Office of Enterprise Assessments Review of the West Valley Demonstration Project Radiological Controls Activity-Level Implementation

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Acronyms

ADA	Analytical Decontamination Aisle
ALARA	As Low As Reasonably Achievable
CA	Contamination Area
CAM	Continuous Air Monitor
CFR	Code of Federal Regulations
CHBWV	CH2M HILL B&W West Valley, LLC
CRAD	Criteria and Review Approach Document
DAC	Derived Air Concentration
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOE-WVDP	DOE West Valley Demonstration Project
EA	Office of Enterprise Assessments
ED	Electronic Dosimeter
EDR	Equipment Decontamination Room
EMCBC	Environmental Management Consolidated Business Center
FR	Facility Representative
GM	Geiger-Mueller
HCA	High Contamination Area
HEV	Head End Vent
HLW	High Level Waste
I&C	Instrumentation and Control
LWC	Liquid Waste Cell
NRC	Nuclear Regulatory Commission
OFI	Opportunity for Improvement
PM	Preventive Maintenance
PPE	Personal Protective Equipment
RBA	Radiological Buffer Area
RCT	Radiological Control Technician
RE	Radiological Engineer
RPP	Radiation Protection Program
RS	Radiation Safety
RWP	Radiological Work Permit
SI	Special Instruction
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SSC	Sample Storage Cell
TLD	Thermoluminescent Dosimeter
WIP	Work Instruction Package
WVDP	West Valley Demonstration Project

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted a review of radiation protection program activity-level implementation at the West Valley Demonstration Project (WVDP). CH2M HILL B&W West Valley, LLC (CHBWV) and its subcontractors are responsible for implementing the radiation protection program (RPP) at WVDP. The EA review was performed within the broader context of an ongoing program of targeted assessments of radiological control programs, with an emphasis on the implementation of radiological work planning and control across DOE nuclear facilities. EA performed the onsite portions of this targeted assessment on May 19-22, and June 9-13, 2014.

WVDP was the only operational commercial nuclear fuel reprocessing facility in the United States. Currently, WVDP is decommissioning the facilities and hardware used in the original reprocessing operations and the subsequent vitrification of the waste. The radioactive contamination residuals must be stabilized to enable safe demolition of site structures.

The WVDP RPP is staffed by qualified, experienced personnel, and includes an appropriate set of implementing procedures and documents that govern operations. The WVDP radiological controls program demonstrates a high level of maturity and rigor in implementation of radiation protection program requirements and objectives.

While overall performance was effective, EA identified some concerns that warrant additional management attention and review in such areas as radiological work planning, the clarity and accuracy of technical basis documents for internal dosimetry, plutonium bioassay requirements, and the conduct of representative breathing zone air sampling. These weaknesses could affect the accuracy of radiation exposure tracking, which is one of the mechanisms being used to compensate for technical limitations associated with the use of annual bioassays to detect and control exposures to transuranic materials. In response to the EA team's bioassay concerns, WVDP committed to further evaluate this issue and establish the appropriate corrective actions.

DOE-WVDP has developed and implemented an effective program for assessing the contractor's radiation protection program. The DOE subject matter experts and the two qualified Facility Representatives demonstrated significant expertise in radiological safety and actively ensure that the contractor keeps radiation doses to workers within the annual radiation dose allotment. Based on the DOE-WVDP staff's in-depth facility knowledge and their routine involvement in planning, reviewing, approving, observing, and assessing work performed by the contractor, the DOE-WVDP staff is sufficiently knowledgeable of the contractor programs and activities to make informed decisions about the hazards and risks, efficiently evaluate contractor performance, and provide direction to the contractor. For the areas reviewed by EA, DOE-WVDP has developed and implemented an effective program for assessing the contractor's RPP.

Office of Enterprise Assessments Review
of the West Valley Demonstration Project
Radiological Controls Activity-Level Implementation

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted a review of radiation protection program (RPP) activity-level implementation at the West Valley Demonstration Project (WVDP). CH2M HILL B&W West Valley, LLC (CHBWV) and its subcontractors are responsible for implementing the RPP at WVDP, which is currently undergoing decontamination and decommissioning (D&D).

The EA review was performed within the broader context of an ongoing program of targeted assessments of radiological control programs, with an emphasis on the implementation of radiological work planning and control across DOE sites that have hazard category 1, 2, and 3 facilities. To meet the goals of the targeted assessment, EA performs assessments that are primarily driven by activity-level observations. When sufficient data has been collected from a variety of sites, EA will compile and analyze the data and then develop a report on radiological control performance throughout the DOE complex.

EA performed the onsite portions of this targeted assessment on May 19-22, and June 9-13, 2014. This report discusses the scope, background, methodology, results, and conclusions of the assessment, as well as findings, opportunities for improvement (OFIs), and items for further follow-up by EA.

2.0 SCOPE

EA conducted an independent assessment of activity-level implementation of radiological control practices at WVDP in accordance with a site-specific EA plan, *Plan for the Independent Oversight Targeted Review of Radiological Controls Activity-Level Implementation at West Valley Demonstration Project*, dated May 2014. The EA team evaluated the effectiveness of the contractor's implementation of the WVDP RPP during D&D operations at the former reprocessing site. The scope of the independent, facility-specific, targeted assessments includes the flow-down of occupational radiation protection requirements, as expressed in facility RPPs, into work planning, control, and execution processes. These processes include radiological work authorizations, such as radiological work permits (RWPs) and other technical work documents. This assessment also included an evaluation of the effectiveness of DOE West Valley Demonstration Project (DOE-WVDP) oversight of the contractor, with an emphasis on ensuring radiological safety through implementation of the RPP.

3.0 BACKGROUND

The WVDP is the site of the only operational commercial nuclear fuel reprocessing facility in the United States. The site reprocessed approximately 640 metric tons of fuel, generating a significant quantity of usable uranium and plutonium and nearly 600,000 gallons of liquid high level waste (HLW). The operations were shut down in 1972 for facility modifications and have never resumed. Since the passage of the West Valley Demonstration Project Act in 1982, the site has been a cleanup project managed by the DOE Office of Environmental Management through its field element, DOE-WVDP. The liquid HLW has been solidified into a stable, glass form suitable for disposal.

Currently, WVDP is decommissioning the facilities and hardware used in the original reprocessing

operations and the subsequent vitrification of the waste. The radioactive contamination residuals must be stabilized to enable safe demolition of site structures. The major facilities at the WVDP include the Main Plant Processing Building, the Vitrification Facility, the Remote Handled Waste Facility, and several radioactive waste Lag Storage Areas, all of which are designated hazard category 3 facilities, based on the quantity of potentially releasable radiological and hazardous material within the facility.

Since August 2011, CHBWV has been the contractor performing the decommissioning work on the site. The contract scope of work includes relocation of the HLW canisters from the plant into shielded casks for outdoor storage, demolition and disposition of the main plant facilities, ongoing site operations and maintenance, and waste management. This work involves operations in areas with significant radiological hazards, such as high levels of loose radioactive contamination and significant dose rates.

The EA assessment program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent assessment of the adequacy of DOE policy and requirements, and the effectiveness of DOE and contractor line management performance in safety, security, and other critical functions as directed by the Secretary of Energy. The program is described in and governed by DOE Order 227.1, *Independent Oversight Program*; a comprehensive set of internal protocols; and criteria and review approach documents (CRADs). Activity-level implementation of radiological controls was identified as an EA targeted assessment area for 2013 in a memorandum from EA's predecessor organization to DOE senior line management, *Independent Oversight of Nuclear Safety – Targeted Review Areas Starting in FY 2013*, dated November 6, 2012.

Title 10 CFR Part 835, *Occupational Radiation Protection*, establishes the requirements for developing, implementing, and maintaining an RPP. Section 835.101(a), *Occupational Radiation Protection*, states that "a DOE activity shall be conducted in compliance with a documented radiation protection program (RPP) as approved by the DOE." Each DOE site that works with radiological material has developed an RPP and supporting implementing procedures for radiological control.

The CHBWV RPP is entitled *CH2MHILL B&W WEST VALLEY, LLC, Documented Radiation Protection Program and Implementation for Title 10, Code of Federal Regulations, Part 835*, as amended in May 2011 and approved by DOE-WVDP on December 1, 2011. The RPP, as defined by CHBWV, applies to all WVDP operations and facilities that present the potential for occupational exposure of an individual to radiation or radioactive materials. Therefore, the CHBWV RPP covers the operations reviewed during this assessment.

4.0 METHODOLOGY

As identified in EA's *Plan for the Independent Oversight Targeted Review of Radiological Controls Activity-Level Implementation at West Valley Demonstration Project*, the principal inspection criteria used for the evaluation were based on the following CRADs:

- CRAD 45-35, *Occupational Radiation Protection Program Inspection Criteria, Review Approach, and Lines of Inquiry*,
  - Section A. Radiological Protection Organization and Administration
  - Section B. Radiological Work Planning, Exposure, and Contamination Control
  - Section C. Radiological Surveys and Monitoring

- CRAD 45-21, *Feedback and Continuous Improvement Inspection Criteria and Approach – DOE Field Element.*

The EA assessment team conducted interviews, observed radiological control activity-level work, and reviewed supporting documents. Work observations included attendance at daily work planning and/or scheduling meetings, pre-job or pre-evolution briefings, execution of work activities, walkthroughs of various facilities, and observation of contractor assurance system activities.

The members of the EA team responsible for this assessment are listed in Appendix A. Appendix B provides a detailed list of the key documents reviewed, interviews conducted, and observations made that are relevant to the findings and conclusions of this assessment.

5.0 RESULTS

The assessment team reviewed the effectiveness of the flow-down of occupational radiation protection requirements to work planning, control, and execution processes at the WVDP D&D project. Results of this assessment are organized around four main areas: radiation protection organization and administration; radiological work planning, exposure, and contamination control; radiological surveys and monitoring; and DOE-WVDP oversight. These results are based on a sampling of data and work that was ongoing at the time of the review and are not intended to represent a full programmatic review of the site RPP.

5.1 Radiation Protection Organization and Administration

Inspection Criteria: *Radiation protection program (RPP) design including organizational structure and administration is sufficient to provide for effective implementation and control of all radiological protection activities. (10 CFR 835.101)*

CHBWV maintains a sound and appropriately structured centralized radiation protection infrastructure led by the CHBWV Radiological Controls Manager, who has direct responsibility for management of site radiological control operations. The CHBWV Radiological Controls Manager reports directly to the Environment, Safety, Health and Quality Director, who reports to the CHBWV President and General Manager. The Radiological Controls Manager is supported by staff in the areas of radiological engineering, dosimetry, instrumentation, and laboratory analyses, as well as two radiological control supervisors who are deployed to support line management in field radiological operations. The two radiological control supervisors manage day-to-day implementation of radiological control with a staff of approximately 20 qualified radiological control technicians (RCTs).

The CHBWV RPP is documented in *CH2MHILL B&W WEST VALLEY, LLC, Documented Radiation Protection Program and Implementation for Title 10, Code of Federal Regulations, Part 835,* as amended in May 2011 and approved by DOE on December 1, 2011. In support of this RPP document, CHBWV has developed appropriate programmatic radiological protection documentation that includes management policy statements, implementing procedures, and technical basis documents. However, except for high-level references to sections of the CHBWV Radiological Controls Manual, the RPP does not link each 10 CFR 835 requirement to subordinate radiological protection flow-down mechanisms and procedures. Thus, the WVDP RPP does not adequately define how the RPP intends to implement and meet each compliance commitment. (See **OFI-1.**)

The following non-mandatory guidance, excerpted from the DOE Guide 441.1-1C, *Radiation Protection Programs Guide*, Section 3.1, provides one means of demonstrating compliance with 10 CFR 835:

> "The approved RPP details how a DOE activity shall be in compliance with 10 CFR 835 and should identify the functional elements appropriate for that activity. Additional documentation

should be developed and maintained to supplement the approved RPP to demonstrate that an RPP can be effectively managed and administered to achieve compliance with 10 CFR 835. This documentation typically includes a site radiological control manual developed to the guidance contained in the RCS [Radiological Control Standard, DOE-STD-1098-99], as well as detailed implementing procedures, appropriate management policy statements, and technical basis documentation. While this documentation need not be part of the RPP, it should be clearly linked to the compliance commitments contained in the RPP."

5.2 Radiological Work Planning, Exposure, and Contamination Control

Inspection Criteria: *Radiological work planning processes are formally defined, designed, and implemented in a manner that adequately defines work scopes, integrates with other safety and health disciplines, minimizes the potential for spread of contamination, and ensures radiological exposures to personnel are maintained as low as reasonably achievable (ALARA). (10 CFR 835.101)*

The radiological material at WVDP came from spent nuclear reactor fuel reprocessing activities at the site during the 1960s and 1970s. Today, work activities at the site present the potential for appreciable internal and external exposure to radioactive materials during intrusive D&D operations. The principal source terms include fission products, such as cesium and strontium; transuranic materials, including isotopes of plutonium and americium; and isotopes of uranium. Engineered controls are prevalent and used appropriately at many locations to mitigate radiological hazards. These controls include reuse of existing hot cell equipment when possible, engineered radiological enclosures and containment systems, ventilation systems, shielding, and specialized tooling. Despite effective use of engineered controls, the nature of D&D work requires extensive use of personal protective equipment (PPE) and respiratory protection to adequately control radiological hazards. During many work observations, workers using such PPE were generally very proficient in proper use, including pre-use inspection and testing of respirators as well as proper donning and doffing.

Pre-job and pre-shift briefings are performed frequently and were thorough and effective in conveying hazards and controls for discrete work evolutions, as well as confirming readiness to perform work. However, some questions posed at pre-job briefings or during work indicated possible shortfalls in work planning that could impact ALARA effectiveness. (See **OFI-2.**) Examples include:

- The procedure did not define the number and type of craft workers needed for entry and support during the Head End Vent (HEV) work, and many questions during the pre-job briefing could have been addressed through prior work planning. For example, craft support for the instrumentation and control (I&C) technician was discussed, and the conclusion was that another I&C technician would be needed instead of a D&D technician, since the I&C technician would be more familiar with fulfillment of requests for certain type and size of fittings needed. Similarly, the procedure did not clearly define the need for a dedicated individual to oversee lockout/tagout, but this concern was worked out during the pre-job briefing.

- As a result of a question at the pre-job briefing, a work step in the procedure for removing a crane sister hook during entry into the Equipment Decontamination Room (EDR) for wall work was determined to be unnecessary. The step would have required use of a 12-foot ladder and thus entailed unnecessary fall protection hazards and additional time in the radiation area/airborne radioactivity area.

- A pre-job briefing for a Sample Storage Cell (SSC) radiological sample field counting task determined that an additional entry into the Analytical Decontamination Aisle (ADA) was required to retrieve meters left there during a prior entry. The work planning for the previous entry did not

identify a requirement to bring these meters out, resulting in additional entries and unnecessary dose. Also, questions related to the need for additional smear puck handles for SSC radiological sample collection and for retrieving a cable cutter from the ADA reduced efficiency and necessitated the use of a separate Work Instruction Package (WIP) task for support work in the ADA, under a different RWP (RWP 2014-3020). These were not included as part of the SSC initial work planning, the equipment removal WIP, and/or the ALARA review.

- The removal process for materials from the SSC hatch described in the WIP included overpacking plastic bags into drums. The craft determined that this activity was beyond the reach limitations of the manipulators, and expressed concerns about potential contamination within the containment tent if sleeves or bags were to be secured in the tent rather than during the lifting process.

- The areas around the SSC hot cell window were decontaminated before any radiological surveys were performed on electrical penetrations above 8 feet, which are not routinely surveyed but were necessary in this case. This sequence of work could have necessitated an additional decontamination effort and associated PPE use/exposure that could have been avoided if the survey had been done in advance.

- WIP W1401321, *Obtain Smearable Survey Data in the Sample Storage Cell*, and associated RWP 2014-3030, *Support Survey and Removal of Equipment from SSC Hatch and Associated Activities*, did not appropriately provide for sample analysis within the ADA. As a result, workers and planners had to use a different RWP during a separate ADA entry, 2014-3020, *Support Work Activities in ADA and Associated Activities*, which led to an additional cell entry. Also, because electronic dosimeters (EDs) are issued and tracked by RWP number, the exposures and ALARA dose budgets assumed for WIP W1401321 and the associated ALARA review may not have appropriately tracked the actual work assignments and task specific exposures.

RWPs are the principal mechanism used for specifying radiological controls during work at WVDP. Radiological control supervisors prepare RWPs after consulting with work planners who are responsible for planning work in accordance with WVDP-485, *Work Control*. RWPs are developed and/or assigned to control radiological work being performed using one of several work control mechanisms determined by work planners using WVDP-485 criteria. These mechanisms may include standard operating procedures (SOPs), instrument recalls (IRs), preventive maintenance (PM) work instructions, skill-of-the-worker, and formal WIPs (normally required for high-hazard non-routine and complex work). Most work observed during this review was governed by a WIP and an RWP.

RWPs that were written to cover discrete, clearly defined work scopes were generally sufficient to identify radiological hazards and requisite controls. For example, RWP 2014-4004, *Replace HEV Inlet Damper Actuator for both the North and South Filter Trains and Associated Activities*, contained appropriately tailored information on anticipated radiological hazards and required controls, as well as proper linkage to the WIP covering the job. This work was also subjected to an ALARA review, which was used in preparation of the RWP. However, some RWPs were written to cover multiple activities under a variety of radiological conditions. In these cases, EA noted some radiological work planning weaknesses with respect to RWP work scope definition, linkage of the RWP to associated technical work documents, and proper design and implementation of ALARA review trigger thresholds. The following examples relate to specific observed work during the assessment; however, EA's review of other RWPs and work planning documentation identified similar weaknesses in a number of other RWPs: (See **OFI-3.**)

- Entries to the EDR area are governed by RWP 2014-1003, which describes that job as "Work in Contamination/High Contamination Area supporting HLWIS and associated activities." Observation of several EDR entries revealed that the scope and span of control of this RWP were too broad to effectively convey information about the specific radiological hazards and controls for discrete work evolutions. For example, the RWP contains open-ended authorizations that leave specific radiological controls to the discretion of the RCT. These include special instructions (SIs) SI2, which states "extremity required per RC Survey," and SI6, which states "BZAs [breathing zone air samplers] and/or Real time monitoring per RC Direction." (See Section 5.3 for further discussion of air sampling.) Similarly, specific work area radiological conditions, such as radiation and contamination levels, were not always accurately conveyed. Notably, during an EDR entry to move material and equipment from one high contamination area (HCA) to another, the expected work area radiological conditions listed on the RWP were based on surveys of a different EDR location and were not representative of the conditions in the HCA where this work was performed.

- The WVDP RWP Form WV-4515 is a standardized form used for preparing RWPs. RC-ADM-6, *Radiological Work Permits*, contains instructions for completing the RWP form. The top of the RWP form contains a field to be used for listing technical work documents that are authorized for use with the RWP. For RWP 2014-1003, this field refers to the notes section of the RWP and appropriately lists specific WIP numbers; however, it does not specifically list PM work instructions but instead refers collectively to "PMs." The lack of specific linkage of RWPs to authorized technical work documents; whether WIPs, PMs, or other work document, reduces the ability to ensure that the correct RWP for the specific work activity is used.

- Article 312 of WVDP-010, *WVDP Radiological Controls Manual*, requires formal radiological review of work activities that have the potential to exceed certain radiological trigger levels that indicate non-routine or complex work. According to Article 312, trigger levels should be evaluated based on radiological conditions that exist or are expected prior to implementation of the job-specific engineering and administrative controls. The formal radiological reviews are performed using Form WV-2404, *ALARA Review Checklist*, in accordance with RC-ALAR-7, *ALARA Review of Work Instructions.*

  One of the ALARA review trigger levels defined in WVDP-010 was exceeded during much of the observed work at WVDP. This trigger level is "100 times the values in Table 2-2 for general area workplace conditions (i.e., the worker's whole body is located in a general area with high contamination levels)." However, WIPs covering work in the EDR area under RWP 2014-1003 have not been subjected to formal ALARA reviews. Discussions with Radiological Engineering indicated a possible misconception, and an interpretation that such work at West Valley is considered routine and thus is not subject to the ALARA review provisions. However, WVDP-485, *Work Control*, defines work governed by a WIP as complex or high hazard work. Further, RC-ALAR-7 states, "When a work instruction document indicates that an activity or operation is likely to have radiological conditions that exceed one or more of these trigger levels, a documented ALARA review shall be initiated by the work document originator and the RE [Radiological Engineer]."

The potential for internal exposures at WVDP is assessed using a combination of air sampling and monitoring (see Section 5.3) and direct and indirect bioassay. The presence of Cs-137 in conjunction with uranium and transuranic materials in many areas at WVDP offers the ability to use direct bioassay (whole body and lung counting), with a low detection sensitivity for Cs-137, as a marker for some of the other isotopes of concern. As a result, WVDP only performs indirect bioassay (confirmatory urine sampling for transuranics and uranium) on an annual basis for radiation workers. The sensitivity of an annual urine sampling frequency will only detect intakes resulting in an internal dose on the order of several rem. This is considered acceptable because DOE regulations only require that bioassay programs

be adequate to confirm that internal doses remain below the regulatory limit of 5 rem and do not require bioassay programs to detect intakes resulting in 100 mrem (the threshold for monitoring).

The technical basis for the bioassay program is described in WVDP-070, *WVDP Internal Dosimetry Program Manual and Technical Basis Document.* While this document is comprehensive, it was found to lack some clarity and accuracy concerning routine confirmatory urine bioassay requirements and potential missed dose for plutonium. Specifically, Section 8.8.4 states that "a monthly urine bioassay frequency for plutonium is required unless an exception is noted in project specific documentation, or unless a more readily identified tracer is present in the source term of the work area." Section 8.8.7 seems to indicate that work areas with "significant" quantities of Cs-137 and/or Am-241, along with the plutonium waste products, those isotopes may suffice as a more readily identified tracer, but provides no specifics. EA determined that CHBWV's work planning process and ALARA reviews do not require monthly urine bioassays for plutonium as stated in the technical basis document and do not formally document the evaluation of whether or not monthly bioassay sampling is required under Sections 8.8.4 and 8.8.7. CHBWV asserts that the Radiological Controls Manager, the Radiological Controls Supervisors, the Radiological Engineering staff, and/or the Internal Dosimetry staff make these determinations informally during the work planning process; however such informal decisions are not consistent with the commitment above to note such deviations in project specific documentation. In another concern, pages 68 and 69 of WVDP-070 state that potential missed dose for a plutonium monthly urine bioassay frequency is 5600 mrem, but incorrectly state that this value is below the applicable regulatory dose limit of 5 rem (5000 mrem). The 5600 mrem value was calculated based on an intake retention fraction at 15 days post exposure. However, at 30 days post exposure (worst case for a monthly sampling frequency); the potential missed dose is actually higher, at approximately 8000 mrem. (See **Finding 1** and **OFI-4.**)

In response to the EA team's concern, the site prepared a preliminary response noting the concern with a commitment to complete two near-term actions. The first is to establish a mechanism for formally documenting the need (or lack thereof) for enhanced in-vitro bioassay monitoring following entries into airborne radioactivity areas; the completion date for this action is August 14, 2014. The second action is to assess the requirements in WVDP-070 Sections 8.8.4 and 8.8.7 to determine whether they are still relevant, considering the implementation of individual derived air concentration (DAC)-hour tracking through personal air sampling; the completion date is July 31, 2014. EA agrees with the importance of the first action item but believes that the assessment in the second action should be followed closely and cautiously in light of the potential weaknesses EA identified with respect to breathing zone air sampling (see Section 5.3).

Workers in the field used generally appropriate contamination control practices. For example, the RCT covering work during an observed entry in the EDR proactively noticed degradation of a worker's taped sleeve and glove and radioed to the outside support staff to assist the worker in doffing and to perform a comprehensive frisk of the wrist area. The frisk confirmed contamination on the worker's wrist, and the RC support staff executed applicable sections of RC-Emrg-02, *Radiological Controls Response to Emergency/ Abnormal Radiological Conditions* and RC-Emrg-01, *Personnel Decontamination*. The entire Health Physics response to this event was swift and in accordance with procedure requirements. The worker was appropriately counseled as to what to expect during the process, and the wrist area was effectively decontaminated to background levels.

EA noted a few isolated examples of weaknesses in contamination control, including a worker using his teeth to rip tape in a radiological buffer zone (RBA), a worker blowing into gloves in an RBA, a worker not changing gloves after reaching into a contamination area (CA) and then handling potentially contaminated items, and allowing clean flexible tubing for air sampling to drag on the ground surfaces during transport. Radiological Control management took actions to correct these weaknesses, including discussion at the plan-of-the-day meeting and worker counseling.

5.3 Radiological Surveys and Monitoring

Inspection Criteria: *Adequate routine and non-routine radiological surveys and monitoring are performed for external radiation, fixed and removable contamination, and airborne radioactivity, as needed to characterize radiological conditions and ensure safety of personnel. (10 CFR 835.401; 10 CFR 835.403)*

Most radiological survey and monitoring activities were conducted appropriately at WVDP facilities. Routine radiation and contamination surveys and monitoring are conducted at appropriate frequencies in and around radiological areas. Specific survey techniques and documentation requirements are defined by Radiological Control procedures. Air monitoring and sampling included the use of continuous air monitors (CAMs), job-specific air samplers at work locations, and stationary air samplers located around former process locations (such as hot cells and access ports).

For work observed by EA, RCT performance of routine radiological surveillances and job coverage was effective. Survey documentation associated with these efforts was also generally thorough and complete. Radiological survey and monitoring instrumentation was appropriate for the radiation hazards, and all instruments were within the required calibration intervals. External beta and gamma exposure rates are measured with portable Geiger-Mueller (GM) detectors and ionization chambers, while alpha potential is measured with portable zinc sulfide (ZnS) detectors coupled with rate meters. Smears and fixed air samples are counted in alpha, beta-gamma proportional counting systems or field counted using a combination of GM and solid state detector technologies.

For external exposure, thermoluminescent dosimeters (TLDs) are used to provide the permanent record of worker exposures. WVDP also conservatively requires the use of supplemental alarming EDs to provide for real-time tracking of external dose for work in high radiation areas and other locations with the potential for appreciable external dose. Incremental doses for each worker are recorded and cumulatively tracked, giving management a real-time picture of workers' external dose profiles prior to obtaining TLD results. For work with a high exposure potential, such as analytical cell equipment removal, sample storage cell loadout, and EDR wall assessment work, this information is used to track individual doses and/or project RWP/ALARA goals and administrative control levels.

WVDP uses an effective combination of manual and electronic data systems to manage a variety of radiological information. For example, workers are issued EDs electronically at computer terminals that are tied to manual log-in RWPs. The RCTs use a database system that provides easily retrievable access to ED results. Radiological survey and sampling results are recorded on paper, and then transcribed to create electronic radiological survey records, air sampling results, and related information.

Personnel monitoring for contamination upon exit from a CA at WVDP relies on a partial body frisk with portable survey instruments (primarily hands, feet, face, and respirator), followed by automated whole body counting at the exit from the RBA. EA observed that automated personnel frisking stations were generally well positioned, and personnel exiting RBAs used them diligently. However, hand-held frisks may not be uniformly effective in identifying contamination on personnel and equipment. EA observed that each RCT used slightly different frisking practices, resulting in some potential to miss contamination. For example, when surveys were performed on the external surface of respiratory protection (including filter cartridges), some RCTs only used GM pancake probes while others used both ZnS (alpha detection) and GM (beta-gamma) probes coupled to rate meters, Additionally, in one case, the outer surface of respiratory PPE was being surveyed for removable contamination (by taking a swipe and field counting with GM); however, no monitoring (either scan or swipe) of internal surfaces of the respiratory PPE (mask) was observed. (See **OFI-5.**)

Most work observed at WVDP had the potential for elevated airborne activity and therefore required the use of respiratory protection. As discussed in WVDP-070, *WVDP Internal Dosimetry Program Manual and Technical Basis Document*, there is a technology shortfall associated with in vitro bioassay monitoring for transuranic radionuclides, such as americium and plutonium. In simple terms, a technology shortfall for routine radiobioassay exists when laboratory analyses using current or state-of-the-art methods and equipment are inadequate to detect the amount of radioactivity in a sample that corresponds to a 100 mrem internal dose. This shortfall commonly occurs with plutonium and americium isotopes (transuranics). To address these technological limitations, WVDP has committed to implementing enhanced measures consistent with the DOE Internal Dosimetry Standard. This includes aggressive use of various workplace indicators, such as enhanced contamination monitoring and air sampling of workers' breathing zones (including comprehensive DAC-hour tracking). Ongoing D&D activities result in facility configuration changes that may significantly impact prior airflow studies. The site contractor has retained many of the prior air monitoring network locations but recognizes that these alone do not provide sufficient characterization. As a result, planned work evolutions require radiological controls supervision to use procedural guidance and the RWP and ALARA review processes to define proper air sampling protocols for each work evolution.

While air sampling is generally performed appropriately, EA identified some implementation weaknesses in breathing zone air sampling that may affect the accuracy and reliability of DAC-hour tracking as a means of assessing potential internal exposures. On more than one occasion, the sampler placement was not representative of the worker's breathing zone or was not appropriately placed, given the work location and airflow. (See **OFI-6.**) Examples include:

- WVDP RWP # 2014-3005.1, *Core Boring for Liquid Waste Cell (LWC) and Associated Activities*, required respiratory protection and air monitoring for the initial core boring and final breakthrough. However, the RWP only identified "General Area Air Sampling," with no direction for breathing zone air sampling, either by lapel or placement of the stationary air sampler. The observed task required multiple individuals to wear respirators, and the sampler that was used did not provide representative coverage of all individuals and/or areas where the work was performed.

- HEV work to replace the inlet damper actuator was covered by RWP 2014-4004.1 and an associated ALARA review #2014-4002. Just prior to performing the work, this RWP was revised to remove the requirement for breathing zone air sampling (which was present in RWP 2014-4004), and instead require only general area air sampling. However, the ALARA review, which was not revised, continued to require both general area and breathing zone sampling. This discrepancy calls into question the RWP revision to eliminate the controls required by the ALARA review. As a result, the sampling may be less representative of the workers' actual breathing zone, which is necessary for accurate DAC-hour tracking.

- RWP # 2014-3030, S*upport Survey and Removal of Equipment from SSC Hatch and Associated Activities*, required real time air monitoring. EA observed that the placement of the general area air sampler was not representative of the work area and/or workers' breathing zone, since the sampler was placed on the left side of the hatch, while the work crew was positioned on the right. The air flow path entered the containment tent through a filtered pathway in the containment airlock on the right side of the tent and into the hatch opening. This weakness was corrected during subsequent entries by placing two additional CAMs within the containment, with the sample collection head located in a more representative position.

- Effective and accurate DAC-hour tracking requires representative breathing zone air sampling results. However, institutional procedures and RWPs resulting from work planning do not always provide

clear instructions for ensuring the adequacy of breathing zone monitoring. While the WVDP *Radiological Controls Manual* and WVDP-216, *WVDP Workplace Radiological Air Sampling and Monitoring Program and Technical Basis Document*, allow the use of stationary air samplers and/or lapel-type air samplers to collect breathing zone air samples, the sampling terminology used in these documents is not interchangeable or understood in all cases. Interviews with RCTs and supervisors indicated that the check box on the RWP that calls for breathing zone air sampling indicates the requirement for a lapel sampler, but EA's observations showed that this requirement is not consistently applied.

5.4 DOE-WVDP Oversight

Inspection Criteria: *The DOE field element has established and implemented an effective oversight program to evaluate contractor and DOE programs for performance. Evaluations are based on operational awareness activities; assessments of facilities, operations and programs; and assessments of the contractors assurance system, according to the hazards, previous operational performance, etc. (DOE Order 226.1B)*

Inspection Criteria: *The DOE field element oversight program includes a written plan and schedule for planning assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment processes and systems. (DOE Order 226.1B)*

Inspection Criteria: *The DOE field element has established a qualification program for Facility Representatives (FRs) consisting of formal training and qualification, specifically tailored to the position, facility, program or office. Selection, staffing, training, qualification, and requalification of FRs must be consistent with DOE-STD-1063-2011, Facility Representatives. (DOE Order 426.1)*

Inspection Criteria: *Senior management has conducted a workforce analysis and developed a staffing plan that identifies critical capabilities and positions. The plan specifies minimum staffing levels to ensure adequate FR coverage at the facility. (DOE Order 426.1)*

Inspection Criteria: *The DOE field element has developed and implemented an Operating Experience program to collect and submit relevant lessons learned from operating experience to the DOE Corporate Lessons Learned Database. The program includes review and evaluation of operating experience from DOE and related government or industry programs, technologies and facilities. (DOE Order 210.2A)*

This EA assessment of DOE-WVDP oversight addresses Federal oversight processes and procedures for broadly evaluating the contractor's performance and for ensuring the effectiveness of the flow-down of occupational radiation protection requirements to work planning, control, and execution processes. The following elements of the DOE-WVDP oversight program are discussed:

- Programmatic elements of oversight
- Planning, scheduling, and conducting assessments
- Facility Representatives (FRs)
- Lessons-learned program.

Programmatic Elements of Oversight

DOE-WVDP provides DOE oversight at the WVDP, augmented by support from the Environmental Management Consolidated Business Center (EMCBC) as a DOE "small site." The EMCBC conducts independent assessments of the DOE-WVDP and supports programmatic assessments of the contractor in specialized areas, such as cyber security, that require unique expertise not available within DOE-WVDP.

However, the EMCBC does not provide oversight of radiation protection at WVDP; this responsibility is conducted by the DOE-WVDP field office.

In addition, the WVDP site is monitored by the Nuclear Regulatory Commission (NRC) under a memorandum of understanding with DOE. As described in NRC Inspection Report No. 05000201/ 2013001, the NRC conducted four monitoring visits in 2013, consisting of interviews with DOE and DOE contractor personnel, a review of documents, reviews of radiological sampling and survey data, and tours of key facilities. No public health and safety issues were identified by the NRC during these visits.

DOE-WVDP has adequately defined its oversight process in a suite of comprehensive procedures. The Policy, Procedure and Plan QP-111-01, Rev 9, *DOE-WVDP Mission and Function Statement*, defines the mission of the Federal cleanup of the WVDP site in accordance with the West Valley Demonstration Project Act (Public Law 96-368), describes the DOE-WVDP organization, and identifies the functions and responsibilities of DOE-WVDP management and staff. The Policy, Procedure and Plan QP-414-03, Rev 3, *DOE-WVDP Stop Work Orders*, establishes the authority, responsibility, and instructions for the DOE-WVDP to stop unsafe work. DOE-WVDP-010, Rev 3, *DOE-WVDP Assurance Oversight Program Description*, describes the DOE field element oversight processes for the WVDP site. The purpose of this program is to ensure that DOE line management is sufficiently knowledgeable of site and contractor activities to make informed decisions about hazards, risks, and resources; provide direction to the site contractors; and evaluate contractor performance. The assurance oversight program and a series of DOE-WVDP policies and procedures were effectively implemented to ensure adequate oversight of radiation protection at the WVDP as defined in the applicable portions of DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*.

The document PD-364-01, Rev 0, *DOE-WVDP Technical Qualification Program Description*, defines the requirements for the technical qualification program and ensures that they are aligned with and integrated into the competency standards for selected technical positions. The DOE-WVDP technical qualification program adequately satisfies the requirements of DOE Order 426.1, *Federal Technical Capability*.

The procedure QP-364-01, Rev 0, *DOE-WVDP Implementation of the Technical Qualifications Program*, provides directions for establishing and maintaining an effective technical qualification program, including site-specific qualifications for designated personnel who perform oversight, such as FRs. This procedure also directs the development of the Annual Workforce Analysis and Staffing Plan to identify critical technical capabilities and positions for adequate oversight of site operations.

Planning, Scheduling, and Conducting Assessments

DOE-WVDP has written plans for planning and scheduling assessments, surveillances, and other activities for performing operational oversight of the contractor. The procedure QP-414-02, Rev 10, *Management and Independent Assessments and Corrective Action Disposition*, describes the processes for planning, performing, and documenting independent assessments, self-assessments, management assessments, surveillances, and audits. A master oversight planning schedule is developed annually and updated quarterly to accommodate changes in priorities and limitations in resources, and to address any identified weaknesses. EA reviewed the second quarter update to the DOE-WVDP FY-2014, *Program Oversight Schedule*, and found that it includes a sufficient range of assessments and surveillances that address all major aspects of the contractor's activities on site, including radiation protection. The DOE-WVDP assessment plan includes external assessments of the contractor and internal self-assessments. The schedule also lists assessments performed by outside organizations, such as EMCBC or EM Headquarters. DOE-WVDP effectively tracks its oversight to ensure completion of assigned tasks.

The DOE Radiation Safety (RS) subject matter expert (SME) is responsible for conducting the triennial

independent assessment of the contractor's RPP. To provide more frequent feedback to the contractor in this vital safety area, DOE-WVDP assesses at least one-third of the 12 RPP areas of inquiry every year, rather than waiting three years to assess all areas concurrently.

The 2013 triennial RPP assessment, A13-014E *CH2M HILL B&W West Valley, LLC Contract No. DE-EM0001529- Radiation Protection Program*, completed in May 2013, assessed seven areas of inquiry and concluded that "in general, the Radiological Controls Program is effectively implemented and is compliant with the requirements of 10 CFR 835." Nevertheless, the triennial assessment identified five comments and six findings, one of which had been previously identified in a 2006 assessment. The contractor responded to all of the findings within 30 days, and all corrective actions were completed within 10 months. DOE-WVDP is adequately reviewing radiological control areas through the triennial RPP assessments.

A 2012 surveillance of radiological worker training documented in S12-014E, *CHBWV Radiological Worker Level 1 and 2 Training Program*, assessed an additional area of the triennial assessment. The surveillance identified three findings and three comments. The contractor responded and satisfactorily completed the corrective actions in a reasonable time.

The DOE RS SME is a Certified Health Physicist with a master's degree in radiation biology. He is qualified in the areas of nuclear safety and radiological controls through formal education, specialized training (e.g., criticality safety, probabilistic risk assessment, and air dispersion modeling), and experience in performing nuclear safety analysis for DOE sites across the complex. He has worked as an RS SME for 28 years and has a total of 15 years of experience at the WVDP site. The DOE RS SME demonstrated an excellent level of familiarity with the operations, hazards, and safety issues encountered in each facility. The DOE RS SME is knowledgeable and experienced in radiological protection and capable of performing as an SME in conducting contractor oversight. Although the Radiation Safety SME has excellent understanding and engagement in oversight of contractor performance in radiation protection, the SME had not identified the discrepancy between the requirements for monthly confirmatory urine bioassays for plutonium specified in WVDP-070, and the actual site practice of performing these bioassay collections on an annual basis, as discussed in Section 5.2 of this report. (See **OFI-DOE-1**)

EA reviewed the DOE-WVDP issues management processes, including documentation, tracking, and closeout of findings from DOE-WVDP assessments and surveillances. The procedure QP-414-02, *Management and Independent Assessments, and Corrective Action Disposition*, describes the process for documenting, tracking, and managing issues.

DOE-WVDP uses a straightforward document control process to maintain records of each assessment performed. A unique number is assigned to each assessment for tracking purposes. After the assessment or surveillance is conducted, the report is sent to the contractor for information and action, and the contractor's documented response to the assessment or surveillance and corrective actions for each finding are tracked. Once the contractor completes the corrective actions for all findings, the DOE-WVDP lead for the assessment verifies completion and closes out the assessment package. DOE-WVDP is adequately tracking issues through its issues management process.

Facility Representatives

The DOE-WVDP FR program is documented in DOE-WVDP-003, Rev. 7, *Facility Representative Program Description*, which describes the duties, responsibilities, and authorities of the FRs. The FR program is based on and references DOE-STD-1063-2011, and it appropriately includes both general qualification requirements as well as site-specific requirements. The program description discusses roles and responsibilities, training and qualification, typical duties and activities, response to occurrences, daily

log of oversight activities, and tracking of issues. The DOE-WVDP FR program meets the expectations of the DOE standard.

WVDP currently has two fully qualified FRs, meeting the requirements established in the site's most recent Workforce Analysis and Staffing Plan. EA examined the FRs' qualification records, interviewed the FRs, and accompanied each of them on facility walkthroughs. Based on the records reviewed, the DOE-WVDP FRs are well-educated and experienced. They have successfully completed the qualification requirements. The senior FR has been qualified for 14 years, while the other FR has been qualified for nearly two years. Based on interviews with the FRs and observations of their performance on the job, the FRs are very knowledgeable of the site, the facilities and systems to which they are assigned, the status of D&D operations and key projects under way, and the main issues currently being addressed in those facilities.

The FRs are located on the site, and along with technical members of the Safety and Site Programs Team, provide most of the daily oversight of the contractor through direct observation and routine interactions. They maintain operational awareness of site conditions and keep DOE-WVDP management informed of facility activities and evolutions as they occur. The FRs share duties by rotating through "on-duty" and "off-duty" status. The "on-duty" FR takes the lead role in attending meetings, interacting with the contractor, and responding to events and occurrences, while the "off-duty" FR is available for other activities, such as completing annual training, conducting scheduled surveillances, and preparing reports.

The FRs perform regular, assessments of the contractor's radiological operations through daily interactions with contractor staff, walkthroughs of the job site, attendance at pre-job briefings, and formal surveillances. The FRs maintain a daily log of their oversight activities, such as notifications received or made to others, actions taken (if significant), and site conditions. The key items from the FR daily log are rolled up into the monthly FR report to the DOE-WVDP Director. These reports regularly inform DOE management about the performance of the subcontractor and the conduct of radiological protection at the site. The FRs analyze data on their concerns, findings, and comments to identify trends in contractor performance, which are then reported to management and are considered during the development of the annual assessment schedule.

While accompanying one of the FRs on a walkthrough, the EA team observed that the FR uses the camera in his DOE-supplied Blackberry to take pictures of any objects or equipment that he observes to be out of place or questionable, such as a pile of combustible materials or a sign that has fallen. On returning to his office, the FR documents his walkthrough in an e-mail to the Plant Systems Operations Supervisor and includes the photos for clarification. In addition, the EA team observed that the FR checked personnel locks used for lockout/tagout to verify that they were locked in position and that the tags were not damaged, and verified that doors that were required to be locked were actually locked. The FR also reviewed the logbook entries in the Low Level Waste Treatment Building to ensure that the operators are documenting their rounds properly in accordance with the Conduct of Operations Procedure, SOP 00-52.

EA also observed interactions between the RS SME and the contractor's Radiological Controls organization, as well as interactions between the FRs and various contractor operations, work groups, and safety organizations (such as Radioactive Waste Operations and D&D Operations), and RCTs. The EA team also observed internal DOE staff meetings and telephone calls in which the field element line management (DOE-WVDP management) was informed of the status of ongoing site work and related DOE oversight activities. Based on these observations and the document reviews and interviews discussed above, the DOE-WVDP staff is capable of performing oversight of the contractor and evaluating contractor performance, particularly in the area of radiological protection.

Lessons-Learned Program

EA reviewed procedure QP-235-01, Rev 5, *DOE-WVDP Corporate Operating Experience Program*, for conducting the lessons-learned program and methods for documenting and tracking lessons learned at WVDP. The DOE-WVDP lessons-learned coordinator is diligent in collecting and disseminating lessons learned to a wide audience, including multiple work groups on site.

The EA reviewers observed that lessons learned are obtained from various sources, including enterprise-wide lessons received from the DOE Office of Analysis; corporate lessons from CH2M Hill and B&W; and lessons provided by other DOE sites, or government agencies, such as the National Aeronautical and Space Administration. These lessons are screened for relevance to WVDP.

The DOE-WVDP lessons-learned coordinator frequently shares lessons verbally during morning phone calls and at the beginning of various safety or quality assurance meetings, thereby communicating the lessons to the work groups and eliminating the potential for the message to be overlooked, as often is the case for mass e-mail correspondence. According to the lessons-learned coordinator, on one occasion a lesson-learned incident was included in a pre-job briefing as a precaution against the urge to "get one more job done, while we're working here," when the added scope is not covered in the work package and may involve hazards not previously identified or mitigated.

The lessons-learned coordinator performs routine surveillance of the contractor's lessons-learned program and reviews/summarizes the program's effectiveness during final contract closeout. Recent surveillances include:

- In September 2011, in conjunction with an audit of the integrated safety management system, DOE-WVDP conducted a surveillance of the lessons-learned/operating experience program established and implemented by West Valley Environmental Services, LLC (the previous site contractor). The results are documented in S11-036 E, *Lessons Learned/Operating Experience Program*, and were provided informally to CHBWV for information.

- In March 2014, a triennial surveillance of the CHBWV lessons/learned/operating experience program was performed. The surveillance, documented in S14-002E, *Lessons Learned/ Operating Experience (Triennial)*, did not identify any concerns or findings but did include two comments. The comments were of a nature that did not require a response.

6.0 CONCLUSIONS

The WVDP radiation protection program is staffed by qualified, experienced personnel, and includes an appropriate RPP document hierarchy consisting of a Radiological Controls Manual, implementing procedures, and technical basis documents. Radiological control supervisors and qualified RCTs are effectively deployed to line management to help implement radiation protection requirements. Overall, the WVDP radiological controls program demonstrates a high level of maturity and rigor in implementation of RPP requirements and objectives.

While overall performance was effective, EA identified some concerns that warrant additional management attention and review. These include weaknesses in some aspects of radiological work planning, including work scope definition, proper linkage of RWPs to technical work documents, and proper design and implementation of ALARA review trigger thresholds. In addition, CHBWV has not ensured the clarity and accuracy of all information in the WVDP technical basis document for internal dosimetry and has neither implemented plutonium bioassay requirements as required nor otherwise

properly documented deviations. Lastly, there are some weaknesses in ensuring the conduct of representative breathing zone air sampling during work where respiratory protection is required. These weaknesses could affect the accuracy of DAC-hour tracking, which is one of the mechanisms being used to compensate for a technology shortfall in achieving desired detection sensitivities associated with confirmatory bioassays for transuranic materials. In response to the concern related to plutonium bioassays identified by EA, the site committed to two initial action items to further evaluate this issue and establish the appropriate corrective actions.

DOE-WVDP has developed and implemented an effective program for assessing the contractor's RPP. The DOE SME and the two qualified FRs demonstrated significant expertise in radiological safety and actively ensure that the contractor keeps radiation doses to workers within the annual radiation dose allotment. However, assessments of the RPP have not evaluated the adequacy or accuracy of the technical basis documentation in some areas, i.e., internal dosimetry.

Based on the DOE-WVDP staff's in-depth facility knowledge and their routine involvement in planning, reviewing, approving, observing, and assessing work performed by the contractor, the DOE-WVDP staff is sufficiently knowledgeable of the contractor programs and activities to make informed decisions about the hazards and risks, efficiently evaluate contractor performance, and provide direction to the contractor as required by DOE Order 226.1B. For the areas reviewed by EA, DOE-WVDP has developed and implemented an effective program for assessing the contractor's RPP.

7.0 FINDINGS

Findings indicate significant deficiencies or safety issues that warrant a high level of management attention. If left uncorrected, such findings could adversely affect the DOE mission, the environment, the safety or health of workers or the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy.

Finding 1: WVDP has neither ensured that routine confirmatory urine bioassay for plutonium is implemented on a monthly frequency as described the WVDP internal dosimetry technical basis document nor prepared written justification for deviations, and has not ensured that the stated monthly monitoring frequency is adequate to demonstrate compliance with the total effective whole body dose limit of 5 rem, as required by 10 CFR 835.

8.0 OPPORTUNITIES FOR IMPROVEMENT

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

OFI-1: Establish better linkage between the WVDP radiological control document hierarchy and the formally documented RPP. Specifically, consider revising the existing RPP to include a graphical and/or narrative depiction of the relationship between the RPP and the WVDP radiological document hierarchy. In the depiction, include a statement that revisions to subordinate implementing mechanisms need not constitute a revision to the RPP requiring DOE approval. (NOTE: This OFI applies both to CHBWV RPP managers and to DOE management reviewers/approvers.)

OFI-2: Improve work planning to ensure proper sequencing and work design so as to maintain doses ALARA and limit the necessity for midcourse corrections to address workability issues

during pre-job briefings and/or the work itself. Specific actions to consider include:

- Use a graded approach for conducting workability walkdowns (with the actual work crew), closer to the conduct of the work, prior to final work package issuance.
- Increase the amount and type of worker input being solicited during work planning to ensure that work can be accomplished as planned and to solicit suggestions for optimization and proper workability.
- Augment existing work planning positions with a radiological point of contact responsible for supporting the radiological control supervisors. Use this position to provide line oversight and assistance in radiological work planning and be responsible for review and approval of all RWPs and ALARA reviews, with a focus on proper implementation of radiological work planning requirements with consistent definition of radiological controls.

OFI-3: Increase emphasis on improving radiological work planning in the areas of RWP work scope definition, linkage of RWPs to applicable technical work documents, and proper design and implementation of ALARA review trigger thresholds. Specific actions to consider include:

- Identify and subdivide broad-scope RWPs into one or more task-based RWPs that are tailored to the specific work being performed and provide accurate information on expected hazards and specific controls. Avoid conditional or open-ended statements that leave controls to the discretion of the RCT at the time of the work.
- Revise procedures to prohibit language in RWPs that refers a worker to the discretion of radiological control personnel for authorized activities or radiological controls.
- Provide specific linkage to all applicable technical work documents authorized for use under an RWP, or create RWP files that link to all technical work documents authorized under a particular RWP. The RWP technical work document field can reference the RWP file that workers can access to verify that the RWP is appropriate for the task to be performed.
- Ensure that ALARA review thresholds associated with potential airborne activity and high contamination levels are utilized for all work that meets the thresholds defined by the Radiological Controls Manual. Consider using this mechanism to formally document evaluations of the need for enhanced in-vitro bioassay monitoring following entries into airborne radioactivity areas.
- Consider upgrading the current software to a commercially available electronic RWP package to integrate ED issuance and tracking of associated thresholds. These packages also typically allow for subdivision of RWP tasks.

OFI-4: Evaluate and revise in-vitro bioassay program requirements and implement changes as necessary. Specific actions to consider include:

- Review and revise the WVDP internal dosimetry technical basis document to ensure the accuracy of information and the required monitoring frequencies for plutonium to achieve the required regulatory detection sensitivity below the annual dose limit.
- Ensure that the technical basis document addresses the specific criteria under which allowance can be made for annual plutonium bioassay, based on other isotopic markers, including documentation requirements.
- Consider using the ALARA review of the work instruction process as a mechanism for formally documenting evaluations of the need (or lack of need) for enhanced in-vitro bioassay monitoring following entries into airborne radioactivity areas.
- Based on the above actions, implement any required changes to the in-vitro bioassay program.

OFI-5: Continue efforts toward improving contamination control practices. Specific actions to consider include:

- Provide additional training and/or use of additional worker job aids to assist workers in their contamination control techniques and practices. Revise procedures and RWPs where appropriate to include additional contamination control guidance.
- Review and revise existing RWPs as appropriate to cover requisite PPE for reach-across CA waste support or other potentially waste-intrusive activities (i.e., waste consolidation or overpacking).

OFI-6: Increase emphasis on ensuring representative breathing zone air sampling during work where respiratory protection is used for radiological hazards. Specific actions to consider include:

- Conduct an extent-of-condition review to identify those RWPs and ALARA reviews that do not provide a sufficient level of air sampling.
- Review existing air sampling procedures and applicable RWP form subsections and consider revising as necessary to eliminate conflicting instructions on accomplishment/use of breathing zone air sampling by means of appropriate placement of retrospective air samplers and/or lapel air sampling.
- Consider revising the procedural guidance and RWP form subsections to define management expectations for the content, detail, and documentation of an air sampling protocol when respiratory protection is prescribed (i.e., whether only a subset of workers are to be issued lapel samplers, or whether stationary retrospective samplers are used, and the basis for such issuance).

OFI-DOE-1: Supplement current DOE oversight reviews and assessments with targeted reviews of current CHBWV technical basis documentation to ensure accuracy of information and that current practices are consistent with commitments and defined technical approaches.

9.0 ITEMS FOR FOLLOW-UP

EA will follow up on actions and satisfactory closure of the findings identified in this report.

APPENDIX A
Supplemental Information

Review Dates

May 19-22, and June 9-13, 2014

Office of Enterprise Assessments (EA) Management

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

Quality Review Board

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

EA Site Lead for West Valley Demonstration Project

Rosemary Reeves

EA Team Members

Rosemary Reeves
Mario Vigliani
Joseph Lischinsky

APPENDIX B
Key Documents Reviewed, Interviews, and Observations

Documents Reviewed

- 141-DLVR-120111 CH2MHILL B&W WEST VALLEY, LLC, Documented Radiation Protection Program and Implementation for Title 10, Code of Federal Regulations, Part 835, as amended May 2011, and approved by DOE on December 1, 2011
- 142-DLVR-080612 Updated Radiation Safety Program, as approved by DOE on August 8, 2012
- 142-DLVR-081213 Updated Radiation Safety Program, as approved by DOE on August 13, 2013
- RC-ADM-1, Rev 15, Preparation, Review, Approval and Compliance with Radiological Controls Department Procedures
- RC-ADM-16, Rev 10, Radiological Controls Organization Review, Routing, and Approval Procedure
- RC-ADM-29, Rev 8, Selection, Use and Control of Shielding
- RC-ADM-6, Rev 24, Radiological Work Permits
- RC-ADM-9, Rev 22, Radiological Controls Department Self-Assessment Program
- RC-ALAR-7, Rev 7, ALARA Review of Work Instructions
- RC-DOS-11, Rev 11, Assigning Permanent Dosimetry Badges
- RC-DOS-12, Rev 11, Routine Exchange of Permanent Dosimetry Badges
- RC-DOS-14, Rev 10, Radiological Work Restrictions
- RC-DOS-21, Rev 14, Issuing and Processing Self-Reading Dosimeters
- RC-DOS-22, Rev 8, Handling and Storage of Dosimeters
- RC-DOS-41, Rev 10, Use of Special Dosimeters
- RC-DOS-53, Rev 5, Assessment of Radionuclide Intake and Internal Radiation Dose
- RC-DOS-57, Rev 0, Indirect Bioassay Data Validation
- RC-DOS-6, Rev 15, Direct Bioassay Monitoring
- RC-DOS-7, Rev 19, Personnel Monitoring by Indirect Bioassay
- RC-EMRG-01, Rev 7, Personnel Decontamination
- RC-EMRG-02, Rev 6, Radiological Controls Response to Emergency/Abnormal Radiological Conditions
- RC-EMRG-03, Rev 7, Radiological Coverage for Contaminated and/or Injured Personnel
- RC-RPL-12, Rev 2, Routine Air Sample Counting Using the Air Quality - Air Sample Management System
- RC-RPL-4, Rev 3, Preparation of Samples for Gamma Spectroscopy
- RC-RPL-7, Rev 5, Non-Routine Air Sample Analysis
- RC-RPO-104, Rev 8, Performing Radiation and Contamination Surveys
- RC-RPO-109, Rev 1, Unconditional and Conditional Release Surveys
- RC-RPO-110, Rev 0, Usage Guides for Fixatives and Decontamination Agents
- RC-RPO-201, Rev 9, Operation of Dose Rate Survey Meters
- RC-RPO-202, Rev 7, Operation of Count Rate Meters (Friskers)
- RC-RPO-203, Rev 7, Field Operation of Scalers
- RC-RPO-205, Rev 2, Operation of the Canberra ICAM Alpha/Beta Continuous Air Monitor
- RC-RPO-301, Rev 11, Air Sampling and Monitoring
- Work Instruction Package (WIP) W1401826, Remove tools, equipment. From Sample Storage Cell
- Work Instruction Package (WIP) W1401321, Obtain smearable survey data in Sample Storage Cell
- Work Instruction Package (WIP) W1401833, Replace HEV Inlet Damper Actuator for both the North and South Filter Trains
- Work Instruction Package (WIP) W1401839, Investigate and Stabilize EDR East Shield Wall

- Work Instruction Package (WIP) W1402255, Remove Concrete from the East EDR Shield Wall
- Minor Work Request W1402731, Install Safety Latch Kits on EDR Crane (15V-21) Hooks
- WVDP-010, Rev 36, WVDP Radiological Controls Manual
- WVDP-070, Rev 25, WVDP Internal Dosimetry Program Manual and Technical Basis Document
- WVDP-071, Rev 16, WVDP External Dosimetry Program Manual and Technical Basis Document
- WVDP-216, Rev 14, WVDP Workplace Radiological Air Sampling and Monitoring Program and Technical Basis Document
- WVDP-227, Rev 26, WVDP Facility Identification and Categorization Matrix
- WVDP-234, Rev 6, WVDP Workplace Radiological Surface Measurements Program and Technical Basis Document
- WVDP-290, Rev 10, WVDP Radiological Controls Training Program Manual
- WVDP-390, Rev 9, VDP Internal Dosimetry Program Quality Assurance Plan
- WVDP-401, Rev 6, WVDP External Dosimetry Program Quality Assurance Plan
- WVDP-477, Rev 7, CH2MHILL- B&W West Valley, LLC Documented Radiation Protection Program and Implementation Plan for Title 10, Code Of Federal Regulations, Part 835, As Amended May 2011
- WVDP-485, Rev 11, Work Control
- WVDP Radiological Work Permit# 2014-3016.3, Remove Raschig Rings from 13D7 and 13D8
- WVDP Radiological Work Permit# 2014-3016.3, Various Supporting Radiation and Contamination Survey Reports and Air Sample Analysis Logs
- WVDP Radiological Work Permit# 2014-3030, Support Survey and Removal of Equipment From SSC Hatch and Associated Activities
- WVDP Radiological Work Permit# 2014-3005.1, Core Boring for LWC and Associated Activities
- WVDP Radiological Work Permit# 2014-3032, Support Loading Out Parcels and Containers From SSC Tent and Associated Activities
- WVDP Radiological Work Permit# 2014-3020, Support Work Activities in ADA and associated Activities (and various supporting radiation and contamination survey reports and air sample analysis logs)
- WVDP Radiological Work Permit# 2014-3030.1, Support Survey and Removal of Equipment From SSC Hatch and Associated Activities
- WVDP Radiological Work Permit# 2014-4004, Replace HEV Inlet Damper Actuator for both the North and South Filter Trains and Associated Activities
- WVDP Radiological Work Permit# 2014-1003, Work in Contamination/High Contamination Area Supporting HLWIS and Associated Activities
- ALARA Review 2014-4004, Replace HEV Inlet Damper Actuator for both the North and South Filter Trains
- DOE-WVDP-003, Rev 7, DOE-WVDP Facility Representative Program Description
- DOE-WVDP-010, Rev 3, DOE-WVDP Assurance Oversight Program Description
- DOE-WVDP FY 2014 Program Oversight Schedule
- QP-111-01, Rev 9, DOE-WVDP Mission and Function Statement
- QP-235-01, Rev 5, DOE-WVDP Corporate Operating Experience Program
- QP-364-01, Rev 0, DOE-WVDP Implementation of the Technical Qualifications Program
- QP-414-02, Rev 10, Management and Independent Assessments and Corrective Action Disposition
- QP-414-03, Rev 3, DOE-WVDP Stop Work Orders
- PD-364-01, Rev 0, DOE-WVDP Technical Qualification Program Description
- S12-014E Surveillance Report on CHBWV Radiological Worker Level 1 and 2 Program
- Letter from Christopher J. Eckert, US DOE-WVDP to Mr. Daniel W. Coyne, CHBWV dated October 11, 2013, “U.S. Nuclear Regulatory Commission (NRC) Monitoring Visit Report Number 05000201/201300 1”

- Letter from D. J. Allred, CHBWV to Bryan C. Bower, USDOE-WVDP dated April 25, 2012 "CONTRACT NO. DE-EM000I 529, Response to U.S. Department of Energy (DOE) West Valley Demonstration Project (DOE-WVDP) Surveillance S12-022E, Nuclear Facility Safety - Fire Protection"
- Email from B. Bower to J. Prowse dated May 28, 2014, Subject: FR Staffing Coverage (with part of Annual Workforce Analysis and Staffing Plan attached)
- Selected DOE-WVDP staff Training and Qualification Records

Interviews

- CHBWV Radiological Controls Manager
- CHBWV Radiological Controls Engineer
- CHBWV Radiological Controls Supervisor
- CHBWV Radiological Controls Technicians
- CHBWV Dosimetry Manager
- CHBWV I&C Technician
- CHBWV D&D Supervisor
- CHBWV D&D Operators
- CHBWV Waste Operations Supervisor
- CHBWV Waste Operations Operators
- DOE-WVDP Director
- DOE-WVDP Team Leader, Safety and Site Programs Team
- DOE-WVDP SME, Radiation Safety
- DOE-WVDP Facility Representatives
- DOE-WVDP Lessons Learned Coordinator
- DOE-WVDP Records Coordinator

Observations

- Walkdowns of numerous site facilities, including the Main Process Plant Building, Lag Storage Areas for radioactive waste, the Remote Handled Waste Facility, the Low Level Waste Treatment Building, and the High Level Waste Canister Storage Pad.
- Daily plan-of-the-day meetings
- Pre-job briefings for HEV Damper Actuator Repair, and EDR Wall Inspection and Concrete Removal.
- Work team entries into the HEV Filter Room for Repair of HEV Damper Actuator, the EDR for Visual Inspection of Wall Crack and Removal of Concrete (via video), and the Analytical Decontamination Aisle.