, post-job briefs, and activities in the control area. Supervisor turnover from night shift to day shift included an update on the weather; operation modes; authorized operations; status of safety systems (three trains of ventilation, as well as all exhaust systems in order); status of operations of Cask Processing Enclosure (CPE), BBA, and GB; and waste processing inventory. Work authorization, procedure status, training, maintenance activities, and other authorized activities (e.g., demonstration of main ventilation blower vibration analysis) were also discussed. Activities were consistent with the previous day's plan-of-the-day meeting. Following the supervisor turnover, the Shift Superintendent conducted the shift change meeting per established procedures CM-I-OP-006, *Turnover*, and CM-X-OP-005, *Plant Status Checklist*. Activities were based upon the plan of the day, and a status of the plant was provided, including operation modes, waste activities, work authorization, maintenance, vital safety systems, and procedures. Status of the operational areas was provided and documented per appropriate attachment for GB, BBA, Hot Cell, Waste Processing Inventory, and CPE. Personnel were reminded to make sure their plant access training was up to date, and not to move waste until the operations mode had been declared. It was noted that each of the meetings began with a safety share. Also, the General Manager addressed the shift turnover meeting on two occasions, once after a national incident (Boston Marathon Bombing – security) and once to discuss issues related to personal protective equipment (air supplied suit quality control issue) and how they were being addressed.

The plan-of-the-day meetings were led by the Operations Manager. Appropriate departments were represented. Each meeting began with a safety message and then discussed the planned work for the

night shift and the next day shift, the week outlook, and longer-term planned work. The meetings addressed operations, maintenance, surveillances, training, and procedure status. For the night shift and next day shift work, priorities were established, supervisors were assigned, and the number of operators was determined. These meetings also addressed emerging issues (e.g., air compressor issues) and reprioritized work as needed.

An operations pre-job brief was conducted for the planned BBA operation. The work to be accomplished, loading pucks, had previously been performed (routine operations). Special considerations for the task included direction not to force the puck if it didn't fit in the drum; instead, the operators were to set it aside for future disposition. Contamination concerns were discussed. Assignments were made on task activities. The pre-job brief addressed hazards specific to the tasks, including the need to be aware of sharp edges on pucks (wear leather gloves) and to keep the breathing air hose untangled. RWP requirements were discussed in detail, including dose rates. Workers were reminded to inspect the suits, especially the seams and welds, because of recent issues with the quality of some of the suits. Due to recent problems with the breathing air, the pre-job brief specifically addressed its use (e.g., in the event of a life threatening situation involving lack of air, check for kinks in the air line, and if that does not resolve the issue, then pull the tab to get air and leave the area). Specific tasks were discussed, including the use of the lapel air sampler, surveying of boots and gloves, and contamination control. The status of supplies (bags, lids, etc.) was also discussed, as was the method of egress in case of personnel injury. The level of detail was appropriate for a routine operation.

Interviews were conducted with two waste operators, the operations manager, and a Shift Superintendent. The operational staff were qualified to perform their positions through experience and training. One of the operators had numerous years of experience in the waste field, and both operators had worked at this project since 2009. Both operators had completed the initial training conducted in 2009 as part of the intake process for a large group of employees hired to perform American Recovery and Reinvestment Act funded work. This training included simulated glovebox and plant operations, as well as systems training. The operators indicated that they were trained on TSRs, surveillances, and atypical events and emergencies. Both discussed the use of qualification cards and on-the-job training (OJT) with mentors. They are trained on new procedures by means of classroom training, required reading, or review during the pre-job briefs. They stated that TSR requirements in procedures are called out in bold letters. They knew how to determine whether a piece of equipment had been calibrated, were knowledgeable of the system configuration process (valve lineups), and were aware that they did not have authority to change the lineup. When questioned about the importance of the exhaust systems for the GB, BBA, and CPE, the operators indicated that these systems help control spills and contamination, but did not mention the potential for forming an explosive gas mixture. Overall, the operators were knowledgeable of the safety systems and were adequately trained and qualified to perform their duties.

The operations group had recently reorganized to establish a separate organization (the Facility organization) responsible for ensuring that the plant is operated within the approved safety envelope. The Shift Superintendents report to the Facility Manager, and the operators report to the Operations Manager. During interviews, the Shift Superintendent and the Operations Manager demonstrated a good understanding of the processes for ensuring that vital safety systems are protected. Both have significant experience (over 20 years) in the waste processing field.

Independent Oversight also interviewed the Training, Education and Development Manager, who has a master's degree in adult education, as well as experience with the nuclear Navy and with commercial nuclear operations and training. Regarding training for safety systems, new hires are provided an overview of the DSA and the TSRs. Continuing training includes annual training on abnormal and emergency procedures, procedure updates, TSR/DSA updates, conduct-of-operations refreshers, lessons learned, and other emergent issues. Most of the operations staff were hired in 2009 and went through the

new hire training, including classroom training, simulators, nuclear safety, Radworker II, and supplied air. Hiring now is limited to much smaller numbers of personnel. The training process for new operators consists primarily of procedure review and OJT with qualification card proficiency signoffs. Specific vital safety systems training courses were provided when many employees were hired using ARRA funding, but these are not currently included in the qualification process for new hires. Instead there is currently a reliance on OJT and qualification card sign offs for knowledge about individual systems. (See **OFI WAI-OPS-2.**)

New hires typically start as waste operators. The curriculum for that position is assigned to the individual in the contractor's on-line learning system. The qualification card for a specific duty area includes OJT requirements. After the OJT instructor/mentor signs the qualification card, another individual evaluates the operator and certifies that the operator is qualified to perform the specific task. Additionally, Independent Oversight observed practical factors training that was being conducted in response to a recent loss of breathing air event. All waste operators and support staff were required to take suit-specific training (there are two types of suits available for operator use). The operators dressed out in the Sperian suit (an air-purified suit) and simulated the performance of waste activities. The training specialist interjected accident scenarios (e.g., "smoke," blue flashing light) and evaluated the response.

In summary, most reviewed system operating procedures are technically accurate, although some procedures need to be updated to reflect current organizational titles. Operators and shift supervisors demonstrated knowledge of operating procedures, including atypical and emergency events. Operators demonstrated an appropriate level of knowledge of the equipment location and operation. Shift turnovers, pre-job briefs, and plan-of-the-day meetings were routinely conducted and included the status of safety systems and TSRs as appropriate. The operator demonstrating the startup of the CPE ventilation system displayed good performance, and the operators are trained and qualified to perform their duties. The process training for new operators consists primarily of procedure review and OJT with qualification card proficiency signoffs. Continuing training has been provided on numerous topics, including changes to the DSA/TSR. Although a few isolated areas need attention, operations of the evaluated safety systems are conducted in a manner that ensures the safety systems are available to perform their intended safety functions when required.

#### **5.4 WAI Cognizant System Engineer Program**

WAI has designated CSEs for TWPC in accordance with DOE Order 420.1B, *Facility Safety*, to ensure continued operational readiness of identified systems to meet their safety functional requirements and performance criteria. (Although DOE Order 420.1C is the latest revision and should apply to EMOR oversight activities, it has not yet been incorporated into the WAI contract.) The WAI system engineer program is described in a single document, CM-A-EG-008, *System Engineer Program Description*. The document repeats the CSE program elements of DOE Order 420.1B and identifies the systems under the program; CSE responsibilities; the role of the CSE in configuration management, operations, and maintenance support; and qualifications/training. However, the program document does not contain specifics of how the CSE responsibilities are to be carried out.

A review of a sample of completed procedure/work packages and direct observation of CSE activities indicated that TWPC CSEs are involved in operations and maintenance activities and review and approve modifications and post-maintenance testing. CSE review is required for any work package involving one of the 16 systems with designated CSEs. PvM procedure revisions for these systems also require the review of the associated CSEs. One example of CSE involvement is the annual verification of PBVS damper positions by the PBVS CSE. Throughout the year, if a need arises to adjust a damper's position, the CSE is consulted and has to approve the change. When that field change is made, the CSE makes a redline change to his working set of system drawings, noting the new position. At the next annual



damper position verification, the report is updated with the items noted on the working drawings. Between annual reports, no formal control is in place to keep track of changes to damper positions. Even though operability of the system is not based on a specific damper position, the positions are an important element of PBVS configuration control. (See **OFI WAI-CSE-1.**)

Independent Oversight observed walkdowns of various PBVS damper positions with the CSE in the Process Building on two separate occasions. The PBVS CSE was very knowledgeable of the damper locations, and in each case the dampers were found in their proper position.

Because each TWPC CSE determines his/her own routine activities, there is some inconsistency in CSE program implementation. For example, one CSE walks down portions of his system each week, another walks down the entire system each month, and yet another enters the Process Building only to respond to a question or concern. One interviewed CSE had overall awareness of every aspect of his system, while another was uninvolved in PdM and instrumentation and control for his system. There are no requirements or expectations in CM-A-EG-008, *System Engineer Program*, or other procedures to document routine CSE activities or specify minimum required activities that should be performed to maintain overall cognizance of the system. The lack of rigor and formality in the TWPC CSE program is hindering its success. (See **OFI WAI-CSE-2.**) This condition led to one CSE being unaware that bearings on an important piece of equipment in his system were expected to require replacement later in 2013, as identified by PdM on the equipment (see Section 5.1). Such a shortfall in cognizance of assigned safety systems is an example of non-compliance with DOE Order 420.1B requirements.

The CSEs are assigned based on a memorandum from the Design Manager designating a particular individual as a CSE. Each CSE has a qualification card that lists approximately 30 important documents, including system-related procedures, the DSA and the TSR. To complete the qualification card, the CSE has to sign each item on the card attesting that he/she has read and understood each document.

Three incumbent CSEs were interviewed by Independent Oversight. These CSEs were subject matter experts (SMEs) for their systems and knowledgeable of the TWPC safety basis and its relationship to their assigned systems. Two of the three CSEs were the original TWPC design engineers for their systems who transitioned to the role of construction engineer and were ultimately designated by the Design Manager in 2005 as CSEs for these same systems. The third CSE, a degreed fire protection engineer, has been the site's fire protection SME for six years and was designated as the Process Building Fire Suppression System CSE by the Design Manager in 2007. Their qualification to perform the function of the CSE for these systems is based on a unique accumulation of expert knowledge about those systems and the site's safety basis, rather than a systematic training/qualification program established for the purpose of qualifying candidate CSEs. As a result, certain training gaps have been overlooked (e.g., PdM techniques and system-specific instrumentation and control applications) for at least one CSE, resulting in a situation where the engineer is not maintaining full cognizance of all aspects of the safety system. Contrary to the requirements of DOE Order 420.1B, WAI has not incorporated the requirements of Chapter V of the Order into a contractor training program for CSEs. (See **Finding WAI-CSE-1.**)

In summary, the CSE program is established, and CSEs have been designated for all SS and other important TWPC systems. The program is having a positive effect on system performance and reliability. The system engineers who were interviewed are appropriately experienced and qualified. However, no formal training and qualification plan/program for CSEs is in place, and the program lacks the rigor and formality needed to ensure consistent expectations for performance and system oversight within the CSE program.

## 5.5 WAI Safety System Feedback and Improvement

A critical aspect of ensuring vital safety system functionality, operability and reliability is a feedback and improvement process incorporating: monitoring and trend analysis for system operability; analysis of incidents and off-normal conditions; development, implementation, and evaluation of corrective actions; and dissemination and review of lessons learned. Independent Oversight evaluated the establishment and implementation of feedback and improvement programs and processes that affect nuclear SS systems at the TWPC. Independent Oversight reviewed program and process documents, interviewed responsible managers and staff, and evaluated samples of process outputs, such as assessment and trend reports, performance indicator reports, incident and event analysis reports, lessons-learned publications, and issues management documentation.

WAI has established the suite of feedback and improvement programs and implementing documents supporting the management of TWPC safety systems. Feedback and improvement processes are described in the quality assurance (QA), contractor assurance system (CAS), and integrated safety management system (ISMS) program descriptions. WAI has issued implementing program plans (e.g., CAS, assessment, engineering management, and subcontractor oversight) and numerous implementing procedures, desk instructions, and guides (e.g., performance analysis and identification of recurring events, QA surveillances, issues management, management and specialty assessments, safety basis implementation checklist, trend and root cause analysis, lessons learned, management observations, and performance indicators). In addition, various guidance and links to outside information sources are available on the program owner's home page on the TWPC intranet.

### Assessment Program

WAI has established an assessment program that includes management and independent assessments, QA surveillances, and quality control inspections for safety. These processes are defined in formal procedures. Annual integrated assessment schedules are developed and maintained. The integrated assessment schedules for 2011 through 2013 reflect a variety of management assessments, including nuclear safety related reviews by the various responsible organizations. Responsible managers review and approve management assessments and ensure that issues are entered into the appropriate issues management processing system. Independent Oversight reviewed the reports for 25 formal management and independent assessments and QA surveillances conducted by WAI in fiscal year (FY) 2011, 2012, and 2013 that affect TWPC safety systems and processes. Formal assessment reports are documented in consistent formats, typically with attached checklists of criteria and compliance results.

Although many assessments are being performed and are providing input for improved processes and performance, the program's effectiveness is limited by weaknesses in process and implementation.

Most of the WAI assessments reviewed by Independent Oversight focused on regulatory or procedural compliance, with insufficient evaluation of the specific or overall adequacy of the process, program, or performance being assessed. Many of the assessments lacked sufficient scope, depth, and breadth to provide management with useful information about the adequacy of processes or performance. Records reviews were much more prevalent than observation of work activities and field conditions. Many of the assessments did not provide sufficient details of the inspection sample or other basis to conclude that requirements were met or to support the defined scope of the assessment. Examples of insufficient assessment scope and documentation included the following (see **OFI WAI-F&I-1** and **Finding WAI-F&I-1**):

- Two management assessments performed in FY 2012, designated as evaluations of the unreviewed safety question (USQ) process and safety basis implementation and maintenance, consisted only of

verifying that a required DSA update was forwarded to DOE for approval and that an implementation date was specified.

- An FY 2011 fire protection program review was almost exclusively process related (i.e., identification of which WAI procedures implements each DOE order requirement), without any qualitative or performance analysis.
- An otherwise comprehensive FY 2012 assessment of the fire extinguisher inspection program appropriately identified an issue in the identification and location of non-mounted extinguishers, stating they may not have been inspected as required, but insufficiently documented the scope and results of the evaluation. The report does not provide the number of extinguishers inspected during the review, their locations, or whether any of the non-mounted extinguisher inspections were current or outdated. No issues management tracking number was documented in the report to indicate that this issue was being formally addressed.
- The FY 2012 ISMS implementation review contained very little information or analysis to support a conclusion that the ISMS program is effectively implemented. The report consisted of a list of safety documents that had undergone revision; a partial list of assessments performed (not reviewed by the assessor for quality); and a list of Voluntary Protection Program activities, safety committees, and areas where continuous improvement champions and mentors had been assigned. There was no mention of some other important ISMS processes, such as event reporting and analysis, lessons learned, or issues management.

WAI is not effectively employing independent assessments. The independent assessments conducted or scheduled in FY 2012 and FY 2013, all performed by the QA organization, are limited to regulatory driven, mandatory topics (for example Resource Conservation and Recovery Act, 10 CFR 835, air permit compliance, criticality safety). No multi-organizational independent evaluations of safety programs or processes were scheduled or performed and management did not select any safety programs for independent assessments, other than those driven by regulatory provisions.

Although WAI has a formal assessment planning process, discussions with responsible personnel and reviews of communications to managers regarding development of the schedule indicated little involvement of line or senior management in identifying topics for evaluation that have multiple-organization or cross-functional impacts or concerns. No training is available or required for performing management assessments, and WAI site procedures contain no guidance documents, linkage or reference to outside resources, on effective assessment techniques. Line management does not sufficiently ensure the quality and effectiveness of completed assessments, and the SMEs and responsible assessment program owners do not review assessments for adequacy. (See **OFI WAI-F&I-1** and **Finding WAI-F&I-1**.)

## **Issues Management**

WAI has established various procedures to document, evaluate, and correct deficiencies and opportunities for improvement to promote continuous improvement using a graded approach. An umbrella issues management procedure (CM-P-AD-048) provides responsibilities, requirements, and process steps for tracking, trending, and administrative management of issues that are directly managed in accordance with other WAI procedures including, but not limited to, Incident Reports (IRs), Corrective Action Reports (CARs), and Nonconformance Reports (NCRs). CM-P-AD-048 includes guidance for determining extent of condition, a list of trend codes, and guidance for conducting effectiveness reviews. Identified opportunities for improvement are documented on a Management Item form, designated as an "MII." The issues management procedure and the various issue format procedures identify the requirements for conducting causal analysis. The processes and guidance for the conduct of issue investigations and causal analysis are provided in a separate manual (CM-M-QA-001).

Many process and performance issues at the TWPC, identified either in assessment activities (including quality surveillances and inspections) or through incidents and events, are formally documented, evaluated, and resolved. However, continuous improvement is hindered by weaknesses and deficiencies in issues management procedures and implementation. Independent Oversight reviewed more than 25 completed and in-process CARs. In addition, as described in the following section on event reporting and analysis, Independent Oversight evaluated WAI's management of issues for ten IRs. Independent Oversight identified many examples where the documentation, evaluation, and disposition of issues were not sufficiently rigorous or comprehensive to provide a full understanding of the issue or to produce fully effective actions or recurrence controls. Weaknesses and deficiencies that may contribute to implementation problems were identified in the suite of issues management procedures and issue documentation forms.

Issues management implementation issues included the following. Note that many of the examples exhibited more than one deficiency (see **OFI WAI-F&I-2** and **Finding WAI-F&I-2**):

- Inadequate description of issues, untimely documentation of issues, and addressing multiple issues on a single issues management record. In some cases, the issue on a CAR is not described fully enough to provide an understanding of what happened or what the issue is. For example, CAR 2012-021 described the issue as maintaining the wrong revision of a valve lineup at the operations control point and allowing a valve that was required to be locked open to remain open but not locked. It was not clear from the description or the actions whether the field condition, or the valve lineup sheet, or both were incorrect. The trend code was designated as work planning "other," without explanation. In another case, (CAR-2011-023), OREM identified multiple deficiencies (three findings involving improper rigging configuration, inadequate documentation-not further described, and failure to inform the Waste Operations Lead of the lift problems) during a critical lift on July 25, 2011. However, WAI did not initiate documentation of the problems with this critical lift until August 18 after DOE formally communicated its findings. The trend code was identified as "other," without explanation. The fact-finding report is undated, unsigned, and lacking indication of the facilitator, author, recorder, or approver. Fact-finding statements from involved personnel did not include their job titles or job function during the event. The fact-finding did not address any apparent problems with the lift plan. The "lessons learned" that were generated did not identify the lesson learned, but repeated the description of the event, the fact-finding conclusions, and the actions specified in the CAR. Consequently, neither the actions specified in the CAR nor the lessons learned addressed the apparent problems with the lift plan hinted at in the DOE finding and attached e-mails. No apparent root cause determination was documented, except for a reference (in the conclusion of the fact-finding report) to lack of attention to detail as the apparent reason for using the wrong rigging configuration.

Likewise, CAR 2011-013, initiated in March 2011, which included four findings and eight observations from a DOE review related to SACs, and seven TWPC identified observations related to SACs, was titled "Address Findings from DOE-HQ and DOE-ORO Reviews for assessing documentation and implementation of SACs at the TWPC." This CAR, which remains open, did not characterize the implications of this collection of issues from a programmatic perspective or their collective significance, and was inappropriately designated as having a low impact because the number of cited issues described a more significant problem with the SAC process. Thus the CAR did not include a causal analysis. A Corrective Action Plan submitted to DOE-ORO did include a section titled "causal analysis summary." However, the summary only discussed ambiguities in the requirements or expectations contained in DOE Standard 1186, *Specific Administrative Controls*, and DOE-STD-3009, *Preparation Guide for U S Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis*, and identified a causal factor derived from DOE ORPS causal analysis tree (A4B1C01) of "Management policy guidance/expectations not well-defined, understood or

enforced.” The summary did not state if this causal factor applied to DOE, TWPC, or both. The summary included a designated causal factor of A6B3C02, inadequate training material content for one DOE Finding (described as a “potential training deficiency”). Further, the “disposition fields” (as labeled on the CAR form) for approving/concurring with planned actions were not signed off by management until August 2012, even though 15 actions had been assigned in March 2011 and 12 of those actions had been noted as complete by August 2011. All of the actions were directed at clarifying and revising the DSA and TSR documents and training lesson plans; none of the actions addressed any recurrence controls to be applied to development of future safety basis documents. The identified trend code was “paperwork,” with no further explanation. Addressing multiple issues, except as examples of a collective programmatic issue, and assigning a single trend code, do not support accurate or effective trend analysis or recurrence prevention.

- Inadequate extent-of-condition reviews. As an example, although CAR 2011-023 involving deficiencies in planning and performing a critical lift (discussed above) was categorized as an “important” CAR, there was no discussion of the extent of condition for these deficient areas in the documentation for the CAR as required by WAI procedures.
- Insufficient, incorrect, poorly documented, or missing determinations of trend codes and causes. The CAR form does not have a field for recording a cause and typically no actions are specified to determine a cause, although the CAR procedure requires a cause determination for issues deemed to have an “important” impact. Most CARs only designate a trend code, which often is not cause related (e.g., “injury,” or “radiological” or “paperwork”) and is not defined or supported with examples. Assigned trend codes are often incorrect – e.g., “radiological” for a failure to report to the DOE Occurrence Reporting and Processing System (ORPS) a reportable contamination event rather than “Procedure Violation/Deficiency,” or “other” for failure to follow the lockout/tagout procedure rather than “Procedure Violation/Deficiency.” In many cases, the designated trend code is “other,” with no explanatory text. For the CAR addressing the filters described above, the disposition did not address why the filters had not been stored as required by WAI documents.
- Untimely documentation of the review of planned corrective actions by management and the QA Manager. In most of the CARs reviewed by Independent Oversight, the signatures of the responsible functional manager, functional director, and the Director of Safety, Health and Quality (DSH&Q) in the “disposition” fields signifying approval of planned actions, schedules, and action owners were entered long after actions were assigned and completed. In many cases, the dates for these signatures were the same as the date of the QA Manager’s verification and final closure.
- Extent of condition and root and contributing causes are often determined after corrective or preventive actions are identified and, in many cases, completed. In a number of the CARs, extent-of-condition reviews and/or causal analyses were performed after most or all specified actions had been identified and completed, often at the suggestion of QA reviewers and sometimes at the verification-of-closure review. The cause(s) and extent of condition should be determined early in the process to drive the development of effective corrective and preventive actions, not at the end of the process.
- Failure to include expected completion dates. CM-P-AD-042 specifies that dispositions are to include a schedule of actions and expected completion dates. These were not reflected on any CARs reviewed by Independent Oversight.
- Trend analysis of non-incident/event issues lacking trending against trend codes. WAI issues management procedure CM-P-AD-048 requires semi-annual trend analysis of issues data, provides a table of trend codes, and requires documentation of trend codes on issues management record forms.

However, trending reports for 2012 do not address trend codes or other cause-related analysis, but instead report only trends related to collective (i.e., project-wide) issues and organizational frequency.

Problems identified in issues management procedures and forms included the following (see **OFI WAI-F&I-2** and **Finding WAI-F&I-2**):

- Inadequate linkages. For example, CAR procedure CM-P-D-042 does not reference the issue investigation and causal analysis manual CM-M-QA-001. CM-M-QA-001 states that it provides guidance and tools for conducting and documenting incident investigation and analysis and that it can be used to investigate and analyze non-incident issues, but it does not clearly state whether any of the listed responsibilities or process steps are requirements. The text of the issues management procedure describes assignment and revision of action completion commitment dates and due dates, but issue documentation forms do not include fields for recording or amending these dates.
- Lack of definition and inconsistent use of terminology. Undefined terms and inconsistent use of the terms “disposition” and “completion” result in inconsistent and after-the-fact approval signoffs by the functional manager, the functional director, and the DSH&Q regarding planned actions, responsible parties, and due dates. CAR procedure CM-P-D-042 addresses “QA Significant” (not further defined) impact determinations, and NCR procedure CM-P-AD-041 addresses “Significant Conditions Adverse to Quality,” which are not part of the impact matrix of CM-P-AD-048 and are not reflected on any field of the CAR or NCR forms. Section 3.2 of the CAR procedure for “disposition” (planned actions) includes action steps to complete the approved disposition and corrective actions (redundant terms).
- Lack of direction regarding documentation of investigation results. For example, the CAR procedure states that for a “Significant CAQ” (Condition Adverse to Quality) or an impact determination of “Serious” or “Important,” actions need to be included for an evaluation and determination of cause, and a determination of whether a systemic program weakness exists. However, it does not indicate how these actions are to be performed (e.g., a reference to the cause determination manual) or how to document them. Issues management procedure CM-P-AD-048 includes an attachment with some guidance on performing an extent-of-condition review, including development of a review plan, but does not address how or where to document the plan, the evaluation details, or the results.
- Lack of a procedure for conducting trend analysis. There is no procedure detailing the requirements or process for conducting the trend analysis required by issues management procedure CM-P-AD-048. In addition, the trend codes, identified as “examples,” contain undefined prefixes such as “I,” “NC,” “WNC,” and “WP” and include a number of codes that do not reflect causal factors, especially for incident-related codes. There is no stated expectation to document or describe why a particular code was selected, even if the code is “other” or “paperwork” or “radiological.” Consequently, it is not possible to meaningfully evaluate trend data.

WAI had previously identified many of the deficiencies described above, but has been ineffective in establishing and implementing corrective actions and recurrence controls in a timely manner. Many various deficiencies in issues management have been identified during management assessments in the past four years, as documented in management assessment MA-2009-022; CARs 2009-006, 2010-008, 2011-011, 2012-016, 2012-030; and MIIs 2011-012 and 2011-024. Some actions were identified and completed for some of these issues, but many were still open in 2012 and were rolled up into CAR-2012-034, issued in June 2012, which identified three additional program improvement “initiatives.” These initiatives (actions) included integration and updating of procedures; software upgrades to the issues tracking system; and training for issue owners, managers, directors, investigators, support personnel, and

system users. At the time of this Independent Oversight review there were six identified open actions. None of these actions addressed the initiative to integrate and update the various issues management procedures. In addition, the disposition fields on the CAR form identifying trend codes and signatures of the responsible functional manager, responsible director, and DSH&Q approving the specified actions had not been completed (i.e., no trend code, no approval signatures). (See **OFI WAI-F&I-2** and **Finding WAI-F&I-2**.)

## **Event Reporting and Analysis**

WAI has established procedures for identification, notification and reporting, investigation, and periodic analysis of performance trends for incidents or events, including occurrences required to be reported to DOE by DOE Order 232.2, *Occurrence Reporting and Processing of Operations Information*, and other DOE directives and associated guidance. WAI has procedures for DOE occurrence reporting (CM-P-AD-038) and incident reporting and investigation (CM-P-IS-015). Incident/event investigation details are documented in formal IRs. Additional guidance for incident investigations is included in CM-M-QA-001 *Issue Investigation and Causal Analysis Manual*. To evaluate these processes and their implementation, Independent Oversight reviewed a sample of WAI IRs for ten occurrences in calendar years (CY) 2011 and 2012 and the third and fourth quarter CY 2012 occurrence reporting performance analysis reports. WAI experienced only 13 events that were required to be reported to ORPS between January 2010 and March 2013. Seven of these reportable events were related to DSA or TSR violation issues (one in 2010, five in 2011 and one in 2012). However, WAI generated 45 IRs in 2010, 23 IRs in 2011, and 19 IRs in 2012, indicating that management has an appropriately low threshold for identification and investigation of anomalous incidents and conditions.

The WAI incident reporting and investigation procedure specifies responsibilities and action steps for immediate response to the incident, including emergency actions, reporting, scene preservation, determining the need for work stoppage, and determining the incident's significance, which drives the level of subsequent investigation and disposition efforts. Investigation and analysis requirements are established using a matrix of impacts (low, important, or serious) correlated with the immediate level of understanding of and complexity of the event. The resulting investigation and analysis to be applied ranges from simply documenting the incident for obvious, non-complex, low impact incidents to conducting a critique and a formal investigation with causal analysis for complex and serious incidents. Fact-finding evaluations or combinations of the other types of investigation can be applied for incidents deemed to meet other matrix combinations. The IR form provides for documenting specific details about the event, classification and investigation decisions, notifications and reporting required and made, persons responsible for leading investigation activities, the disposition (immediate and root causes, a summary of actions taken or to be taken, and any lessons learned), completion signatures of the lead investigator and responsible functional manager, and signature of the QA Manager's verification of completed actions and closure.

WAI has investigated many incidents and events, and many of the investigation reports reflect thorough evaluation and specification of appropriate corrective actions and recurrence controls. However, Independent Oversight identified many of the same deficiencies in documentation and performance as identified in CARs (discussed in the previous section) in the sample of IRs reviewed by Independent Oversight. These deficiencies and weakness included the following (see **Finding WAI-F&I-2**, **OFI WAI-F&I-2**, and **OFI WAI-F&I-3**):

- The “knowledge and complexity” element of the impact decision matrix from procedure CM-P-IS-015 is not on the IR form, only the “impact.” For some IRs, the specified investigation level is not in accordance with the decision matrix. Based on the completion dates documented on the IRs, the various elements of incident investigation are not performed in a logical sequence. For example, for

IR-2011-017, a critique was completed on September 1, 2011, but the fact-finding (that should be done soon after the event and is needed to support an effective critique) was not completed until September 6, 2011. Similarly, a causal analysis, intended to focus and ensure appropriate corrective and preventive actions and recurrence controls, was completed on November 6, 2011; however, all but 2 of the 16 specified corrective or preventive actions had already been assigned. The causal analysis was incorrectly titled as an investigation report, which was not specified as required on the IR disposition decision field. The extent-of-condition review was not performed until the same day as the verification and closure for the IR, more than four months after the event. Similar timeline issues were identified in IR-2011-013.

- CM-P-IS-015 specifies that personnel with roles and responsibilities for performing activities described in the procedure are required to be trained to this procedure in its entirety, but does not indicate what type of training or documentation is required.
- Multiple cases of unsigned and undated fact-finding and critique reports were identified.
- Actions were completed without signoff of disposition analysis summary and completion/management review (IR-2013-002).
- An ORPS reportable event (TSR violation) was documented and dispositioned on a CAR rather than an IR (IR-2012-015). The IR was generated over four months later, with no additional specified actions.

Independent Oversight noted that although the emergency management procedure covering response to atypical events identified several managers as responsible for reviewing occurrence reporting requirements for events, there were no references to WAI occurrence reporting or incident reporting procedures and no action steps or notes in the procedure section of this document to evaluate the incident for reportability. (See **OFI WAI-F&I-3.**)

The WAI analysis and conclusions in the quarterly performance report reviewed by Independent Oversight addressed the appropriate scope of reportable and non-reportable events and issues and evaluated the data sets for adverse trends. The WAI analysis determined that “no negative trends existed.” However, although the analysis report identified that 47 percent of CY 2012 incidents involved human error and 32 percent involved procedure violations, it did not address the significance of this data or need for further review or corrective actions/recurrence controls. Therefore WAI missed the opportunity to appropriately benefit from the compiled analysis of the data. (See **OFI WAI-F&I-2.**)

### **Performance Indicators**

WAI has established a procedure for development and maintenance of project-wide and functional/organizational directors. WAI has established and maintains a basic set of seven quality and safety related performance indicators, which are published as an attachment to the TWPC monthly progress report in a Performance Dashboard “stoplight” (i.e., blue, green, yellow, and red) format. Performance goals and rating thresholds are established, but are not reflected in the progress report stoplight charts. The current indicators include radiological, industrial safety and health, nuclear safety, management system, environmental quality, and DOE reportable items. The procedure specifies that if deficiencies or deviations are identified during the evaluation or reporting of performance measures, they should be addressed using the CAR process. However, neither the procedure nor the published “stoplight” chart of project measures addresses any analysis or discussion of actions being taken or needed to drive improvement. The monthly report provides only limited descriptions of the reasons for or scope of any monthly changes in ratings. A new program plan was issued in February to establish a leading indicator



program at the TWPC. The Performance Assurance organization administers the program, and implementation was just beginning during the conduct of this review. The new program plan includes expectations for documentation of analysis and actions for indicators, but no implementing procedure has been issued to define specific requirements and processes. (See **OFI WAI-F&I-4**.)

Engineering has established and maintains organization-level performance indicators addressing such areas as product quality, safety performance, configuration management, productivity, continuous improvement, and training and qualification. Each indicator report has a red/yellow/green/blue rating; includes a definition, measures, goals, analysis, and action descriptions; and addresses monthly performance over a 12-month period. Similar to the company-level performance indicators, when actions are identified on the Performance Dashboard sheet, there is no designation of an action owner or the method of managing the specified action(s). (See **OFI WAI-F&I-4**.)

## **Lessons Learned**

WAI has established and implemented an operating experience/lessons learned program that identifies, evaluates, and provides for appropriate application of lessons learned generated from external operating experience and internal activities, conditions, and events. The program requirements and expectations are defined in a WAI procedure, and a formally issued guidance document (work instruction) details the performance expectations and process steps for the lessons-learned coordinator's responsibilities. The program includes a content-rich and user-friendly intranet site and a designated company coordinator who maintains formal documentation and manages screening activities, SME evaluations, and application actions. The lessons-learned intranet website contains links to WAI internally generated lessons-learned documents, as well as the DOE Headquarters lessons-learned website and database.

The designated company coordinator maintains the site procedure and website and inputs internally generated lessons to the internal database. The coordinator screens externally generated operating experience reports, and disseminates them to SMEs for further applicability evaluations. When applicable, the coordinator disseminates them to appropriate managers and subcontractors for review and application. The coordinator routinely interfaces directly with the maintenance organization in identifying operating experience reports for review and incorporation into new work packages. The procedure for development of activity hazard analyses includes responsibilities for including lessons learned, and the associated hazards screening checklist includes a specific field for listing applicable lessons learned. The work control program description references the lessons-learned procedure and specifies addressing lessons learned in pre-job briefings and in post-job feedback from workers. Maintenance and operations pre-job briefing instructions address the discussion of pertinent lessons learned. Fifteen to 20 externally generated lessons learned are disseminated each month, and 15 to 20 internally generated lessons learned are developed and published each year by WAI. The coordinator maintains a spreadsheet of the externally generated lessons that are screened, the assignment and status of SME evaluations, the evaluation results, and feedback on actions taken from managers to whom lessons are disseminated. The coordinator has performed management self-assessments of the program annually.

Although the coordinator disseminates many externally generated lessons learned to the training organization, there is no specific requirement to review and apply pertinent lessons learned in developing lesson plans. Also, there is no reference to the lessons-learned program or procedure in the training and qualification program plan or procedures. (See **OFI WAI-F&I-5**.)

## **Activity-Level Feedback and Improvement**

Sections 5.1 and 5.3 discuss the processes and implementation of post-job reviews to provide feedback to procedure and maintenance document preparers.

For some years, members of the WAI Performance Assurance group have led and administered various continuous improvement projects involving TWPC employees and management. These projects, have focused on process flow improvements for efficiency and cost reductions, but have also been linked with initiatives with clear safety improvement focus or elements including Human Performance Improvement (HPI), High Reliability Organization, Work Control and Safety Conscious Work Environment. Champions for each initiative have been designated and a Continuous Improvement Program Committee meets regularly for status reporting and planning. Previous process improvements have had likely, but difficult to measure, beneficial safety effects. For example, improvements in drum movements reduced the number of times drums needed to be moved, reducing the opportunities for accidents and unnecessary exposures. An initiative for turnover and pre-job information efficiency has resulted in improved communications that can result in safety performance improvement. Although these continuous improvement project activities are certainly providing efficiency, monetary, and safety benefits, they are not governed by any formal WAI procedures that define the roles, responsibilities, requirements and processes to conduct these activities and integrate them with existing management systems and oversight. (See **OFI WAI-F&I-6.**)

In summary, WAI has established and implemented the elements of an appropriate assurance system supporting safety systems at TWPC. Managers and SMEs have taken proactive process improvement steps that can enhance nuclear safety. However, insufficient attention to detail has been applied in planning, performing, and documenting assessment activities. In addition, issues management processes have longstanding, systemic weaknesses and have often not been accurately and rigorously implemented to ensure that problems are effectively addressed. WAI management has been aware of many of these issues management problems during the past few years and documented them on many corrective action reports, but has been ineffective in addressing these deficiencies in an appropriate and timely manner. This may in part be due to the lack of integration between the procedures for elements of a feedback and continuous improvement program and diffuse assignment of responsibilities for each of these elements. (see **OFI WAI-F&I-7.**)

## **5.6 OREM Safety System Oversight Program**

In recent years, DOE field elements at the Oak Ridge Reservation and OREM have experienced two major reorganizations with significant changes in the positions, reporting structures, and personnel duty assignments. The current staffing includes many dedicated and technically capable individuals who have been providing the required oversight while simultaneously attempting to update the procedures to reflect the new organizations. While progress has been made, significant work remains to be performed; this will be discussed more in Section 5.7.

In accordance with DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis*, each facility or operation is expected to establish and maintain a DSA that (among other things) specifies the Safety Significant (SS) Safety Systems and Components (SSCs), the Specific Administrative Controls (SACs), and the Safety Management Programs (SMPs) necessary to ensure the safety of the public, the environment, onsite co-located workers, and facility workers. Direct oversight interaction with the contractor's operational and technical staff is mostly performed by DOE Facility Representatives (FRs), Safety System Oversight personnel (SSOs) and Subject Matter Experts (SMEs). In many cases, SSOs also serve as SMEs for related technical areas. The EM Active Safety System Oversight Coverage table for Oak Ridge (March 2013) identifies operations under 8 DSAs, covering 14 buildings and incorporating 27 DSA credited active SS systems. SSO personnel are assigned to each of these systems. Due to similarities in the technical areas of expertise required, five individuals have formal SSO assignments covering multiple systems and multiple contractors. One other individual is currently under training/mentorship to take on SSO duties as part of a

plan for succession, since one of the current individuals is eligible for retirement. Two of the individuals assigned to SSO responsibilities are provided to OREM under a staff augmentation agreement with the Oak Ridge Service Center managed by the Office of Science. The others are OREM employees.

## **Policies and Procedures**

OREM performs field element oversight based on an assessment schedule that is expected to be developed annually in accordance with OREM procedure EM-3.6, *Assessment Program Committee and the EM Integrated Assessment Schedule*. The assessments are expected to be conducted in accordance with EM- 3.3, *Integrated Assessment Program*. The assessment schedule is intended to ensure assessment of all aspects of a program on a three-year cycle. As noted later in section 5.7 of this report, partially due to the recent reorganizations, there are opportunities for improvement in the implementation of the assessment planning cycle and scheduling process

SSO program duties and responsibilities are defined in accordance with procedure EM-2.2, *Safety System Oversight*. EM-2.2 defines the responsibilities for a position of SSO Coordinator (SSOC), which include recommending, scheduling, and coordinating assessments of contractor CSE programs; conducting self-assessment of the SSO program; recommending specific reviews to be conducted by SSOs; and tracking and trending SSO-identified issues. As noted, OREM performs field element oversight based on the EM-3.6 assessment schedule, and assessments are to be conducted in accordance with the EM-3.3, *Integrated Assessment Program*. However, the SSOC is not included as part of the assessment program committee defined in EM-3.6 and does not have assigned duties within procedure EM-3.6. Independent Oversight reviewed documentation of SSO oversight activities and determined that much of this oversight was generally limited to assessments of specific systems, rather than reviews of the contractor CSE programs. Although system-specific review is a critical aspect of SSO duties, it does not satisfy the requirement for assessment of the contractor's CSE program. In addition, no recent management self-assessments of the DOE SSO oversight program were identified. While the SSOC's responsibility is defined by procedure EM-2.2, the authority to implement the program has not been defined. That is, the SSOC is not identified as part of the assessment program committee in EM-3.6, and has no identified personnel supervisory authority, program management authority, training approval authority, or budget and resource allocation authority. (See **OFI OREM-1**.)

FR roles, responsibilities, authorities, and accountabilities (R2A2) are presented in procedure EM-3.2. The FRs serve as DOE line management's principal personnel to ensure operational awareness of facility conditions/operations and the contractor's performance. FRs are responsible for daily walkthroughs of the facility and for monitoring and reporting on contractor activities. As such, they are considered the principal interface between DOE and the contractor, and must provide routine coordination and feedback to the SSOs and SMEs to assure their awareness of SSC-specific or SMP-specific issues. It should be noted that although updated as recently as February 2011, the procedure in effect at the time of this review references the previous operations awareness and issues management reporting system and outdated organizational elements. Efforts are under way to bring the procedures up to date. (See **OFI OREM-1**.)

In accordance with procedure EM-2.2, SSO personnel are expected to oversee assigned active safety systems (SS level SSCs) to ensure that they will perform as required by the safety basis. The R2A2s of the SSOs are outlined in this procedure. In many respects the procedure mirrors the language used in DOE Order 426.1 Appendix D. SSOs are expected to be "Highly Qualified Personnel" who provide a variety of assessment and technical support activities for the FRs, SMEs, and Federal Project Directors in "evaluating the significance and impact of identified system problems" as related to the technical discipline and assigned systems. In addition they are expected, "as requested," to provide input to the budget reviews in order to ensure adequate resource requests to maintain system reliability. Based on

interviews with the SSOs, it was unclear when or how some aspects of their assigned responsibilities were implemented, as they have had minimal direct input to the USQ, justification for continued operation (JCO), and DSA review process unless specifically requested by the safety basis reviewers. Similarly the SSOs have had minimal connection with the budgetary review and allocation process. (See **OFI OREM-1**.) Like the procedure governing the FR program, OREM procedure EM-2.2 (last updated in 2011) also refers to reporting systems and organizational structures that have been superseded by reorganizations. (See **OFI OREM-1**.)

Per DOE-STD-3009-94, the safety basis for each facility is expected to include contractor commitments for establishing and maintaining specific SMPs and outlining how various elements of those programs will be implemented. In general, designated DOE SMEs are expected to provide technical expertise, oversight assessments, and program element review in their assigned area(s) to ensure that contractor SMPs are functional and effective and that they conform to regulatory and contractual requirements. In many cases, the SMEs also serve as SSOs for related technical areas and systems. While OREM does assign individual SMEs with specific oversight activities as part of the integrated assessment program, there is no established written policy or procedure that outlines the generic R2A2s or training and proficiency requirements for the SMEs. Instead, each individual SME has an individual position description, qualification card, and performance management plan, specifying different degrees of expertise and effectiveness for each SME. The consistency of SME qualifications is further complicated by the matrix support arrangements for staff augmentation from the Oak Ridge Service Center, where separate supervisory and personnel management expectations can challenge an SME's or SSO's time management priorities and resource allocations. The review of SMEs' and SSOs' written assessment reports and observed performance of assessments showed inconsistencies in quality and attention to detail, suggesting a need to systemically clarify performance expectations, duty assignments, R2A2s, and qualifications. Specifically, the roles of SMEs as technical advisors to the DOE managers, the responsibilities of SMEs for oversight of contractor safety management programs, and the responsibilities of SSOs for oversight of the contractor's systems and CSE programs are not clearly differentiated. (See **OFI OREM-1**.)

### **Training and Qualifications**

Procedure EM-2.5, *EM Facility Representative Training and Qualifications Program*, outlines the training requirements for the FRs. Like the other program oversight procedures, it refers to the superseded ORION reporting system and should be updated. (See **OFI OREM-1**.) Two FRs are assigned responsibility for the TWPC facility. Both have significant experience as FRs at DOE facilities, and both have current qualification card signoffs for the TWPC facility. These FRs exhibited detailed knowledge of the facility design and operations and an active working relationship with the contractor's facility operations and maintenance staff.

The training and credentials requirements for the SSOs are defined in EM-2.9, *Safety System Oversight Training and Qualification Program*. This procedure also refers to a superseded reporting system and outdated organizational structures. (See **OFI OREM-1**.) As noted, OREM has 5 SSOs assigned to 27 active SS systems. Two of the SSOs are supplied via a staff augmentation matrix agreement with the Oak Ridge Service Center, which is managed by the Office of Science. In accordance with the matrix support agreement, when performing duties for OREM, Service Center employees are expected to operate in accordance with OREM procedures. However, OREM managers do not have direct responsibilities for these individuals' performance appraisals or assignments. The other assigned SSOs are OREM employees. One of the OREM employees, who serves as an SSO but also has duties as a SME, has an SSO assignment over Personal Radiation Detection Instruments (PRDIs). These instruments do not meet the classic definition of a SS system but are considered safety components that are used in lieu of a fully functional and credited criticality accident alarm system (CAAS). Another OREM employee is being

mentored to serve as an SSO, as part of succession planning. At the time of the review, he had not yet been formally assigned responsibility as the lead SSO for a system.

Independent Oversight reviewed position descriptions and qualification cards for most of the assigned SSOs. For the SSOs who are OREM employees, Section II “Specific Position Requirements” on the position descriptions was checked “NO” with regard to SSO knowledge, skills, and abilities (KSAs) and technical qualification programs (TQPs). (See **OFI OREM-2**.) While the individual qualification cards matched the generic SSO KSA and credentials as required in Appendix D of DOE Order 426.1, *Federal Technical Capabilities*, and the necessary demonstration of system and facility familiarity, neither procedure EM-2.9 nor the individual qualification cards address specific technical discipline training, credentials, or competencies necessary for an individual to be expected to serve as a “Highly Qualified” technical advisor for the particular systems. For example, a chemical engineer is assigned as the SSO for a CAAS and several other instruments-based level indication systems, and a civil engineer is assigned as the secondary SSO for a variety of heating, ventilation, and air conditioning (HVAC) systems. While these individuals appear to have the technical KSAs to serve as expert resources for the oversight of these systems, it is unclear from the qualifications and training records how the appropriate discipline-specific technical KSAs were obtained or determined to be satisfied. (See **OFI OREM-2**.)

### **Observation of FRs**

This targeted review focused on a vertical slice of the implementation of the SSO/CSE programs by looking at particular systems in a facility and observing the performance of oversight activities related to that system. In this case, the selected focus was for the HVAC effluent and confinement systems (i.e., the PBVS) in the TWPC facility operated by WAI for OREM. Operational awareness and knowledge of the condition of credited safety systems rely significantly on the immediate daily observations and oversight provided by the FRs. The two FRs assigned to this facility were found to be very capable and very aware of the facility, operations, and status of credited safety systems. Both were interviewed regarding their understanding of their roles and responsibilities related to system oversight, DSA updates, USQ and/or JCO review and comment, and their interactions with the contractor CSEs and the Federal SSOs and SMEs. The FRs stated that their primary duties were to maintain operational awareness and provide feedback and information to contractor and Federal management regarding contractor performance. They indicated that they had complete and unfettered access to the facility and to the contractor staff, and that they had played a significant role in the stop work and incident investigations following the recent breathing air system failure. When asked about plans for expansion of the facility, they expressed awareness of the intended mission and expected operational aspects of the expanded facility and ongoing site preparations. However, they have not been specifically involved in the processes satisfying DOE-STD-1189, *Integration of Safety into the Design Process*, for integrating safety into the design and development or review of the projects safety basis documentation, so they were not fully aware of the status of the Critical Decisions, hazard analyses, or Preliminary Safety Design Reports. They indicated that they are a part of the concurrence signoff process for the annual DSA updates for the existing facility but that their role in the USQ and JCO processes is informal and dependent on verbal communications with the contractor’s CSEs or other Federal safety basis reviewers. (See **OFI OREM-3**.)

On the topic of SSO, the FRs were knowledgeable of details of the credited safety systems and frequently participated with SSOs and CSEs during system walk downs. In light of the recent event involving breathing air, they were asked what mechanism the DOE uses to review designs, ensure configuration control, or otherwise provide oversight for systems that are important to safety but are not specifically credited within the DSA. Other than routine operational awareness and the SMEs’ general review of SMPs in support of SME assessments, they did not identify any established processes for review and oversight of such systems. Their answer may suggest a weakness in DOE oversight and the contractor’s design and maintenance of systems and components that are important to worker life safety but are not

specifically credited in the safety basis documentation. (See **OFI OREM-4.**)

Independent Oversight followed FRs during their daily observations, which included attendance at management meetings, work planning and scheduling meetings, contractor's plan-of-the-day work coordination briefings, and work observations. The FRs exhibited strong working knowledge of the operations and were fully engaged with the operations staff and management on oversight activities.

### **Observation of SSOs**

The lead SSO assigned to the PBVS is provided to OREM via the staff augmentation agreement with the Oak Ridge Service Center. This individual has been with the Federal government in a variety of roles for a significant period of time and is currently eligible for retirement. In an effort to ensure succession planning, an additional OREM employee serves as the assistant SSO and is being mentored to fulfill the lead role at some future time. Both individuals demonstrated a clear knowledge of the components of the PBVS and the role it plays in maintaining the facility safety basis. The lead SSO appeared to have a very strong technical understanding of the engineering discipline for HVAC systems.

Both individuals were interviewed regarding their understanding of their roles and responsibilities for SSO and for DSA, USQ, or JCO review and comment, and regarding their interactions with the contractor CSEs and the OREM FRs and SMEs, as further discussed below.

Among the R2A2s and KSAs for an SSO, in accordance with DOE Order 426.1 Appendix D, is the expectation that SSOs are knowledgeable of the safety basis requirements and TSRs for their systems and provide appropriate feedback to DOE safety basis approval authorities for applicable changes, USQs, or JCOs. The SSOs who were interviewed indicated that while they were kept informed unofficially by the CSEs, they played minimal roles in the review, comment, and approval process for DSAs, USQs, or JCOs; they participate only when invited by the safety basis approval authorities. The OREM procedures do not specifically require formal SSO comment or concurrence in the review of safety basis changes, DSA annual updates, USQs or JCOs. (See **OFI OREM-3.**)

SSOs derive their awareness of facilities and systems primarily from quarterly system walk downs and coordination discussions with the CSEs and FRs, although they occasionally observe contractor plan-of-the-day meetings. The SSOs indicated that the review of a particular system is driven by the annual Integrated Assessments Schedule, unless the FRs or the CSEs present a specific issue. They further indicated that they had not recently reviewed any processes for acquisition or receipt acceptance or QA of maintenance items or replacement parts for any of the systems they oversee. Nevertheless, they were aware of early changes in the lubrication specifications and ongoing temperature and vibration monitoring for specific bearings used on the TWPC blowers.

As with the FRs, the SSOs were asked whether DOE had any mechanism for providing review and oversight of design, installation maintenance, and configuration control for systems, such as the breathing air system, that are important to safety but are not specifically identified in the DSA. Again, the answer was that they were not aware of any formal mechanism for DOE oversight or review. (See **OFI OREM-4.**)

Independent Oversight observed the performance of an annual assessment of the WAI TWPC confinement ventilation systems performed by the lead SSO. When asked about a formalized review plan and lines of inquiry (LOIs), the lead SSO indicated that such things were "paper formalities." When OREM management was asked a similar question, they provided a plan and set of LOIs titled "Plan for Assessment of the Cognizant System Engineer Program Transuranic Waste Processing Center" that had been signed in March 2013 by the lead SSO, assistant SSO, and Director, Engineering Safety and Quality

Division (ESQD). The SSOC indicated that this plan was based on a set of standard LOIs that SSOs use for their annual or quarterly assessments. Each plan would be modified for the specific facility but would follow a standard template format, containing an appropriate set of objectives and LOIs for assessing the CSE program, as indicated by the title. These included assessment of the contractor's CSE assignments, training, and qualifications processes; the DSA/TSRs and contractor's document control and work change processes; the contractor's maintenance records, TSR surveillances, trend analysis, and USQ processes; the CSEs' knowledge and awareness of system conditions; and configuration management. The written plan appeared to provide a strong and comprehensive foundation for a review.

The lead SSO is an employee of the Oak Ridge Service Center supplied to OREM on a staff augmentation arrangement. On the day of the scheduled assessment, Service Center management had assigned him to attend a training class, and he said he needed to finish the assessment quickly so he could attend the class. Although the specific plan for the assessment, including LOIs, had been developed and signed by OREM management and the SSO, Independent Oversight observations noted a failure to use the plan or LOIs. There was an apparent lack of rigor in assessment of the contractor's CSE program and training records. Instead, the assessment appeared to rely on the relationship between the SSO assessor and the CSE and an expectation of "expert" knowledge on the part of the CSE, rather than on an effort to review the contractor's program or processes. During the Independent Oversight observations there was minimal review of documentation supporting configuration control or maintenance and surveillance of the system, except for a brief look at recent temperature measurement and lubrication records. There was no inquiry into the status of TSR surveillances or USQs. Any areas of change that were addressed were primarily presented, unsolicited, by the CSE. There was no observed evidence that the SSO assessed the status of the contractor's CSE program. (See **Finding OREM-1.**)

### **Reviews of Previous Assessment Reports**

Review of a set of the 2011 and 2012 annual reports for the same facility and systems performed by the same SSO found minimal variation in the text of the report; all identified changes from one report to another were updates of specific operational or system changes noted by the CSE. The reports did not cover the comprehensive LOIs in accordance with the established written plan. Following this observation, Independent Oversight requested and received additional reports of assessments that the same SSO had performed in other facilities. In the report "Technical Assessment of the System Engineer Program for ORNL Building 3019A," dated September 14, 2012, the report again (contrary to the title) concentrated on the status of the system, with no indication of review of the contractor's CSE program. Although the planned LOIs attached to the report reflected a comprehensive review of the CSE programs, the written report provided little indication that the LOIs for most of the specific objectives had been used. The report "Technical Assessment for the System Engineer ORNL Buildings 3038 and 3517," prepared by the same assessor, was written shortly after a change in the prime contractor and associated changes in the personnel assigned as CSEs. In contrast to the other reviewed reports, this report applied a much more rigorous application of the LOIs, reflecting the need for a baseline assessment of the contractor's performance. (See **OFI OREM-5.**)

While Independent Oversight did not observe other SSOs' performance of specific assessments, interviews showed that other SSOs were very engaged with other system CSEs, knowledgeable of the appropriate technical disciplines, and knowledgeable of the status of the systems. In general, reports from other SSOs were not titled as reviews of the CSE programs, but as technical reviews of the particular systems. These reports did not attach the LOIs or review plans, but did identify what documents were reviewed and who was interviewed. The reports focused principally on the status and health of the particular systems but also indicated the SSO's assessment of the training and qualifications of the contractor personnel responsible for the systems. While these reports documented an appropriately questioning technical review of the particular systems, they did not directly focus on the assessment of the

contractor's CSE program. (See **OFI OREM-5**.)

In summary, OREM has established and implemented an SSO program for qualifying staff to apply engineering expertise in its oversight of the assigned safety systems and to monitor the performance of the contractor's CSE program. This program includes appropriately comprehensive written templates for review plans and LOIs. However, recent reorganizations of management and relationships to Headquarters reporting structures have made many of the existing procedures obsolete. Despite the challenges of updating the processes to address new organizational and reporting structures, OREM is mostly staffed by dedicated, qualified, and competent individuals working to perform the fundamental oversight responsibilities. However, as observed during this assessment, the specific implementation of the SSO program for the TWPC PBVS was ineffective in ensuring adequate oversight of the contractor's CSE program for that system. The procedural requirements and performance expectations for the SSO and SMEs should be defined more clearly. Management self-assessments of the SSO program, stronger management review of the quality of oversight products (assessment reports), and stronger use of individual performance and accountability appraisal processes will improve OREM's ability to ensure that contractors' systems and programs are sufficient to protect the safety of workers, the public, and the environment.

## **5.7 OREM Oversight/Feedback and Improvement**

In addition to the focused review of the OREM SSO program, Independent Oversight performed a broader evaluation of the establishment and implementation of OREM programs and processes for conducting oversight of WAI management and operation of nuclear safety systems and OREM internal feedback and improvement systems and performance. Independent Oversight reviewed program and process documents, interviewed responsible managers and staff, and evaluated samples of process outputs (e.g., assessment schedules; assessment, surveillance, and operational awareness reports; issues management data; and contract performance-based incentive criteria and evaluations).

OREM conducts comprehensive and generally effective oversight of its contractors, including nuclear safety programs and performance. However, difficulties associated with the management and implementation of two major reorganizations in the past several years, coupled with concurrent reductions in staffing, have resulted in weaknesses in the definition of roles and responsibilities and in management system processes. These issues present ongoing challenges to effective management and implementation of oversight. The Oak Ridge Office reorganization was approved by the Secretary of Energy in August 2011. In the fall of 2012, the Environmental Management organization at Oak Ridge became OREM, a separate office reporting directly to EM Headquarters. The change became effective before any documentation was generated to define changes in R2A2s, management system program descriptions, and implementing procedures. The reorganization also involved realignment of the OREM internal organization, with reassignment of personnel between divisions and merging of the performance assurance group into an ESQD. In addition, at the beginning of 2012, ePegasus, a new management system for recording oversight activities and management issues, replaced the ORION system. The OREM staff has been challenged with continuing to implement their oversight activities and responsibilities while managing the changes needed to support the new organizational and reporting structure. A draft functions, responsibilities, and accountabilities (FRA) document is undergoing management review, the OREM FR training and qualification procedure has been revised, and OREM is engaging the EM Consolidated Business Center in Cincinnati, Ohio, to help update/create management system descriptions. In the interim, the procedures from the old organization are still in use. Although they are out of date, primarily regarding organizational responsibilities and references and the use of ePegasus, these procedures provide a continuing set of expectations and requirements for the conduct of safety oversight of OREM contractors. (See **OFI OREM-1**.)



Nuclear safety oversight is conducted primarily by FRs from the Facility Operations Division (FOD) and SSO engineers and SMEs from ESQD. SMEs and SSOs from the Oak Ridge Service Center provide continuing oversight support in several functional areas, including accident investigation, environmental management, and emergency management.

Formal processes have been established for assessment and operational awareness activities, management walkthroughs, evaluation of the contractor's quarterly event analysis report, safety basis management and the SSO program, startup/restart of nuclear facilities, contract performance evaluation, issue reporting and resolution, and staff technical qualification. However, there is no current, comprehensive oversight program description or plan or an approved Quality Assurance Plan. (See **OFI OREM-5.**)

Independent Oversight interviewed and observed work activities of FRs assigned to WAI and reviewed documentation of operational awareness planning and walkthrough and surveillance activities. Competent and qualified OREM FRs conduct effective operational awareness and effectively engage and interact with contractors to monitor performance and foster continuous safety improvement. The FOD director has issued a schedule of monthly targeted surveillance topical areas for FRs and maintains and monitors a key performance indicator on these focused surveillances.

The existing assessment procedures include a planning process, EM-3.6, that describes an assessment program committee's responsibility to develop a three-year rolling integrated assessment schedule, and an integrated assessment program procedure, EM-3.3, that details responsibilities and requirements for the various elements of the assessment program. The committee process was used to develop the initial FY 2013 assessment schedule, but the out-year schedule has not been established and quarterly status meetings identified in the procedure have not been held. Although not officially designated as the Assessment Program Manager, as detailed in the program procedure, the manager of the FOD has functioned as the lead in developing and maintaining the FY 2013 assessment schedule. Responsibility for the FY 2014 schedule is rotating to a member of the ESQD. The procedure identifies three tiers of assessments. Tier 1 assessments are defined as critical to OREM mission achievement and compliance with regulations or DOE orders, such as ISMS verification reviews and readiness reviews. Tier 2 assessments are defined as those needed to satisfy customer expectations or to meet regulations or DOE orders of a lower visibility or significance; examples are triennial assessments of emergency management or fire protection and readiness reviews of lower priority projects. Tier 3 assessments are based on general DOE requirements for conducting oversight or self-assessment, such as the requirements of DOE Order 226.1. The primary function of this tier system appears to be to identify the level of authority needed to delete or delay performance. For example, changing Tier 1 scheduled assessments and deleting Tier 2 assessments require the Manager's approval; delaying Tier 2 assessments requires the Deputy Manager's approval; and changing scheduled Tier 3 assessments requires approval by the responsible manager. This categorization process does not appear to add value and is not applied consistently. As an example, FR planned and scheduled topical area surveillances are categorized as Tier 2, but ESQD functional area surveillances are categorized as Tier 3. Tier 3 assessments that are performed but are not on the initial schedule, primarily functional area surveillances, have not been routinely added to a schedule as specified in the procedure, but are only input to ePegasus after completion. Although the integrated schedule is required to be maintained in ePegasus, retrieval of a current schedule and status from the system is problematic, and several personnel with knowledge of ePegasus could not retrieve such items when requested by Independent Oversight. (See **OFI OREM-5.**)

A review of the initial schedule for FY 2013 and completed assessments indicated that OREM performs many and varied contractor safety oversight assessments. However, few self-assessments have been scheduled or performed other than mandatory quarterly reviews of DOE injury and illness, the annual Federal Employee Occupational Safety and Health (FEOSH) review, a procurement management program review, and an FR staffing analysis. Many limited-scope surveillances have been performed, but

few formal assessments, team assessments, and cross-functional, cross-organizational, or cross-contractor assessments. (See **OFI OREM-5.**)

Independent Oversight reviewed approximately 25 reports of assessments and surveillances completed by OREM in the past 18 months. While many of these assessment activities were thorough and provided value in evaluating and improving contractor safety processes and performance, additional mechanisms and management attention are needed to ensure that assessment activities, particularly surveillances, are performed and documented well. Many of the surveillance reports (of the small sample reviewed) lacked a summary of the results or overall conclusions but simply provided a completed checklist; did not support conclusions about compliance with commentary or objective evidence; did not focus on performance and field activities; or did not identify any specifics or the scope of the field condition or activities observed. OREM's February 2013 assessment of the WAI CAS concluded that the assessment and issues management systems were "fully and effectively established and implemented." This statement conflicts with Independent Oversight's conclusions that there were ongoing significant weaknesses in both process and performance in the areas of assessment and issues management. In addition, the OREM report's conclusion conflicts with WAI's self-assessments, which have indicated significant ongoing problems with issues management and associated open CARs (see Section 5.5 of this report for details.) In addition, Section 5.6 of this report describes additional issues with ventilation system SSO assessment reporting and performance. Taken together, these issues suggest a need to ensure more rigorous and questioning oversight assessments. (See **OFI OREM-5.**)

In addition to formal assessments and FR operational awareness activities, OREM continues to implement a procedure on a management walkthrough program. Approximately 30 walkthroughs had been performed and documented by the FOD and ESQD directors in the six months prior to this review.

The requirements and process for management of issues identified by OREM are included in the integrated assessment program procedure. Although feedback from the assessments is appropriate for establishing areas of focus for future assessments, the management of issues should more appropriately be a stand-alone program and implementing procedure, since not all issues are identified by formal assessment activities (e.g., management walkthroughs, FR operational awareness activities, and external assessments). The existing process describes three levels of assessment findings: Level 1 is "major significance," such as imminent threats to environment, safety, and health or a systemic breakdown in work control elements; Level 2 findings include non-conformances, deviations, or deficiencies in the implementation of requirements; and Level 3 findings are defined as observations, including isolated, minor deviations from requirements or from best practices. Other assessment result designations are Strengths and Noteworthy Practices. Level 1 findings require a formal corrective action plan (CAP), Level 2 findings require a corrective action unless closed during the assessment, and Level 3 findings can be entered into the tracking system either as "auto close," with no actions required, or as "action required." The procedure contains no discussion or guidance regarding the conduct or review of causal analyses or extent-of-condition reviews, other than statements that they are required in contractor CAPs, and does not mention DOE self-assessment issues. (See **OFI OREM-6** and **Finding OREM-2.**)

The integrated assessment procedure requires OREM management to designate a staff person to periodically evaluate the results and findings of assessments and walkthroughs for trends needing senior management attention, and then to document this evaluation in a report. No other guidance or details concerning trending are provided. Independent Oversight reviewed trend reports for FY 2013 quarter 2 and the draft report for FY 2013 quarter 3. Although the reports quantify and graphically present considerable data related to walkthroughs and assessments, including the number performed, functional areas covered, number of findings, and finding levels and status, they contain no analysis of the data that would assist in understanding the cause of trends or suggest enhanced monitoring or corrective or

preventive responses to issues. (See **OFI OREM-6.**)

Independent Oversight reviewed the issues (findings) entered into the tracking system for CY 2011, CY 2012, and the first four months of CY 2013 related to WAI. Of the 81 issues, 63 were categorized as Level 3 auto close, almost all of which were deviations from procedural or regulatory requirements. Although not described in the procedure, in practice Level 2 findings are categorized in the tracking system as either “CAP required” (5 issues) or “follow-up required” (13 issues). These records reflect weaknesses in the OREM issues management process and implementation, including under-classification of finding levels, lack of or inadequate documented follow-up in the tracking system when required, and incorrect cause codes. With respect to under-classification, no Level 3 findings identified any actions required, even though more than half were deviations from requirements and action should have been required. Many of the auto close Level 3 deviations appeared to be of a more than minor nature, possibly indicating under-categorization (e.g., employees working under a raised load, annual safety harness inspection not performed, inadequate documentation of a critical lift, and lockout/tagout procedure not followed). The documentation in the tracking system does not describe contractor actions for the auto close issues. A Level 2 finding categorized as “follow-up required” stated that it was the third safety harness inspection issue identified by OREM staff in 2011, but did not require a causal analysis, an extent-of-condition review, or a CAP from the contractor. Additionally, for 5 of the 13 Level 2 “follow-up required” issues, there was no follow-up information in the tracking system. For three other “follow-up required” issues, the only documentation was that WAI had issued a CAR or management issue document, and there was no identified comment about closure or specified actions. For one of the five Level 2 CAP required issues, no corrective actions were entered into the system as required. Approximately one third of the cause codes (source not specified, but apparently from ORPS) listed for Level 2 findings appeared to be incorrect or were not entered. In addition, several other fields in the tracking system have no associated guidance or instructions and are inconsistently completed (e.g., the undefined “MAP” element and ISMS function). (See **OFI OREM-6.**)

In addition to the previously described problems with respect to outdated organizational references, responsibilities, and references to the tracking system tool, weaknesses were identified in OREM feedback and improvement procedures. The assessment procedure defines surveillances as “informal,” even though they usually follow a formal checklist of criteria/requirements and results with commentary. Assessment and FR procedures contain many “should” statements where “shall” (i.e., requirement) statements are appropriate to ensure consistent and effective implementation of performance expectations (e.g., Level 2 findings **should** be assigned a causal code). Assessment and FR procedures lack clarity on the process and expectation for communication of assessments and issues to the contractor. The procedures state that issues are to be communicated to the contractor, but the method is not defined (e.g., formally, informally, or both; with the approval of the FOD director or contractor; and to whom in the contractor organization). Although the assessment procedure states that the responsible manager **should** transmit the final report to the contractor through a letter from the OREM Contracting Officer’s Representative, OREM staff stated that such a letter would not be sent unless a formal CAP was required. Transparent communication of the specific scope and results of DOE assessment activities can provide valuable information for contractor management in developing self-assessment plans and schedules. The text of the management walkthrough program procedure does not adequately address the management of issues, stating that “significant deficiencies” (undefined) **should** be transmitted to the FR and placed in the tracking tool “as necessary.” The main body of the assessment program procedure does not specifically refer to the issues management process, although the process is referenced in an appendix. (See **OFI OREM-1.**)

OREM employs an award fee process with a variety of performance-based incentives to prioritize and monitor contractor performance to ensure or improve nuclear safety. Independent Oversight reviewed the FY 2012 and FY 2013 Performance Evaluation Plans (PEPs) for WAI, the associated FY 2012 award fee

determination report, and several mid-year evaluation reports. Areas with defined incentives, objectives, and criteria/measures included maintenance and conduct of operations, and safety basis and design elements for the Sludge Buildout project. The FY 2012 PEP also included measures for implementation of the QA program and performance related to contractor assessments and corrective actions. Also included in the PEPs are several non-rated evaluation areas related to safety (i.e., performance areas that do not have formal criteria, ratings, or award amounts but can result in a reduced fee if performance does not meet expectations). These areas include the implementation of an effective worker safety and health program and maintenance of an effective ISMS. Although appropriate areas were selected for evaluation, the measures were broadly defined, with few specific qualitative criteria for evaluation. For example, the measure for implementation of the QA program simply listed the ten QA criteria from DOE Order 414.1D that DOE intended to evaluate, rather than providing specific performance expectations. In addition, the measures and associated criteria for the FY 2012 evaluation of assessments and corrective actions were limited to on-time completion of 75 percent of scheduled assessments and completion of 90 percent of DOE tracked corrective actions by their due dates, without any elements related to the adequacy of the actions or their effectiveness. (See **OFI OREM-7.**)

## **6.0 CONCLUSIONS**

With some noted exceptions, overall, WAI has established and implemented the programs and processes necessary for effective management of safety systems at the TWPC.

The WAI maintenance program and procedures are generally adequate, and the WAI maintenance activities that were observed were properly planned, scheduled, and performed. WAI workers were observed to be engaged in the planning and conduct of work and in many cases were even responsible for writing procedures used in the conduct of maintenance. The surveillance and test activities performed by WAI are consistent with the safety basis, with the noted exception of the calibration of one air flow measuring device which appears to indicate a violation of the TSR as written. The technical aspects of WAI's system operating and maintenance procedures were generally accurate, although some procedures need to be updated to reflect current organizational titles. Operators and shift supervisors demonstrated knowledge of operating procedures, including atypical and emergency events. However Independent Oversight observed instances where procedures were not or could not be implemented specifically as written. In all of the observed cases these did not represent direct or immediate hazards and could be addressed by appropriate modifications to the written procedures or requirements, but a pattern of failure to maintain verbatim compliance written procedures or TSRs could have broader implications.

The WAI CSE program uses engineers who are knowledgeable and experienced experts for those systems. Overall CSE program is performing adequately to ensure the credited safety systems are functional and reliable. However, improvements in the program are needed to assure conformance to all aspects of the DOE Order 420.1 B, in such areas as a formal training and qualification plan/program for CSEs and improved rigor and formality of CSE activities.

WAI has established many of the elements of an appropriate assurance system supporting the management of safety systems at TWPC. However, improvement is needed in planning, implementing, and documenting assessment activities. Similarly, WAI has established appropriate elements of an issues management system. However, improvements are needed in the implementation of causal factors analysis, implementation and effectiveness verification of corrective actions, and dissemination of lessons learned to assure the full benefits of the issues management system.

OREM has implemented generally effective programs and processes for conducting daily oversight of

WAI management and operation of nuclear safety systems. FRs provide effective, continuous operational awareness and surveillance feedback to the contractor and DOE management. OREM has established and implemented an SSO program for qualifying staff to apply engineering expertise to the oversight of the assigned safety systems and to monitor performance of the contractor's CSE program. However, the specific implementation of the SSO assessment for the TWPC PBVS, as observed by Independent Oversight, was ineffective in ensuring adequate oversight of the contractor's CSE program for that safety system. OREM has also established appropriate performance-based incentives related to nuclear safety, although measures and criteria would benefit from increased specificity and a refined balance focused more on qualitative rather than quantitative metrics. Improvement in OREM oversight is needed to ensure that formal assessments of contractor safety process implementation are thoroughly and accurately performed and documented, and that issues management processes are better defined and effectively implemented.

## **7.0 OPPORTUNITIES FOR IMPROVEMENT**

This Independent Oversight review identified the following opportunities for improvement. 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. In some cases these OFIs are linked in the text with findings identified in section 8.0 and provide clearer definition of the weaknesses that resulted in the finding.

### **Wastren Advantage Incorporated**

**OFI WAI-Maint-1:** Because the TWPC maintenance program is not clearly delineated as a SMP, the next DSA update should explicitly identify the maintenance program as a SMP to ensure that all required reviews and activities assigned to SMPs are consistently applied.

**OFI WAI-Maint-2:** Pre-job briefings should assure that job-specific risk and hazard information and potential error traps that may be encountered on the job are discussed. Contrary to TWPC procedure CM-I-MT-009, *Maintenance Pre and Post Job Briefs*, the observed Daily Pre-job Briefs, which cover coordination of a multitude of routine work activities, did not always include specific interaction between workers and supervisors on potential job-specific risks and hazard response.

**OFI WAI-Maint-3:** Documentation of maintenance management expectations for maintenance specialists to discuss the specifics of routine work before starting the work should be documented in the Pre- and Post-Job Brief procedure and reinforced during management assessments to ensure that workers are fully prepared to perform the job tasks.

**OFI WAI-Maint-4:** Because non-static gauge readings can be taken in a variety of ways, maintenance staff should be trained on the specific method for taking readings that fluctuate due to turbulent system conditions, with the goal of ensuring that the readings are consistent and that trending is accurate.

**OFI WAI-Maint-5:** The basis for measuring performance of PvMs should be changed to improve the effectiveness of trending and monitoring of the planned PvMs.

**OFI WAI-OPS-1:** Revise operating procedures during next update to reflect current organizational roles.

**OFI WAI-OPS-2: Consider including specific vital safety systems training in the qualification process for new operators.**

**OFI WAI-CSE-1: PBVS damper positions should be brought under the facility's formal configuration management system to ensure that dampers are maintained and controlled at all times.**

**OFI WAI-CSE-2: The CSE program should be revised to include specific details of how CSE responsibilities are to be accomplished to ensure consistency across the program and to adequately document CSE activities (e.g., system notebooks, system health reports, walkthroughs).**

**OFI WAI-F&I-1: Strengthen the WAI assessment program to provide greater assurance that safety-related topical areas are rigorously and effectively assessed and accurately reported.** Specific actions to consider include:

- Formalize and strengthen the assessment planning process to ensure collective management analysis of data and past performance (e.g., incidents and identified process or performance issues). Ensure engagement of all members of the senior management team in the planning process.
- Expand the independent assessment element to include non-regulatory driven assessments. Include cross-organization and cross-discipline team assessments of project-wide topical areas or topics that involve or affect multiple organizations.
- Develop a classroom based training module on conducting assessments that includes proven techniques for successful assessment, as well as WAI procedural requirements and management expectations. Require course training for assessment performers and all managers.
- Establish formal review and feedback processes for completed reports that engage the assessment performers and organization management in ensuring the quality of assessments and reporting. Identify grading criteria, with a focus on qualitative elements, to support ongoing evaluation of performance improvement and identification of problem areas, both topical and organizational. Collect, analyze, and report rating data, and provide results and trending information collectively and by organization to WAI management.

**OFI WAI-F&I-2: Strengthen the processes and implementation for managing safety issues to ensure that process and performance problems are accurately documented and rigorously evaluated and that effective recurrence controls are implemented.** Specific actions to consider include:

- Prioritize the formal characterization and resolution of weaknesses and deficiencies in issues management procedures and performance. Use a project management approach to this complex problem to fully analyze and define the scope of the issues to be addressed and the required actions, and to manage the many actions that will be required. Specifically, ensure that actions are appropriately discretely identified and described with sufficient specificity (e.g., identify what changes will be made to a procedure, not just "revise the procedure as required"). Establish needed compensatory/interim measures, pending development of refined processes to ensure effective management of issues. Recognize the need for, and provide, appropriate resources to accomplish the program improvement actions. Prioritize required actions and establish challenging action completion dates.
- Establish a corrective action review board with representatives from various organizations, including managers, to review a sample of issue reports (e.g., CARs, NCRs, and IRs) for accuracy and quality, including proper categorization, extent-of-condition and causal analyses, corrective actions, and recurrence controls. Provide formal feedback to responsible managers, maintain data on identified problems, and periodically communicate the collected results and trends to senior management. Consider using this board to provide up-front input when developing disposition plans for more significant issues to minimize changes and additional evaluations identified by reviewers late in the

issue resolution process, avoiding issues that were evident in previous CARs and IRs.

- Establish classroom training for managers on effective issues management considerations and techniques with an emphasis recurrence control – i.e., preventing the same or similar conditions, events, or poor performance from happening again by applying good analysis and action development and implementation.
- Clarify when the use of, and which elements of, the processes in Issue Investigation and CM-M-QA-001 *Causal Analysis Manual* is a requirement or just guidance.

**OFI WAI-F&I-3: Strengthen incident/event investigation processes and performance.** Specific actions to consider include:

- Define the specific training requirements for persons performing duties detailed in CM-P-IS-015, *Incident Reporting and Investigation*.
- Clarify expectations and decision making for performing and documenting fact finding and/or critiques. Ensure that a designated note taker is assigned in addition to the facilitator, and record more detail in fact finding or critique minutes.
- Provide guidance on implementation of causal analysis techniques and the use of the causal analysis process results before developing, implementing, and assessing corrective or preventive actions.
- Review and revise procedure CM-P-EM-101 *Atypical Events* to provide linkage in the text to the use of procedure CM-P-AD-038 *Occurrence Reporting* and procedure CM-P-IS-015 *Incident Reporting and Investigation* for documenting and managing these events.
- Provide training, resources, and management review to ensure appropriate classification of issues, and follow-up on corrective and preventive actions.

**OFI WAI-F&I-4: Establish an implementing procedure for the new leading indicator program plan and perform and document a more detailed evaluation of published performance indicators regarding the cause of rating changes and the management actions needed or being taken to improve performance for indicators rated as needing management attention (yellow and red).**

**OFI WAI-F&I-5: Review and revise training program procedures to specifically address the review of lessons learned and their incorporation into lesson plans when appropriate.**

**OFI WAI-F&I-6: Strengthen the specification and implementation of training requirements in feedback and improvement procedures. The specific type and required documentation of training requirements (e.g., classroom, required reading, or formal OJT) and the population affected should be identified in each procedure.**

**OFI WAI-F&I-7: Establish a formal procedure or procedures defining the roles, responsibilities, authorities, requirement, and processes for the Continuous Improvement Program.**

## **Oak Ridge Environmental Management**

**OFI OREM-1: Initiate a formal project management approach to “stand-up” of the new OREM organization.** Specific actions to consider include:

- Include comprehensive, prioritized, task listing, resource allocation, and scheduling with assigned responsible managers, ongoing maintenance, and accountability for implementation.
- Promptly identify any needed compensatory measures and formally communicate performance expectations and progress to staff during the stand-up process.
- Formally designate personnel with responsibility for administering and monitoring the assessment and issues management programs.
- Prioritize arrangements for development of the FRA, Management Systems Documents, and

implementing procedures. Ensure that new and revised procedures are all appropriately linked, are consistent in defined requirements, are integrated with ePegasus, and reflect current organizational and reporting structures. Eliminate ambiguities and ensure that expectations for consistent performance are clearly defined (shall vs. should).

- Establish defined mechanisms for communicating issues and assessments to the contractors.
- Ensure that assigned oversight and program responsibilities are accompanied by the appropriate authority and resources for implementation.
- Develop an appropriate set of procedures addressing the R2A2s, the training and qualification (KSAs) requirements, and performance expectations for SMEs. Specifically, these should address the roles of SMEs as technical advisors, and the responsibilities of SMEs with respect to safety management system oversight.

**OFI OREM-2: Ensure that position descriptions and performance plans clearly and accurately define required TQP, KSA, and performance expectations commensurate with the assigned duties for SMEs, SSOs, and FRs. Qualification cards should not only reflect the generic DOE guidance for the position and the local facility/system KSAs, but should also ensure appropriate discipline-specific training, expertise, and KSAs commensurate with the assigned duties.**

**OFI OREM-3: Clarify and formalize the roles and processes for FR, SSO, and SME participation in the review and comment or concurrence processes for the DSA updates, USQ determinations, and JCOs.**

**OFI OREM-4: Review and ensure that mechanisms for oversight of systems, components, or programs considered important to safety (life and health) that are not credited as SS or safety class as part of the DSAs are adequate to ensure worker safety.**

**OFI OREM-5: Strengthen the OREM oversight and assessment program.** Specific actions to consider include:

- Develop a comprehensive oversight program plan that collectively describes the elements and scope of all oversight activities supporting an approved Quality Assurance Plan.
- Establish the stated three-year rolling schedule (i.e., include a targeted schedule for the out-year during development of the FY 2014 assessment schedule).
- Provide more procedural direction for the content and format of surveillance reports to include a summary of the specific performance based surveillance activities and overall results and to ensure sufficient documentation of the bases for conclusions or recommended actions.
- Formally require management review and approval of assessments in the concurrence field in ePegasus.
- Establish a requirement for assessment managers to sample assessments for quality and provide feedback to performers (FRs, SSOs, and SMEs) and management. Employ a defined checklist of assessment attributes (with a focus on performance based qualitative criteria vs. document compliance) for consistent review and trending.
- Review and consider adjusting the balance of assessment types with fewer “informal” surveillances and more planned and documented “formal” assessments. Identify opportunities for cross-discipline, cross-contractor, and team assessments to provide more comprehensive evaluations of processes and observed field performance.
- Formally communicate the observations, findings, and results of *all* assessments to contractors.
- Establish a monthly report to contractors that transmits assessment and operational awareness activities and results and communicates expectations for actions and responses.
- Include expectations and specific process steps for identifying and scheduling self-assessments into integrated assessment schedule at both division/office and site office levels.



- Ensure that the assessment/oversight schedule is kept current with planned activities and is easily identifiable and accessible in ePegasus.
- Perform appropriate management self-assessments and review of FR, SSO, and SME assessment products to ensure appropriate performance, quality, and value of contractor oversight activities. Individual accountability for performance should be implemented through the personnel performance appraisal system.
- SSOs should ensure review and comprehensive assessment of both the specific system health and the contractor’s CSE program in accordance with all the aspects of the written assessment plans and LOIs.

**OFI OREM-6: Strengthen the OREM issues management program.** Specific actions to consider include:

- Separate the issues management processes and requirements from the assessment procedures. Establish procedures, requirements, and guidance for performing and reviewing issues management elements, such as cause analysis and extent of condition.
- Establish a procedure for selecting, performing, and using data trending. Strengthen the trending process by establishing goals and action criteria and document the analysis (e.g., cause and impact) and the need for increased monitoring or analysis or actions.
- Review ePegasus data fields and require entry of only necessary information and information for which users are qualified and trained. Specifically, are inputs for apparent cause, functional area, integrated safety management function, and MAP element entries being used for some purpose, and are they being input consistently and accurately? Define the source and level of cause coding. Ensure that there is sufficient instruction and guidance to assure consistent input that supports compiled data and trend analysis.
- Create another category of finding or assessment result to document “observations” that are not deviations from requirements, as distinct from Level 3 deviations from requirements.
- Ensure that expectations for documenting follow-up of actions by contractors are well defined.
- Establish requirements for the issues management manager/coordinator to monitor ePegasus issue input for quality and compliance, and provide feedback individually and collectively to initiators and management.

**OFI OREM-7: Strengthen contractor annual performance evaluation measures with more qualitative criteria.**

## 8.0 FINDINGS

Findings represent identified deviations from the regulatory or procedural requirements. These must be addressed by the site office and contractor management formally with an appropriately graded analysis of the causes and extent of condition, followed by development and implementation of a corrective action plan, effectiveness evaluation, and closure.

### **Wastren Advantage, Incorporated**

**Finding WAI-Maint-1:** WAI is not in all cases following procedures as written, as required by DOE Order 422.1, *Conduct of Operations*, and the WAI DOE-approved CM-X-OP-004 *Conduct of Operations Matrix*.

- CM-P-MT-507, *Maintenance Building Ventilation System Blowers*, maintenance was not followed in the required step-by-step manner on multiple occasions and the latent error in that procedure that should have prevented the procedure’s execution was not identified.
- CM-UET-OP-008, *BBA and GB Differential Pressure Requirements/Ventilation*, was not being

followed verbatim as written because the procedure was executed numerous times containing actions to be performed by a position that no longer existed.

- CM-I-MT-009, *Maintenance Pre and Post Job Briefs*, expects discussion of job specific hazards and potential error traps that may be encountered. Contrary to this expectation, the observed Daily Pre-job Briefs, which cover coordination of a multitude of routine work activities, did not always include specific interaction between workers and supervisors on job-specific risks and hazard information.

**Finding WAI-S&T-1:** WAI has not met (TSR) Surveillance Requirement 4.4.4 “Calibrate or replace the Box Breakdown Area hood face exhaust air flow anemometer to ensure that instrument error is less than or equal to +/-12 fpm annually”.

**Finding WAI-CSE-1:** WAI has not established a comprehensive training and qualifications processes for CSEs incorporating all the elements required by DOE Order 420.1B Chapter V.

**Finding WAI-F&I-1:** WAI has not implemented a fully effective assessment program as required by 10 CFR 830.122, Subpart A, *Quality assurance criteria*; DOE Order 414.1D, *Quality Assurance*; DOE Order 226.1C, *Implementation of Department of Energy Oversight Policy*; and WAI CM-A-QP-001, *Quality Assurance Program Description*.

**Finding WAI-F&I-2:** WAI has not established and implemented an effective issues management and quality improvement program that ensures that the extent and causes of problems are fully and accurately investigated and that these processes result in appropriate, effective corrective actions and recurrence controls as required by 10 CFR 830.122, Subpart A, *Quality assurance criteria*; DOE Order 414.1D, *Quality Assurance*; DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*; and WAI CM-A-QP-001, *Quality Assurance Program Description*.

## **Oak Ridge Environmental Management**

**Finding OREM-1:** OREM has not established and implemented a fully effective assessment and oversight program as required by 10 CFR 830.122, Subpart A, *Quality assurance criteria*; DOE Order 414.1D, *Quality Assurance*; DOE Order 420.1C *Facility Safety*; DOE O 426.1 appendix D *SSO Duties Responsibilities Knowledge, Skills and Abilities*, and DOE Order 226.1C, *Implementation of Department of Energy Oversight Policy*. Specifically, OREM had previously failed to implement an effective SSO program for oversight of the contractor’s CSE program for the PBVS. Further, OREM management has not performed effective self-assessments of its oversight program and management review of the assessment products to assure the performance and quality.

**Finding OREM-2:** OREM has not established and implemented a fully effective issues management and quality improvement program as required by 10 CFR 830.122, Subpart A, *Quality Assurance Criteria*; DOE Order 414.1D, *Quality Assurance*; DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*; and OREM procedures.

**Appendix A  
Supplemental Information**

**Dates of Review**

Planning Visit: April 2-5, 2013  
Onsite Review: April 15-19 and May 19-23, 2013

**Office of Health, Safety and Security Management**

Glenn S. Podonsky, Chief Health, Safety and Security Officer  
William A. Eckroade, Principal Deputy Chief for Mission Support Operations  
John S. Boulden III, Director, Office of Enforcement and Oversight  
Thomas R. Staker, Deputy Director for Oversight  
William E. Miller, Deputy Director, Office of Safety and Emergency Management Evaluations

**Quality Review Board**

William Eckroade  
John Boulden  
Thomas Staker  
William Miller  
Michael Kilpatrick

**Independent Oversight Site Lead**

Timothy Mengers

**Independent Oversight Reviewers**

Timothy Mengers – Lead  
Robert Compton  
Glenn Morris  
Terry Olberding