

Independent Oversight Follow-Up Review of Activity Level Implementation of Radiation Controls and Radiological Work Planning at the Materials and Fuels Complex of the Idaho Site



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**Office of Safety and Emergency Management Evaluations
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Acronyms

ALARA	As Low As Reasonably Achievable
AMWTP	Advanced Mixed Waste Treatment Project
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
CFR	Code of Federal Regulations
CWI	CH2M-WG Idaho, LLC
DOE	U.S. Department of Energy
DOE-ID	DOE Idaho Operations Office
EFF	Experimental Fuels Facility
EM	Office of Environmental Management
FASB	Fuels and Applied Science Building
FIDC	Facility Internal Dosimetry Coordinator
FMF	Fuel Manufacturing Facility
HCA	High Contamination Area
HFEF	Hot Fuel Examination Facility
HPT	Health Physics Technician
HSS	Office of Health, Safety and Security
ICAMS	Issues and Corrective Actions Management System
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MFC	Materials and Fuels Complex
NE	Office of Nuclear Energy
OFI	Opportunity for Improvement
OI	Operating Instruction
PPE	Personal Protective Equipment
RadCon	Radiological Control
RBA	Radiological Buffer Area
RPP	Radiation Protection Program
RWMC	Radioactive Waste Management Complex
RWP	Radiological Work Permit
SME	Subject Matter Expert
TBD	Technical Basis Document
TRU	Transuranic
TWD	Technical Work Document
ZPPR	Zero Power Physics Reactor

Independent Oversight Follow-Up Review of Activity Level Implementation of Radiation Controls and Radiological Work Planning at the Materials and Fuels Complex of the Idaho Site

1.0 PURPOSE

This report documents an independent review of radiation protection program (RPP) implementation at the Idaho Site conducted by the U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight) within the Office of Health, Safety and Security (HSS). The review was performed by the HSS Office of Safety and Emergency Management Evaluations to follow up on the ongoing program of targeted assessments of RPP implementation across the DOE complex at sites that have hazard category 1, 2, and 3 nuclear facilities. The purpose of the Independent Oversight targeted review effort was to evaluate the flowdown of occupational radiation protection requirements, as expressed in facility RPPs, to work planning, control, and execution processes. The purpose of this follow-up review was to revisit observations made during the September 2012 Independent Oversight targeted review at the Idaho Site, which specifically pertained to RPP implementation at the Materials and Fuels Complex (MFC).

Independent Oversight performed this review at the Idaho Site from September 9 to 20, 2013. This report discusses the scope, background, results, conclusions, and opportunities for improvement (OFIs) resulting from this review, as well as items identified for further follow-up by HSS.

2.0 SCOPE

The Idaho Site comprises the Idaho National Laboratory (INL), the Idaho Cleanup Project (ICP), and the Advanced Mixed Waste Treatment Project (AMWTP). The DOE Idaho Operations Office (DOE-ID) provides direction and oversight for the design and operation of the Idaho Site nuclear facilities for the DOE Headquarters' Offices of Nuclear Energy (NE) and Environmental Management (EM); NE is responsible for INL facilities, and EM is responsible for ICP and AMWTP facilities. Within DOE-ID, the two line management organizations exercise responsibility for oversight of these nuclear facilities and their activities. The Deputy Manager for Operations Support is ultimately responsible for contractor oversight of the NE facilities, and under the Deputy Manager for ICP, oversight of the EM facilities is the responsibility of the Assistant Manager for Nuclear Safety and Performance.

The primary contractors responsible for the management and operation of the INL and ICP facilities are Battelle Energy Alliance, LLC (BEA) and CH2M-WG Idaho, LLC (CWI), respectively. Most of the Idaho Site nuclear facilities, which are categorized as hazard category 1, 2, or 3, pursuant to DOE-STD 1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, are located at the Advanced Test Reactor (ATR) Complex, the MFC, the Idaho Nuclear Technology and Engineering Center (INTEC), and the Radioactive Waste Management Complex (RWMC). BEA operates the ATR Complex and MFC, while CWI operates the ICP facilities (e.g., INTEC and RWMC) except for those that are part of the AMWTP. AMWTP is operated by a separate contractor, Idaho Treatment Group, LLC (ITG).

For this review, Independent Oversight reviewed changes made to the documented BEA process for planning radiological work and establishing radiological hazard controls as implemented at MFC, and then observed work activities to verify the effectiveness of these changes. Independent Oversight observed work activities at MFC and conducted interviews of selected key personnel responsible for this subject area. The execution of this scope was guided by HSS Criteria, Review, and Approach Document (CRAD) 45-35, Rev. 1, *Occupational Radiation Protection Program Inspection Criteria, Approach, and Lines of Inquiry*.

3.0 BACKGROUND

Title 10 Code of Federal Regulations (CFR) Part 835, *Occupational Radiation Protection*, contains the requirements for developing, implementing, and maintaining an RPP. Title 10 CFR 835.101(a), *Radiation protection programs*, states that “A DOE activity shall be conducted in compliance with a documented radiation protection program (RPP) as approved by the DOE.” This HSS targeted review area is intended to assess the contractors’ compliance with 10 CFR 835 by observing the conduct of work activities involving radiological hazards.

In January 2011, BEA, the primary contractor responsible for the management and operation of INL, instituted a voluntary suspension of work requiring radiation controls (often referred to as “rad work”), beginning with the MFC. This action followed a history of poor performance with regard to radiological hazard controls, dating back many years. Between 2009 and early 2011, DOE-ID and BEA both identified that changes in, and management of, the INL RPP were ineffective. BEA therefore suspended radiological work to reassess the condition of the program, identify the major shortcomings, and develop a plan for corrective action. During the 2011 cessation of radiological work at INL, BEA identified weaknesses in key management positions and conducted independent reviews of its RPP, the radiological work planning process, and the overall work control process. Those reviews revealed additional weaknesses in access control for high radiation areas, instrumentation, and the radiological worker training and qualification program, as well as other functional areas. BEA made personnel changes at INL and began to develop a formal “Radiological Controls Road to Excellence Plan” for its occupational radiological protection program, with the intention of addressing all of the identified programmatic deficiencies. Among other activities, this plan initiated efforts to address human resource issues, update and upgrade training and procedures, upgrade the INL bioassay program, and more clearly define the roles and responsibilities of key radiation control personnel (e.g., radiation control supervisor, radiological engineer). Independent Oversight performed an independent assessment from July 25 through 28, 2011, to assess the state of the INL RPP and to evaluate the effectiveness of the then-recent enhancements. That assessment noted the ongoing improvement efforts but highlighted a need for improvement in many additional areas of radiation protection and work control, specifically procedures and process execution. These results were documented in an HSS Independent Review Report issued in August 2011.

On November 8, 2011, the Zero Power Physics Reactor (ZPPR) facility, located within the MFC, experienced an accidental loss of control of radioactive transuranic (TRU) material that resulted in personnel and equipment contamination. An Accident Investigation Board found continued significant deficiencies in radiation control, work planning, and RPP implementation at INL. The Accident Investigation Board’s report was issued in January 2012. As the result of the ZPPR accident and the many previous events, BEA ceased all radiological work with transuranics at INL and, under the oversight of DOE-ID, began to re-evaluate its approach to improving radiological work practices. To address the conclusions and judgments of need expressed in the ZPPR Accident Investigation Board report, a corrective action plan was developed by BEA and approved by DOE-ID. The planned improvements were documented by BEA in its project execution plan PLN-4145, *Radiological Controls Road to Excellence*, which intends to outline the use of an Integrated Safety Management System approach to “realign” the INL RadCon Program.

From September 4 to 7, 2012, Independent Oversight performed a targeted review of RPP implementation at the Idaho Site. This 2012 Independent Oversight review was performed concurrent with an effectiveness review by DOE-ID, which was intended to evaluate the value of work planning and control and radiological protection changes made by BEA at MFC. The report documenting the Independent Oversight review, *Independent Oversight Review of Radiation Protection Program Implementation at the*

Idaho Site, dated November 2012, identified weaknesses at MFC. This report documents the Independent Oversight follow-up on the review conducted in 2012.

4.0 RESULTS

As noted, the HSS Independent Oversight review was performed in conjunction with a scheduled DOE-ID work planning and control and conduct of operations assessment from September 9-20, 2013. The DOE-ID review was performed to evaluate the effectiveness of BEA's continuing performance initiatives to improve Work Planning and Control and Conduct of Operations (ConOps) at MFC, with special emphasis on Radiation Protection Program performance and Contractor Assurance. The objectives of the Independent Oversight review were as follows:

1. Determine the extent to which BEA has implemented improvements to their radiological work programs, planning, and execution since the aforementioned Independent Oversight review conducted in 2012.
2. Observe additional radiological work at MFC to further evaluate the effectiveness of radiation control implementation.

4.1 Improvement Actions

The 2012 Independent Oversight report identified weaknesses related to BEA operations at MFC in three areas:

- Improving RPP compliance matrices to provide a more complete linkage to specific implementing mechanisms and technical basis documents (TBDs).
- Improving the implementation of the radiological work permit (RWP) and as low as reasonably achievable (ALARA) Review processes.
- Formalizing bioassay program implementation and administration.

Based on review of evidence and interviews with BEA radiological staff, Independent Oversight determined that BEA appropriately evaluated the potential weaknesses identified in the November 2012 report and expended appropriate effort to address them. As of September 2013, actions related meant to address the first weakness had been closed, and actions related to the other two remained open, with completion dates in January 2014. The still-open items are time consuming because they involve a process of systematic evaluation and proposed changes to the site-wide RWP, ALARA Review, air monitoring, and bioassay programs that govern work not only at MFC, but at all BEA-managed facilities.

Linkage of Compliance Matrices

BEA Radiological Control (RadCon) senior management determined that the most appropriate and cost effective method to improve the linkage of compliance matrices was to use the existing BEA Requirements Management System to establish clear linkage of 10 CFR 835 requirements to specific implementing procedures and TBDs. The purpose of the Requirements Management System is to communicate applicable source requirements (laws, regulations, contract directives, standards, policy) to affected management systems, facilitate requirements reviews, and maintain requirements traceability for implementing functions and/or mechanisms. RadCon management conducted a gap analysis to identify where INL compliance matrices lacked linkage to specific implementing procedures and TBDs. A new compliance matrix specifically linking each 10 CFR 835 requirement to specific implementing procedures and TBDs was then developed using Form 482.02, *Requirements Analysis Worksheet*, required by LWP-1610, *Requirements Management*. The matrix and worksheet were submitted to BEA Requirements Management for inclusion in the INL Requirements Management Database, which is available on the

BEA intranet. While not specifically linked to the RPP compliance commitments matrix, the establishment of a linked compliance matrix through use of the Requirements Management System accomplished the intended objective.

Implementation of RWP and ALARA Processes

Improving the implementation of the RWP and ALARA Review processes was assigned to an action item entitled “*Apply LEAN techniques to evaluate RWP and ALARA processes.*” Based on the results of the LEAN evaluation, improvement action implementation plan PLN-4568, *Radiological Control Implementation Plan for the Radiological Control LEAN Process*, was developed to define planned changes. PLN-4568 includes benchmarking with other sites and major revisions and module additions to the automated Sentinel RWP development system. The software vendor expects to complete these changes by January 2014.

As part of this corrective action, BEA took interim measures that included adding more specific implementation guidance to the RWP and ALARA program and implementation procedures, LWP-15021 and LWP-15009, respectively. In addition, the Senior RadCon Manager issued a letter, dated December 5, 2012, to address expectations for writing specifically focused RWPs and limiting the use of broadly scoped RWPs. A copy of the letter and the expectations for 2013 were posted on the RadCon home page.

In late 2012, the RadCon organization also created new “RWP Writer” positions to aid in ensuring the clarity, consistency, and specificity of RWPs. Staff in these positions are specifically trained to ensure procedure compliance and strengthen the consistency of RWPs across INL. Once Sentinel RWP software revisions have been completed, LWP-15009 will be revised to require the radiological engineer to input ALARA Review requirements directly into the Sentinel RWP software. Similarly, the RWP, ALARA Review, and related documentation will reside in a single document package, rather than in the multiple documents that currently exist.

Formality of Bioassay Program

Four main areas for improvement were identified: improving the bioassay program technical basis; formalizing procedures for selection, enrollment, and verification of bioassay participants; linking job-specific bioassay requirements to RWPs; and training radiological engineers on properly addressing bioassay within ALARA Reviews. Some planned actions cannot be completed until the Sentinel RWP software revisions are completed in January 2014.

The technical basis has been improved through revision of institutional procedures and TBDs. No formal root cause analysis has been completed, but input from internal dosimetry personnel and radiological engineers pointed to a number of areas of concern. For example, it was determined that in MCP-2246, *Determining Bioassay Sampling Requirements*, the roles and responsibilities of programmatic personnel and field RadCon individuals were not clear. Multiple management and personnel changes in the RadCon programs and RadCon field organizations between 2007 and 2012 resulted in a loss of knowledge of ownership for oversight and implementation of the program. Also, radiological engineer (programmatic and field) priorities were directed to other areas of the RadCon program, and few resources were left to ensure proper implementation of the Radiological Engineering program.

Based on these identified concerns, BEA has hired additional radiological engineers and technical support personnel to facilitate effective implementation. For example, facility internal dosimetry coordinators (FIDCs) have been established at each area to ensure timely implementation of the program. The Internal Dosimetry Technical Lead has had ancillary responsibilities reassigned to allow more focused attention on internal dosimetry and work closely with the FIDCs on program documentation.

MCP-2246 has been updated and includes enhanced instructions and firm requirements for the selection and enrollment of individuals in the bioassay program. It also defines the frequency for reviewing the enrollment lists, requires the involvement of both RadCon and Operations management in review and approval of the lists, and specifies enforcement actions via worker follow-up notifications and lockout from Sentinel if requests are not fulfilled in a timely manner. Additionally, ALARA Reviews now require a facility-specific radiobioassay TBD or documentation.

The process of formalizing procedures for selection, enrollment, and verification of bioassay participants is ongoing, but a number of improvements have been made in identifying personnel and program assignments and tracking and verifying sample requests and submissions at MFC, including establishment of a master schedule and spreadsheet database to determine sampling requirements and personnel to be sampled. During this follow-up review, selective sampling of bioassay participation, for work that required it, identified that one individual (out of nine) who required confirmatory bioassay was not selected for participation in 2013, despite being in respiratory protection during this review. This discrepancy was attributed to a change in his craft/organizational code, and is being corrected. In contrast, during the 2012 review, a large percentage of workers who should have been sampled were not included in the program.

The linkage of job-specific bioassay requirements to RWPs is being addressed in conjunction with the Sentinel RWP software changes scheduled for completion in January 2014. Lastly, radiological engineers have been trained on the changes in MCP-2246, with an emphasis on roles and responsibilities, clarifying the selection process, and verifying/updating the bioassay candidate lists. RadCon managers have also been trained on their responsibilities with respect to the radiobioassay program. The training was provided to radiological engineers, FIDCs, and RadCon managers during the first week of September 2013.

Many efforts have been undertaken, and others are ongoing, to address the weaknesses identified during the 2012 Independent Oversight review. While improvements were noted, some weaknesses in these areas were identified during this follow-up review, as described in Section 4.2. The overall effectiveness of actions taken and still planned to address RWP, ALARA Review, and bioassay concerns cannot be fully ascertained at this time as they have not yet been completed.

4.2 Results from 2013 Work Observations

Independent Oversight observed a sample of ongoing radiological work and work planning activities at MFC during this review. Though representative of ongoing activities, all work observed by Independent Oversight were new work packages, which began during this review. These activities included Hot Fuel Examination Facility (HFEF) hot cell support work, uranium machining and related fabrication at the Experimental Fuels Facility (EFF) and the Fuels and Applied Science Building (FASB), nuclear material handling at ZPPR and the Fuel Manufacturing Facility (FMF), and sample transfer activities at the Analytical Laboratory. Some of the observations were also witnessed by one or more members of the DOE-ID review team.

During this review, Independent Oversight noted that radiation control implementation had improved as compared with the 2012 review. Changes to staffing and improvements in defining of the roles and responsibilities for such functions as RWP and ALARA Review development and bioassay administration appear to be improving quality and effectiveness in these areas. However, as discussed above, corrective actions for these programmatic functions are still under way, and both Independent Oversight and the DOE-ID team identified some additional concerns in these areas. Details are further discussed in the remainder of this section.

Radiological work at MFC was generally being planned and conducted in a very conservative manner. While RWPs are required to be used to control work in radiological areas, they are also often used to control work in non-radiological areas, such as radiological buffer areas (RBAs), where contamination levels do not meet radiological posting requirements, as well as for work activities that have very little potential to create contamination. For example, observed work involving removal of manipulators for leak check surveillances used a specific RWP and technical work documents (TWDs) that required the area to be posted as an RBA, with workers donning lab coats and gloves for the work. Since HFEF hot cell master manipulators are contained in a closed system, they can be removed with little expectation of contamination, and an RWP would not necessarily be required. The use of an RWP was seen as a conservative measure that went beyond the requirements. Conservative health physics technician (HPT) coverage with frequent radiation and contamination surveys was also required throughout the work. Similar examples were observed at other locations at MFC.

While the general approach to radiation control at MFC was conservative, weaknesses were identified in some aspects of contamination control, RWP and ALARA Review administration, and TWDs, as described below.

First, several weaknesses in radiological practices were observed during uranium machining work in the EFF. Specifically, during the work the operator used his hands, with only nitrile gloves, to “sweep up” the sharp uranium turnings from the collection area and collect them in a jar. The skin cutting/ abrasion hazards associated with collecting the sharp machine turnings were not identified in the RWP (MFC-2013-157 Rev 1) or in the work hazards and controls section of the associated work procedure (1664-11-CESB). Neither the RWP nor the procedure required the use of cut-resistant gloves for this activity, although the procedure did indicate a hazard of “general shop activities” with a note to see mitigations in LI-RDSS0004, *General Work Activities within the R&D Manufacturing Services Facilities*, or LST-667, *Performer Controlled Activity List for S&T Work Performed in L&HCS Facilities*. Both of these documents specify the use of cut-resistant gloves when handling objects with sharp edges.

While collecting the turnings, the operator also did not change out his gloves or survey his hands at any time during the activity, including after sweeping the turnings and before moving to the computer station and using the keyboard. Although the computer station is located within the posted contamination area, this is a poor radiological practice with likelihood to spread contamination. The RWP did not provide any specific instructions regarding contamination control or glove change expectations.

Both of these concerns were communicated to the MFC RadCon organization, and the activities were observed again on the following day. No changes had been made to the work control documents to identify or mitigate the cutting hazard, and no radiological survey instrument was available to allow the worker to survey of his hands after the sweeping activity. Procedure 1664-11-CESB was revised the following day to include a requirement for cut-resistant gloves when handling turnings, although it did not specify whether they were to be used over or in place of radiological gloves specified in the RWP.

In a related concern, radiological air sampling was not being performed during uranium machining operations to characterize the potential for airborne uranium. While machining operations are relatively small scale and the RWP limiting conditions are set below high contamination area (HCA) thresholds, there is some potential for measurable airborne radioactivity generation during any machining operation. Procedure 1664-11-CESB refers to the RWP for air monitoring requirements, but the RWP includes no information on air monitoring and no documented evaluations or air characterization data was available to justify the lack of monitoring.

Lastly, related to the machining work, it was determined that changes to TWDs that govern radiological work, such as Procedure 1664-11-CESB, have not always been properly reviewed and approved by the

RadCon organization, as required by Manual 15A. Article 315 of LRD-15001, *Radiological Control Manual*, requires that TWDs used to control radiological work activities be reviewed and approved by the RadCon organization. Under LWP-1201, *Document Management*, document owners are responsible for identifying appropriate reviewers for new or revised TWDs. Procedure 1664-11-CESB, which covers the uranium machining work observed during this review, was revised in July 2013 in response to a fire during machining, but the reviewers did not include a RadCon subject matter expert (SME), and the procedure revision was approved without the required RadCon approval. Similarly, a field change request to revise the procedure hazard table for uranium sharps on September 12, 2013, did not receive the required RadCon SME review and approval. It was noted that LWP-1201 does not address the LRD-15001 requirement for RadCon review of all TWDs governing radiological work

The above concerns about uranium machining were jointly witnessed by Independent Oversight and a DOE-ID MFC Facility Representative. Concerns about the sharps hazard and contamination control were documented in the DOE-ID Pegasus system as ISS-OS-9/25/2013-94957. (See also Section 6, **OFI-1** and **OFI-2**.)

RBAs are prevalent in many locations at MFC. In several cases, personnel did not understand the survey and frisking requirements for exiting RBAs, and the requirements may be inadequate to prevent the possible spread of contamination. For example, a worker in FASB was observed hand-carrying items out of the RBA without performing a radiological survey of the items. The worker stated that the items had been surveyed by an HPT in another part of the building, who told the worker that as long as the items were not set down, they would not need to be surveyed at the RBA exit. HPTs at other MFC facilities provided varying information about the survey requirements, ranging from *all items have to be surveyed at the RBA exit* to *hand carried items do not need to be surveyed as long as they are not set down and the carrier always keeps control of the items*. Additionally, construction workers in EFF and operators in the Analytical Laboratory were observed crawling on the floor within RBAs. When asked what survey was required for these workers to exit the RBA, both the workers and the HPTs indicated that a hand and foot survey was required. However, since the workers could also have contamination on their knees, the hand and foot survey does not appear to be adequate.

The above observation was jointly witnessed by Independent Oversight and a DOE-ID MFC Facility Representative. These concerns were documented in the DOE-ID Pegasus system as ISS-OS-9/25/2013-90628. (See also Section 6, **OFI-1**.)

In the area of RWPs and ALARA Reviews, Independent Oversight recognized improvements in the quality and content in some areas. MFC provided several examples of RWP's and ALARA reviews revisions from the past year that successfully addressed previously identified concerns with inadequate work scope definition and clarity of controls. However, these improvements were not consistently evident for some of the new work observed during this review, such as TRU material handling work at FMF, where work scope for 9977 shipping container unloading was not clearly defined, and the ALARA Review and RWP were too broad to be able to evaluate specific radiological hazards to be encountered. Specific concerns included the following:

ALARA Review FMF-2013-002 Rev. 1

- This ALARA Review lists eleven separate FMF operating instructions (OIs) and two RWPs that collectively cover numerous work activities and a wide array of transuranic bearing containers that can be handled. However the OI listing is misleading and too broad because only a few of the OIs allow for opening of containers and drums, which was the activity of concern associated with development of this ALARA Review.

For the specific 9977 container work observed, neither the ALARA Review nor RWP provided any indication the 9977 unloading and overpack activity would be conducted as a “planned” abnormal operation under Section 7 *Abnormal Operations* of OI FMF-OI-005, *Nuclear Material Handling*, rather than a normal operation covered elsewhere in the OI. Section 7 is not included in the procedure routing table, presumably because it is intended to be encountered only during the course of normal operations. There was no other work planning documentation that discussed this unusual use of this OI, so it is unclear how a radiological engineer responsible for reviewing the OI during development of the ALARA Review would know what the specific work scope and activities were. Furthermore, unlike other sections of the OI, Section 7 does not provide any direction concerning radiological dose rate or contamination surveys. This omission conflicts with the statement in the ALARA Review that routine dose rate, contamination, and airborne surveys are incorporated into the work documents and are sufficient to perform the tasks. While these surveys were discussed at the pre-job brief as something to be performed, they were not specifically required as critical steps or hold points in the OI and were not properly addressed by the ALARA Review.

- Because the ALARA Review was not intended to address a discrete work scope, the evaluation of available radiological information associated with the 9977 container unloading, such as specific source terms, expected radiological conditions, required hold points, and specific air sampling requirements, was not possible. Thus, the ALARA Review was of limited value in developing an RWP that was tailored to the specific work being performed.
- The documented purpose of the ALARA Review conflicted with the technical approach taken in completing the ALARA Review. As documented, there was “concern over the integrity of each layer of containment and management felt that handling of a container that could result in a dropped fuel container could release radioactive material, so the need for a more restrictive approach for this work [was] the purpose of this ALARA Review.” This position is not supported by release calculations, potential contamination, and derived air concentration postulated in the ALARA Review. For example, the ALARA Review provides no technical justification for selecting 2000 dpm alpha as the resuspension source term for airborne activity rather than a release fraction from the individual source terms being handled.

Interviews with MFC RadCon management and engineering indicate that container integrity is not in question and the use of respiratory protection is a defense-in-depth measure taken in part as a corrective action following the ZPPR event. The HCA threshold of 2000 dpm was thus considered appropriate as a limiting condition to be put into the RWP and for airborne calculations. However, this approach assumes that contamination will be a precursor to any airborne event, and, as stated, this assumption is not consistent with the concerns described as the purpose of the ALARA Review.

- The ALARA Review did not provide a basis for the conclusion that container integrity was not of concern. Information on container integrity and the characteristics of the 9977 container and other shipping containers containing TRU materials was available but was not used in work planning.

RWP MFC2013090

- The RWP title is *FMF-Transuranic Material Handling with a single set*. The work scope of this RWP is not clearly defined. Also, the RWP inappropriately assumes that the worker should know what personal protective equipment (PPE) to wear in advance of selecting the RWP; one of the functions of the RWP is to define the PPE requirements for the worker.

- Radiological conditions listed on the RWP were not representative of what was to be expected based on available source term information for the 9977 containers. The values listed were based on the highest levels seen during similar container handling, but during the pre-job brief it was stated that they did not expect to see anything measurable. This was inconsistent with what was shown on the RWP, and is due in part to the broad nature of the work and containers that can be handled under the RWP. In response to assessor questions, calculations were done based on available source term data, and lower but measurable results were ascertained for the 9977 containers. However, task-specific worksheets or similar mechanisms are not being developed to tailor and ensure accuracy of expected radiological conditions for such discreet work scopes conducted under a broad scope RWP.
- The dose rate “evaluation point” value shown in the RWP was lower than the “expected radiological condition” value for dose rate, which defeats the purpose of pausing for evaluation should the “evaluation point” be reached during work. This was corrected when brought to the attention of BEA RadCon management. However, this condition is the result of not doing thorough radiological hazard analysis to determine and document expected radiological conditions which are based on available source term information.

MFC operations and RadCon management took actions to address some of the questions and concerns raised during this review. For example, they delayed the work to discuss appropriate changes and a path forward. In addition, a few changes were made to the ALARA Review and RWP and in the calculations to determine the expected dose rates on individual items in the 9977 container.

Independent Oversight shared these ALARA Review and RWP concerns with the DOE-ID review team, who summarized them in the DOE-ID Pegasus system as ISS-OS-9/25/2013-73729. (See also Section 6, **OFI-3**.)

5.0 CONCLUSIONS

Independent Oversight has determined that BEA appropriately evaluated the potential weaknesses identified by the 2012 Independent Oversight review and expended appropriate effort to address each underlying concern. In addition, for most work activities observed by Independent Oversight at MFC, radiation controls are implemented and appropriately integrated into safety management. Management exhibited an expectation for radiological work to be performed safely, and the workforce understands this expectation. Management also provided the resources and time for planning and safely performing radiological work, and the workforce demonstrated a high level of awareness of radiation controls and care in performing work. Further, systematic radiological work control processes have been established and implemented. Appropriate radiation controls were included in RWPs and work packages for most observed work, and the workforce followed these controls.

However, continued BEA management attention is needed to address contamination control and monitoring practices, radiological work document review and approval, and the conduct of ALARA engineering reviews, to improve the implementation of the RPP and the performance of radiological work at the MFC.

6.0 OPPORTUNITIES FOR IMPROVEMENT

The DOE-ID oversight process identifies issues as concerns, findings, or observations. An observation represents a “situation that is presently in conformance with requirements but has the potential for future problems, deficiencies, failures, or adverse conditions, etc., based upon the assessor’s judgment.” A

finding is a “failure to perform a specified action contrary to specific requirements” and can be based on requirements that “range from laws to contractor facility level procedures that if left unchecked could result in an adverse condition or outcome.” Observations, as described by DOE-ID, closely approximate OFIs, which, according to Independent Oversight protocols, are “suggestions offered by the Independent Oversight appraisal team that may assist line management in identifying options and potential solutions to various issues identified during the conduct of the appraisal.”

The OFIs from this Independent Oversight review are provided to DOE-ID for evaluation and follow-up. The OFIs are not mandatory and should be accepted, rejected, or modified as deemed appropriate by site management, in accordance with DOE-ID procedures and processes, and consistent with site-specific program objectives and priorities.

OFI-1 Increase the rigor of contamination control and monitoring practices for contamination area work and exit from RBAs. Specific actions to consider include:

- Provide more specificity in RWPs or TWDs on the expectations for contamination control measures, such as changing gloves and surveying hands when removing hands from a machining lathe.
- Ensure that adequate technical basis or monitoring data exists when air sampling is not performed during work that may generate airborne radioactivity, such as machining.
- Provide additional training to HPTs to develop a consistent understanding of management expectations for survey of personal items exiting an RBA.
- Revise the RBA exit posted survey instructions to add language that hand, feet, and other potentially contaminated body parts must be surveyed. Alternatively, for work in an RBA that is known to involve the potential for kneeling and crawling, add specific survey requirements and/or PPE to the work package or work instructions.

OFI-2 Establish a method to ensure that RadCon personnel properly review and approve all TWDs used to control radiological work activities, as required by Manual 15A. Specific actions to consider include:

- Review LWP-1201, *Document Management*, to ensure that document owners are made aware of the requirement for RadCon review and approval.
- Review RadCon procedures to ensure that review and approval of TWDs, in a manner similar to that required for RWPs (i.e., authorized reviewers, etc.), is addressed.

OFI-3 Continue existing efforts toward improving RWPs, ALARA Reviews, and bioassay implementation. Evaluate the additional examples identified in this report in relation to existing initiatives to improve implementation of these processes and determine whether any additional measures may be needed.

7.0 FOLLOW-UP ITEMS

None.

Appendix A Supplemental Information

Dates of Review

Onsite Review: September 9-20, 2013

Office of Health, Safety and Security Management

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Independent Oversight Site Lead for the Idaho Site

Aleem E. Boatright

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