Plutonium Finishing Plant
Demolition Resumption Expert Panel
Final Report

Introduction

In January 2018, the Department of Energy Richland Operations Office (DOE-RL) chartered (Attachment 1) the Plutonium Finishing Plant (PFP) Demolition Resumption Expert Panel (Panel) to review and challenge CH2M Plateau Remediation Company's (CHPRC's) proposed approach to fully recover from the recent spreads of contamination and safely complete the demolition of the PFP. The Panel consisted of federal personnel who are subject matter experts in pertinent scientific and technical disciplines and who have specific operational and assessment experience. These individuals have expertise in operational and radiological controls and evaluation experience, environmental remediation, and environmental management. The panel also included ex officio members from organizations outside of the federal government with similar expertise and experience.

Using a collegial and iterative process, the Panel reviewed and provided feedback on CHPRC's causal analysis and corrective actions, demolition options evaluation, and the resulting PFP Work Resumption Plan. The Panel continued their review until the Panel Chair, in consultation with the Panel Members, concluded that CHPRC's proposed approach had been adequately considered and that recommendations from the Panel Members had been adequately incorporated into the proposed approach.

Panel Members

Mr. Todd Lapointe, Panel Chair, DOE, NNSA
Mr. Jason Armstrong, DOE, NNSA
Mr. Steven Feinberg, DOE, Environmental Management Consolidated Business Center
Mr. William Miller, DOE, Environment, Safety and Health Assessments
Mr. Matthew Moury, DOE Environment, Health, Safety and Security
Mr. John Tappert, NRC Nuclear Material Safety and Safeguards
Mr. Steve Yarbro, DOE, LANL
Dr. Kathryn Higley, Oregon State University
Dr. Steve Krahn, Vanderbilt University
Mr. Chip Lagdon, AECOM

Panel Activities

Because of the multiple locations of the panel members the Panel conducted a majority of its business remotely, using information technology. This included teleconferences and webinars with CHPRC and DOE staffs, internal panel teleconferences, and information sharing of reference documents with CHPRC utilizing an established shared file folder.

To execute its charter, the Panel met with CHPRC staff to discuss and review:

- The PFP background information;
- CHPRC's *Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities Root Cause Evaluation Report* (RCER), Draft Rev. 2, dated March 5, 2018;
- CHPRC-03673, *Plutonium Finishing Plant Demolition Option Evaluation Report*, Draft A; and,
- CHPRC-03689, *Plutonium Finishing Plant Work Resumption Plan*, Drafts A and B

The panel deliberated and provided feedback to CHPRC on each of the above documents as part of its iterative review. The feedback was documented and is included in Attachments 2, 3, and 4.

Conclusions

In the review of Draft B of the Plutonium Finishing Plant Work Resumption Plan (Plan), it was evident that feedback provided by the Panel on the *Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities Root Cause Evaluation Report* and the *Plutonium Finishing Plant Demolition Option Evaluation Report* had been considered by CHPRC. While there is still an opportunity to provide additional clarity in the Plan on implementation of the senior supervisory watch, radiological data trending, and the work control process, the Panel is confident that if executed with appropriate rigor of operations, contractor assurance oversight, management controls and communications, along with appropriate federal oversight and engagement, that the remaining demolition can be successful.

While not necessarily an element that needs to be captured within the plan, DOE, and in particular DOE-RL, also needs to consider how they, as the owner/regulator, will provide adequate and effective oversight of the demolition activities. During earlier demolition activities at PFP it was not clearly evident that issues were being identified and communicated up through leadership among the federal staff. Similarly, if these issues were being communicated it is not clear if or how they were considered and dispositioned (internally, or with CHPRC).

June 28, 2018

Todd Lapointe — Date
Chair, PFP Demolition Resumption Expert Panel

Attachments

Attachment 1 Plutonium Finishing Plant Demolition Resumption Expert Panel Charter, Revision 2

Attachment 2 Plutonium Finishing Plant Expert Panel Bios

Attachment 3 Expert Panel Comments on the Root Cause Evaluation Report (RCER), Draft Rev. 2

Attachment 4 Expert Panel Comments on “Plutonium Finishing Plant Demolition Option Evaluation Report”, Draft A

Attachment 5 Expert Panel Comments on “Plutonium Finishing Plant Work Resumption Plan”, Draft B

Attachment 1

Plutonium Finishing Plant Demolition Resumption Expert Panel Charter, Revision 2

Plutonium Finishing Plant (PFP) Demolition Resumption
Expert Panel Charter
Revision 2

BACKGROUND

Under its contract with the Department of Energy's (DOE) Richland Operations Office (RL), the CH2M Hill Plateau Remediation Company (CHPRC) is in the process of demolishing the highly contaminated PFP. The PFP produced approximately 60 percent of the plutonium for the United States and has been in the process of de-inventory, decommissioning and decontamination for the last 20 years. In June 2017 demolition activities resulted in the spread of airborne radioactive contamination outside of established control boundaries, exposure to nearby workers, and a subsequent stop work order by CHPRC and workers. As a result, CHPRC completed a causal analysis and developed several corrective actions to prevent recurrence. In early November 2017 demolition resumed and continued until early December 2017 when there was another spread of airborne radioactive contamination outside of established control boundaries and exposure to nearby workers.

On December 18, 2017, DOE-RL formally communicated to CHPRC that no additional PFP demolition was authorized without DOE's approval. On January 5, 2018, DOE-RL formally reiterated its position that "as previously directed verbally and by letter, no demolition work, rubble/debris load-out or work other than identified stabilization activities, shall be conducted until CHPRC has this situation fully stabilized and has briefed DOE-RL and received concurrence on the path forward." On January 9, 2018, the Washington Department of Ecology (Ecology) and US Environmental Protection Agency (EPA) transmitted a letter to DOE stating that "Ecology and EPA are aware that DOE-RL has stopped work at the PFP (Plutonium Finishing Plant) site at this time. However, given our determination, we hereby invoke Hanford Federal Facility and Consent Order (HFFACO) Article XXXII ("Creation of Danger") and order all work at PFP to stop until Ecology and EPA determine that DOE-RL has taken actions sufficient to allow the remaining work at PFP to continue and informs DOE-RL that work may resume."

CHPRC is conducting a causal analysis of the events and developing a proposed approach for safely completing demolition activities at PFP. Corrective actions from the event and the proposed approach must be approved by DOE prior to resumption of PFP demolition.

OBJECTIVES

Using a collegial and iterative process, the Panel Members will review and challenge CHPRC's proposed approach to fully recovering from the recent spreads of contamination and safely completing the demolition of the PFP. The Panel Members will continue their review until the Panel Chair, in consultation with the Panel Members, concludes that CHPRC's proposed approach has been adequately considered and that recommendations from the Panel Members have been adequately incorporated into the proposed approach.

PANEL MEMBERSHIP

The Demolition Resumption Expert Panel consists of federal personnel who are subject matter experts in pertinent scientific and technical disciplines and who have specific operational and assessment experience. These individuals have expertise in operational and radiological controls and evaluation experience, environmental remediation, and environmental management. The panel also has ex officio members from organizations outside of the federal government with similar expertise and experience. The federal personnel on the Panel come from DOE's Environment, Health and Safety community; the National Nuclear Security Administration (NNSA); the Separations Process Research Unit (SPRU); Los Alamos National Laboratory (LANL); and the Nuclear Regulatory Commission (NRC). The ex officio members come from Oregon State University, Vanderbilt University, and AECOM.

Panel Members:
Mr. Todd Lapointe, Panel Chair, DOE, NNSA
Mr. Jason Armstrong, DOE, NNSA
Mr. Steven Feinberg, DOE, Environmental Management Consolidated Business Center
Mr. William Miller, DOE, Environment, Safety and Health Assessments
Mr. Matthew Moury, DOE Environment, Health, Safety and Security
Mr. John Tappert, NRC Nuclear Material Safety and Safeguards
Mr. Steve Yarbro, DOE, LANL

Ex Officio Members:
Dr. Kathryn Higley, Oregon State University
Dr. Steve Krahn, Vanderbilt University
Mr. Chip Lagdon, AECOM

The Expert Panel will provide its observations and recommendations to CHPRC and DOE-RL. CHPRC will review them and provide its response to the Panel and the Manager of DOE-RL, Doug Shoop.

REVIEW APPROACH

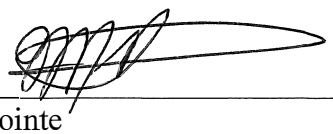
The Panel will be provided with a Panel Administrator who will, at the request of the Panel Chair, formally document recommendations from the Panel and the disposition of these recommendations by CHPRC. The Panel Chair with the assistance of the Administrator will coordinate all logistical and administrative support for the Panel, and make necessary arrangements for the addition of Panel Members from the federal government, Ex Officio Members from other organizations, and technical support as the Panel Chair deems necessary. Webinars and other technologies will be used, to the maximum extent possible, to enable the Panel Members to meet as often as deemed necessary by the Panel Chair, and to consult with individual Ex Officio Members. Arrangements for site tours will be made as deemed necessary by the Panel Chair and coordinated through the Administrator. An initial webinar will be scheduled in late January 2018 to provide the Expert Panel with a comprehensive understanding of PFP activities through December 2017.

The Panel Members should consult with the Ex Officio Members as needed to gain the benefits of their expertise and insight. Panel Members should consult with individual Ex Officio Members as needed and on an individual basis.

Operations of the Panel may be observed by Hanford Labor Leaders, Washington State's Departments of Ecology and Health, and the EPA. The Panel Administrator will coordinate the observations of the Panel by these entities and will facilitate disposition of any questions they may have for the Panel.

DELIVERABLE

The deliverable from the Panel will be the collective opinion(s) coordinated through and presented by the Chair as to whether the contractor's proposed approach appears technically sound and, if effectively implemented, would protect workers, the public and the environment supported by a robust, comprehensive root cause analysis of the recent spread of contamination events in 2017 and 2018 including identified corrective actions. The opinion(s) of the Panel and Panel Members do not constitute authorization for CHPRC to initiate its proposed approach for resuming PFP demolition; this authorization must come from DOE line management.



02/27/2018

Todd N. Lapointe
Chair, PFP Demolition Resumption Expert Panel

Date

Attachment 2

Plutonium Finishing Plant Expert Panel Bios

Plutonium Finishing Plant Demolition Resumption
Expert Panel Membership

Todd Lapointe, Panel Chair

Senior Technical Safety Manager, Office of Safety, Infrastructure and Operations, NNSA

Mr. Todd Lapointe is a s technical safety manager and engineer in the National Nuclear Security Administration (NNSA), within the Department of Energy (DOE) providing nuclear safety leadership, technical review and analysis, program assessment, issues management, and field management support across the NNSA complex.

Previous roles within DOE have included serving as the Chief of Staff for the Department of Energy's Under Secretary for Management and Performance, Director of the DOE's Office of Science Office of Safety and Security Policy, Director of the Office of Environmental Management, Office of Safety Management and a member of the Department's Chief of Nuclear Safety Central Technical Authority Staff serving as the technical expert for operations management. In these positions, Mr. Lapointe was responsible for providing broad operations and policy leadership and managing worker safety and health, emergency management, radiological safety, and other key safety management programs. In addition, Mr. Lapointe has served on numerous 'for cause' and operational readiness, safety and quality assurance reviews including serving as the nuclear safety team lead for the Waste Isolation Pilot Plant Accident Investigation Board assessing the causes and corrective actions related to the February, 2014 underground radiological release accident in Carlsbad, NM.

Prior to joining the Department, Mr. Lapointe provided management and leadership in the commercial research and development software industry and served as an officer aboard submarines in the U.S Pacific Fleet.

Mr. Lapointe holds a B.S. in Marine Engineering from Maine Maritime Academy, is a graduate of the U.S. Navy's Nuclear Propulsion Engineering Program and a Harvard University Kennedy School of Government Fellow in Senior Executive Studies.

Jason Armstrong

Assistant Manager for Nuclear Safety & Engineering, NNSA Production Office (Y-12 & Pantex)

Mr. Jason Armstrong is a mission focused manager and leader with ~20 years' experience in Nuclear Safety, Nuclear Facility Decontamination and Decommissioning (D&D), Nuclear Operations, Health Physics, and Quality. He has extensive experience executing DOE nuclear safety responsibilities, obligations, and activities at DOE's Environmental Management, Science, and the National Nuclear Security Administration (NNSA) locations. He has nuclear reactor and facility D&D, construction, and production experience at the Oak Ridge Reservation, Hanford Site, Brookhaven National Laboratory, Pacific Northwest National Laboratory, Y-12 National Security Complex, and the Pantex Plant. He has a strong background in transuranic waste management, open air nuclear facility demolition, Integrated Safety Management, safety culture, and Project/Program Management.

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Mr. Armstrong has a B.S. in Radiation Health Physics from Oregon State University and A.A. in Communications from Southern Oregon State College. He qualified as a Nuclear Executive Leader, Senior Technical Safety Manager, Facility Representative, and Radiation Protection Specialist. He is a Certified Health Physicist by the American Board of Health Physics.

Steven Feinberg

Federal Project Director, DOE, Separations Process Research Unit

Mr. Feinberg worked for Naval Reactors for seventeen years as a nuclear engineer in various assignments including safety, environmental programs, radioactive material transportation, hot cell operations, and nuclear core and fuel fabrication. In the last ten years with Naval Reactors, he was the Project Officer for nuclear plant overhaul and decommissioning. He assisted in the refueling and overhaul of two nuclear plants, and the green fielding of their Windsor Site reactor and site from the start of the decommissioning process through removal of the reactor and nearly all of the sites buildings.

In late 1999 he started with the DOE Environmental Management Oakland Operations office. He has been the project engineer, and later the certified Federal Project Director at the Separations Process Research Unit (SPRU) since 2005 and had a short break from SPRU project in 2010 to be the Federal Project Director for the DOE EM programs at Brookhaven National Laboratory. He returned in 2011 to help recover the SPRU project from its work pause and continue the decommissioning effort.

Mr. Feinberg holds a Bachelor of Science in Chemical Engineering from the University of Massachusetts Amherst, and a Master's Degree in Business Administration from the Sage Colleges Albany, New York. He is also qualified as a Senior Technical Safety Manager, and a Project Management Professional by the Project Management Institute.

William E. Miller,

Deputy Director, Office of Environment, Safety and Health Assessments, DOE

William E. Miller is the Deputy Director of the Office of Environment, Safety and Health Assessments, within the U.S. Department of Energy's (DOE) Office of Enterprise Assessments (EA). Mr. Miller previously served as Director of EA's Office of Nuclear Safety and Environmental Assessments where he supervised a large group of Site Leads tasked with performing nuclear safety oversight across the DOE complex. He has led and participated in numerous complex-wide safety management evaluations and engineered safety functionality assessments that review nuclear safety systems with respect to design, configuration control, surveillance/testing, maintenance, and operations. He was assigned as a Board Chairman on one Type 'A' Accident Investigation and as a Board Member on two other Type 'A' Accident Investigations, and has participated as a team member or observer on DOE Operational Readiness Reviews at several different facilities. Mr. Miller spent 5 years in nuclear submarine

engineering in the U.S. Navy and worked for 7 years in commercial nuclear power with the New York Power Authority, during which he obtained his Senior Reactor Operator's License from the Nuclear Regulatory Commission.

He holds a degree in mechanical engineering from Cornell University.

Matthew Moury

Associate Under Secretary for Environment, Health, Safety and Security, DOE

Mr. Moury is the Associate Under Secretary for Environment, Health, Safety and Security. The office provides corporate leadership and strategic approaches for protecting DOE's workers, the public, the environment and national security assets. This is accomplished through developing corporate policies and standards; sharing operating experience, lessons learned, and best practices; and providing assistance and supporting services as DOE's environment, health, safety and security advocate.

From June-October, 2017, Mr. Matthew Moury was the Acting Under Secretary for Management and Performance. In this role he is responsible for directing nine program offices with a total budget of $7B in areas including environmental management, human capital, public and worker safety and health, security (including cyber) and capital project management oversight.

Prior to serving as Associate Under Secretary for Environment, Health, Safety and Security, Mr. Moury served as the Deputy Assistant Secretary for Safety, Security, and Quality Programs within the Office of Environmental Management.

Mr. Moury has 30 years of experience in the nuclear field, including almost 20 years at the Defense Nuclear Facility Safety Board (DNFSB). While at the DNFSB, Mr. Moury held numerous senior leadership positions and was the lead on a wide variety of safety-related areas such as: Integrated Safety Management, facility design and construction, DOE directives, facility startup activities, and quality assurance.

Mr. Moury began his career as a nuclear-trained submarine officer and retired at the rank of Captain in the Navy Reserves. He has a Master of Science degree in Reliability Engineering from the University of Maryland; a Master of Business Administration degree from the University of Maryland; and a Bachelor of Science degree in Ocean Engineering from the U.S. Naval Academy.

John Tappert, PE

Director, Division of Decommissioning, Uranium Recovery, and Waste Programs, USNRC

Mr. Tappert joined the U.S. Nuclear Regulatory Commission (NRC) in 1991 as a Reactor Engineer in the Philadelphia Regional Office. He subsequently was the Resident Inspector at the Fitzpatrick Nuclear Power Plant before transferring to the Office of Nuclear Reactor Regulation

(NRR) where he held progressively more responsible positions including supervisory roles in the Operational Experience and Plant Life Extension programs. He played a leadership role in the formation of the Office of New Reactors where he supported licensing and the development of the construction inspection program for the first new nuclear power plant build in the United States in a generation. He subsequently served as NRC Commissioner Ostendorff's Chief of Staff and has been in his current position as the Director of the Division of Decommissioning, Uranium Recovery, and Waste Programs in the Office of Nuclear Material Safety and Safeguards since January of 2016. Prior to joining the NRC, Mr. Tappert served in the U.S. Navy's nuclear power program. He received a Bachelor's degree in Aerospace and Ocean Engineering from Virginia Tech and a Master's degree in Environmental Engineering from Johns Hopkins University. He also holds a Professional Engineer's license.

Dr. Stephen Yarbro

Senior Research Engineer, National Security Education Center, Los Alamos National Lab

Dr. Yarbro has a Ph.D. in Chemical Engineering from New Mexico State University (1996) and is a licensed Professional Engineer in the state of New Mexico. Steve began his career as a process engineer in Tanks Farms and the 234-5Z Plutonium Facility at Hanford. After Hanford, he moved to Los Alamos National Laboratory to the TA-55 Plutonium facility. Steve has led a diverse set of technical projects and organizations. He has been the Group Leader of the Intelligence Analysis Group Leader, Division Leader of Plutonium Manufacturing Technology (PMT) and Nuclear Materials Technology (NMT) Divisions and the Actinide Process Chemistry Group (NMT-2) Leader at TA-55. He has participated in many different projects concerning non-proliferation, foreign weapons assessment, export policy development, operations in Hazard Category II nuclear facilities and the handling, processing and recovery of uranium and plutonium compounds and metal at Los Alamos, Rocky Flats and Hanford. Currently, he is a senior research engineer with the National Security Education Center (NSEC) and a senior advisor to the Seaborg Institute.

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Dr. Kathryn Higley

Professor and Head of the School of Nuclear Science and Engineering, College of Engineering, Oregon State University

Dr. Higley received both her Ph.D. and M.S. in Radiological Health Sciences from Colorado State University, and her B.A. in Chemistry from Reed College. She has held both Reactor Operator and Senior Reactor Operator's licenses, and is a former Reactor Supervisor for the Reed College TRIGA reactor. Dr. Higley started her career as a Radioecologist for Portland General Electric. She later worked for Pacific Northwest National Laboratory for ten years as a Senior Research Scientist in the area of environmental health physics. Dr. Higley has been at Oregon State University since 1994 teaching undergraduate and graduate classes on radioecology, dosimetry, radiation protection, radiochemistry, and radiation biology.

Her fields of interest include environmental transport and fate of radionuclides; radioecology; radiochemistry; radiation dose assessment; neutron activation analysis; nuclear emergency response; and environmental regulations. She is current Vice Chair of Committee 4 of (Implementation of the Commission's Recommendations) of the International Commission on Radiological Protection and past Chair of Committee 5 (Protection of the Environment); she is also a council member of the National Council on Radiation Protection and Measurements and serves on Council Committee 1 (radiation protection recommendations of the NCRP) and Committee 2 (where are the radiation professionals). She is a fellow of the Health Physics Society and a Certified Health Physicist. Dr. Higley and her students have done research in radiologically contaminated environments around the globe.

Dr. Steven L. Krahn, BCEE

Professor of the Practice of Nuclear Environmental Engineering, Vanderbilt University

Dr. Krahn is Professor of the Practice of Nuclear Environmental Engineering in the Department of Civil and Environmental Engineering at Vanderbilt University, where he teaches three courses in nuclear environmental engineering and performs research in the nuclear fuel cycle and risk assessment/management. Immediately prior to Vanderbilt, he served in DOE-EM as the Deputy Assistant Secretary for Safety & Security in the Office of Environmental Management where he provided senior technical leadership to DOE's nuclear waste processing/management, D&D, and environmental restoration program; he was awarded the DOE Career Distinguished Service Award in 2010.

Dr. Krahn brings more than 35 years of technical and project management experience in positions of increasing responsibility in government, private industry and the military. His technical highlights included: leadership of the safety program of the nuclear waste processing/management, D&D, and environmental restoration program at DOE; technical direction for a major DOE engineering program in nuclear waste processing, environmental restoration and D&D; technical leadership of a federal agency providing independent safety oversight to DOE's environmental restoration program/nuclear weapons complex; direction and

management of a $25M division in an engineering services company, which provided environment, safety and health and engineering consulting to the DOE complex; and leading the technical review of numerous technical and systems issues at nuclear fuel cycle and waste processing projects and facilities.

His project management highlights include: participation in the independent project management review of the D&D of the $4B Rocky Flats Environmental Restoration Project; technical direction of the R&D program for a DOE program office focused on nuclear waste processing, D&D, and environmental restoration; leadership and management of the $140 (FY 1986 dollars) million complex overhaul of a nuclear submarine and nuclear work package for two nuclear submarines; development of the D&D process for US nuclear submarine reactor plants; and direction of the design and construction of two major safety nuclear upgrades at DOE nuclear facilities.

In 2015, he was selected by the Secretary of Energy to serve on a congressionally-mandated review of the use of risk-informed decision-making in the DOE's management of nuclear cleanup projects nation-wide. He is a senior engineering and project management consultant to the nuclear industry. Dr. Krahn was selected to the American Academy of Environmental Engineers & Scientists in 2013, is a Board Certified Environmental Engineer in Hazardous Waste Management, and was elected to the Executive Committee of the Fuel Cycle and Waste Management Division (FCWMD) of the American Nuclear Society in 2015.

Chip Lagdon

Senior Project Director, Consulting Services, AECOM Nuclear & Environment Technical Services, LLC

Mr. Lagdon joined AECOM in January 2016 after retiring from the Department of Energy in December 2015. Since joining AECOM, Mr. Lagdon has provided support to the Nevada Test Site, Idaho National Laboratory, Hanford Site, Savannah River Site and Los Alamos National Lab. Mr. Lagdon chairs the AECOM Corporate Nuclear Safety Functional Area Coordination Team and provides support for the AECOM corporate contractor assurance program. He has conducted ORRs at LANL and INL, led QA and Configuration Management reviews at NNSS, and is designated as the Contractor Team Leader for the Salt Waste Processing Facility. He has also completed the shielding and design reviews for the Radiation Sciences Laboratory addition at NIST, led a Root Cause Analysis review at WIPP and conducted corporate training on root cause analysis.

Previously, at the Department of Energy, Mr. Lagdon was appointed Chief of Nuclear Safety for Energy in January 2006, where he is responsible for nuclear safety of the Office of Environmental Management nuclear facilities until he retired. He also served as the Central Technical Authority for the Office of Environmental Management. Mr. Lagdon led periodic Construction Project Reviews for the Department on EM's major nuclear construction projects to evaluate management systems, technical issues and project performance. Prior to becoming the

Plutonium Finishing Plant Demolition Resumption
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Chief of Nuclear Safety, he served as the Director for the Office of Quality Assurance Programs with responsibility for Department's Implementation Plan for DNFSB Recommendation 2002-1, Software Quality Assurance. He previously served as the Deputy Director for Special Projects and Investigations where he was responsible for the Operational Readiness Review program, Criticality Safety, Safety Concerns, and the Accident Investigation Program. Mr. Lagdon conducted several Accident Investigation Training courses as well as serving as Board Chairperson for Type A and Type B Accident Investigations. He was one of the original authors of the Operational Readiness Review Order and has been involved with many operational readiness reviews since joining DOE in 1992.

Mr. Lagdon graduated from the U. S. Merchant Marine Academy where he received a Bachelor of Science in Marine Engineering with a Nuclear Engineering minor. He holds a Master's Degree in Engineering Administration from George Washington University and completed the Senior Executive Fellows Program at Harvard University. Mr. Lagdon retired from the US Navy Reserve in 2012 after 30 years of service where he was an Engineering Duty Officer and holds the rank of Captain.

Attachment 3

Expert Panel Comments on the Root Cause Evaluation Report (RCER), Draft Rev. 2

Expert Panel Review of the "Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities" Root Cause Evaluation Report (RCER), Draft Rev. 2, dated March 5, 2018

Panel Objectives

The charter of the Plutonium Finishing Plant (PFP) Expert Panel was established to review and challenge the cleanup contractor's (CH2M Plateau Remediation Company or CHPRC) proposed approach to fully recovering from the recent spreads of contamination and safely completing the demolition of the PFP. To that end, the panel members reviewed the draft Root Cause Evaluation Report (RCER) intended to support safe recovery and completion of demolition. The panel's review looked at the causal analysis, judgements of need, and corrective actions in their support of a sound technical approach to recovery.

Observations:

Overall, the Panel observed that many of the corrective actions (CA) are prospective in nature, and did not define in their outcomes an adequate technical approach such that there is confidence that completing these actions would preclude repeating the similar events in the future. Though not exhaustive, examples include:

- CAs 2, 3 and 5 – Evaluations for the use of water and fixatives to suppress airborne contamination during demolition and the results of these evaluations translated into effective work package controls and procedures are not included.
- CAs 11 and 12 – New airborne dispersion modeling for the transport of larger particles of contamination is not included. The results of such modeling, converted into clear, easy-to-understand work package requirements and limits is critical.
- CA 14 – Expectations are not defined within the CA for the roles and responsibilities of the Independent Hazards Review Board (HRB) and how the Board's function will be enhanced.
- CA 20 – The criteria and thresholds for entering the contractor's change management processes are not defined or clearly stated.
- CA 23 – Near real-time radiological survey protocols during demolition are not defined; data analysis methods and periodicity, and clear path to impacting work execution.
- CA 31 – While this action is intended to reinvigorate labor/management communications, it is not clear how it is being codified and how employee feedback is being tracked to resolution. Without addressing this the likelihood may remain for missing future opportunities to appropriately incorporate employee input.
- CA 37 – Details of the roles and responsibilities, authorities and accountabilities (R2A2s) for the Senior Supervisory Watch (SSW) are not defined, nor are job coverage expectations and qualification requirements.

In addition there were some areas that were either not addressed by the Judgements of Need or the details insufficiently analyzed in the supporting corrective actions. Examples include:

- It is not clear how ALARA reviews are or will be incorporated into the demolition work, from planning to post-job evaluations.
- The RCER clearly identifies there was insufficient formality in the technical/operational decision making for the PFP demolition. There were also examples of contractor employees not following established procedures and protocols (e.g., lack of notification to the shift operations manager, employees parking personal vehicles in no parking zones, radiological controls technicians decontaminating personal vehicles and not reporting). These conditions indicate a broader issue for the PFP organization. And while the CAs in the RCER are expected by CHPRC to provide a level of control to compensate for these issues during completion of the PFP demolition, it is not clear how the contractor will address these systemic safety behavior issues.
- Section 5 of the RCER provided an evaluation of the oversight (management assessments) for PFP. A significant weakness was identified in the report that the PFP management assessments did not identify potential weaknesses that might have served as leading indicators of the present event. Most of the assessments appeared focused on radiological practices rather than reviewing the conduct of demolition work to determine if demolition actions were in accordance with the work package and other technical documents. It is recommended that PFP management assessments need to be improved and implemented to ensure normalization of responses to events over time does not occur with the PFP Project Management. Normalization of responses to events by project management represents a weakness in the management team to maintain the necessary safety culture for safe operations.
- The RCER did not consider the framework of the Department's Integrated Safety Management (ISM) guiding principles as it evaluated the performance of the entire PFP demolition organization. For example, the RCER identified weaknesses with the performance of the SSW but did not further evaluate weakness with Shift Managers at PFP and with CHPRC Line Management. The RCER did not evaluate if there were weaknesses in the roles and responsibilities with the multiple organizations involved and routing interfacing in the PFP demolition. Also, the RCER did not evaluate the implementation of Operations Authorization that work conditions will be as expected and will not introduce unexpected hazards. Further analysis with the implementation of ISM would potential identify additional needed corrective actions.

Conclusions:

The corrective actions defined in the RCER are intended to provide the bases for a comprehensive technical approach to enable the completion of demolition. The Expert Panel found that in some cases they lack the necessary details to provide assurance that appropriate

controls will be implemented to address the causes that led to the event. The expert panel also identified some areas that may need supporting corrective actions.

It is recommended that the contractor address the issues identified in the RCER and weaknesses and identified by the Expert Panel in the development of the planning to resume demolition with a focus on deficiencies in practices, behaviors and safety culture.

Expert Panel Comment Sheet
Document: EM-RL--CPRC-PFP-2017-0018, CR-2018-0022,
Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities Root Cause Evaluation Report; Draft Rev 2

ID Number	Commenter Name/Phone	Page Number	Section/ Paragraph	Major/ Suggested	Comment, Suggest Solution
1	Chip Lagdon AECOM 301-471-1013	General		Major	Overall, the Root Cause Evaluation Report is insufficient to preclude repeating the same event in the future if the degree of holdup remaining is as significant as what was experienced in the demolition of PRF. The RCER lacks a comprehensive events and causal factors analysis. As a result, a number of details are not sufficiently analyzed which leads to an incomplete set of judgements of need and missed lessons learned. A robust RCER is necessary to give the panel the confidence that the contractor understands the weaknesses in their management systems and that they will follow newly implemented controls to ensure safe completion of work.
2	Steven Feinberg, DOE EMCBC 518-395-4580	iii, 29-35	Main body, JONs, and corrective actions	Major	Recommending breaking Root Cause – 01 into separate issues of relying on empirical data from CAM's etc. and the already well documented contributing cause of the use, application, and reliance on fixatives and or fogging. They are two important and different issues, and the reliance on empirical data appears to require additional development. Although both are discussed in the report, the Justification of Needs (JONs) do not reflect a clear path to corrective actions and feedback associated with the concern regarding use of empirical data. I expected to see a discussion and corrective actions regarding analysis and trending of daily and weekly air samples, which from my demolition experience, are necessary to detect low concentrations of alpha emitters. The air sampling program is typically used to verify the boundaries of where no respirators are required, and to verify the boundary where personnel would receive less than 25 millirem per year. The later boundary identification and verification by air sampling would virtually eliminate the need to perform bio-assay monitoring of workers in administrative office spaces outside the demolition areas.
3	Chip Lagdon AECOM 301-471-1013	6	3.2 & Attachment 5	Major	The Root Cause Analysis Report (RCAR) would be greatly strengthened if an events and causal factors (ECF) chart was completed that began with previous contamination events and followed through to the most recent occurrence and immediate remediation activities. There are a number of lessons learned from this event for open air demolition that need to be fully analyzed and captured for future decontamination and decommissioning activities. A comprehensive ECF chart is necessary to identify the causal factors for each event on the time line and would enable a full evaluation of the Integrated Safety Management Principles and Core Functions.
4	Chip Lagdon AECOM 301-471-1013	18	6	Major	In addition to the ECF chart, the effects of at least 2 events should be evaluated using the change analysis process to identify any potential missed lessons learned. These 2 events are the change to the demolition procedure and the decision to dilute the fixative. Both of these actions contributed to the amount of Pu available to be released and should be further

					evaluated. The change analysis would also address the reasons why the Hazards Review Board was not utilized in evaluating the impacts of these changes.
5	Chip Lagdon AECOM 301-471-1013	29	Attachment 1	Major	It is difficult to determine if the Judgements of Need (JONs) are comprehensive. The crosswalk contained in Attachment 1 doesn't address the barrier analysis and how it contributes to the list of causal factors. The barrier analysis would contribute to an ECF chart and be addressed through that analysis. The judgements of need do not appear to address the following issues observed in the RCA: 1. Interim monitoring and surveys of material and debris when higher contamination levels are present. 2. Command and control of demolition activities and who is responsible for ensuring established controls are maintained and adhered to. This includes model assumptions, required sprays and fixatives, and ensuring real time monitoring of demolition activities. 3. HP Training and Response to contamination events (drills) to demonstrate proficiency. 4. Roles and responsibilities for safety and control of demolition within limits established by the model.
6	Chip Lagdon AECOM 301-471-1013		3.2 Attachments 5 and 6	Major	The timelines (section 3.2 and attachment 5) do not discuss the impacts of the increased rate of strongback removal on the increasing frequency of contaminations. The limits on strongback removal were deleted from the demolition procedure on November 30th at the same time contamination was being discovered outside posted areas. It also isn't clear if the procedure was followed before because the timeline lacks specifics on what was removed. The strongback removal sequence is important due to the level of contamination (~644 grams) believed to be present behind their locations.
7	William Miller EA-30 301-903-5635	General	General	Suggested	Line Management is Responsible for Safety - The RCER did not discuss or analyze the ISM guiding principle Line Management is Responsible for Safety. The RC-01 states that there was an over-reliance on selective empirical data gathered during the course of, and following demolition and it was used in making decisions on the rate and methods of demolition. Line Management was part of the team that did not prevent this less than adequate decision making process. For example, the RCER did not describe if Line mangers demonstrated their commitment to safety, if they spend time on the floor, if they maintained a strong focus on the safe conduct of work activities, if they set an example for safety, if they adequately responded to employee questions and if credibility and trust are present. Because RC-01 was not prevented by Line Management corrective actions are needed to improve Line

					Management's performance. Further analysis is needed to determine what specific corrective actions should be put in place for Line Management.
8	William Miller EA-30 301-903-5635	General	General	Suggested	Clear Roles and Responsibilities - The RCER does not discuss the guiding principle Clear Roles and Responsibilities. In Section 2.5 *Demolition Evolution*, it states that Project management made the decision based on prior success to allow the demolition rate to be controlled based on feedback from radiological workplace indicators and the CAM array. It is unclear in the RCER how this decision was made in regards to the established ISMS roles and responsibilities defined for the groups involved (project management, operations, demolition, radiological controls, and radiological engineering). Was the decision made solely by project management without input from the other groups? Were the established roles and responsibilities adequate? Further in Section 2.5 *Demolition Evolution*, it states that in December 2017 management determined the safest course of action would be to bring the walls down, apply a fixative, and cover the debris with soil within a few days for long-term storage. How was this decision made in terms of the established ISMS roles and responsibilities? Was it made with inclusion of the other groups? In Section 6 *Problem Evaluation*, RC-01, it states that project management continued to rely on selective empirical data from workplace radiological indicators as a means to evaluate the efficacy of work package controls and ultimately pace the demolition. Under the established ISMS roles and responsibilities for project management, was it permitted for project managers to adjust the work package controls base on selective empirical data? Further analysis is needed with the definition, implementation and interface of roles and responsibilities with the different organizations involved in the RCER to identify corrective actions in this area.
9	William Miller EA-30 301-903-5635	General	General	Suggested	Competence Commensurate with Responsibilities - The RCER does not discuss the guiding principle Competence Commensurate with Responsibilities. It does identify a few JONs that are associated with this guiding principle such as the JON—PFP Project needs to provide lessons learned from this event to all radiological control personnel, the JON—PFP and Functional Organizations need to establish actions to reinforce expectation for notifications and communications, and the JON—PFP needs to provide gap training to PFP personnel regarding the lessons learned of this event to include notification process, response to upset conditions, new boundaries, etc. and several corrective actions are written that provide detailed training improvement tasks. However, the RCER does not discuss weaknesses in this guiding principle for other involved groups such as shift managers and line managers or what improvements with their competencies are needed. As an example, within section 6.0 *Problem Evaluation*, RC-01 states that lapel sample results were not immediately factored in to the empirical data evaluation and may have resulted in a different outcome. This is an

					example where there was a potential for a lack of knowledge by key individuals throughout the PFP demolition project organization to have an understanding of the importance of lapel sampling results. It is recommended that this potential training deficiency and corrective actions be addressed in a separate JON or included in an existing training JONs. It is also noted that training of the project staff will also be needed to describe that the current contamination consists of large particles. Another example for this guiding principle is that the barrier analysis identified that the Senior Supervisor Watches were conducted by separate individuals with no turnover during expedited demolition in December, 2017. SSWs active presence did not result in the needed observation(s) that the demolition had become unsafe. The use of SSWs was a missed opportunity to stop expedited demolition. The corrective actions to establish clear expectation for the SSW is useful. However, the SSW process needs additional corrective actions to ensure it is fully effective. Additional SSW program and training efforts are needed to increase the competency of the SSWs. An additional concern with this guiding principle was with the Shift Managers' flawed decision making to approve expedited demolition in December, 2017. It was also a missed opportunity for any of the Shift managers to stop the expedited demolition. The current corrective actions do not focus on shift manager competencies. Additional training efforts are needed to increase the abilities of the Shift Managers to make conservative decisions as applied to demolition production versus safety.
10	William Miller EA-30 301-903-5635	General	General	Suggested	Balanced Priorities - The RCER does not discuss the guiding principle Balance Priorities. In section 2.5 *Demolition Evolution* it states that challenges were noted in containerizing and shipping building rubble, and a number of process changes were attempted to improve the pace of rubble loadout, which was restraining overall process. This discussion is limited and does not provide enough detail to understand how these changes may have challenged decisions related to balanced priorities. Were changes being made that reduced safety to increase productivity? In section 2.5 *Demolition Evolution,* it states that the revised goal of completion of demolition by December 31, 2017 was made. Were there unintended consequences by setting the goal to complete demolition by December 31, 2017 in the area of balanced priorities? Did it cause a shift in the project management to focus more on productivity rather than safety? Further analysis is needed to determine if corrective actions are needed to improve balanced priorities.
11	William Miller EA-30	General	General	Suggested	Identification of Safety Standards and Requirements - The RCER report does not discuss the guiding principle of Identification of Safety Standards and Requirements. In Section 2.5

	301-903-5635				*Demolition Evolution*, it states that the expedited demolition challenged the base assumptions of PNNL-2073. It also states to compensate, the project placed two CAMs in close proximity to PRF for Canyon demolition. These CAMs existed well within a 24 derived air concentration (DAC)-hr isopleth from the model, associated with concurrent demolition of the Canyon and Zone 4 of 234-5Z. The report does not evaluate if the decision to conduct expedited demolition that challenges the existing established requirements was acceptable. It does not discuss if the project had completed the required approvals to revise the established requirements in PNNL-20173. Further analysis is needed to determine if corrective actions are needed to ensure the identification of safety standards and requirements are correct.
12	William Miller EA-30 301-903-5635	General	General	Suggested	Operations Authorization - The RCER report does not discuss the guiding principle Operations Authorization. Key aspects of Operations Authorization were not followed during the expedited demolition. To some extent the report recognizes these weaknesses as problems with change management. However, the problem is broader as shown by the following expectations in this area. Operations Authorization dictates that facility operations (demolition) personnel maintain awareness of all facility activities to ensure compliance with the established safety envelope. This did fully occur during expedited demolition. Operations Authorization dictates that the work authorization process verifies that adequate preparations have been completed so that work can be performed safely. In contrast, the PFP work packages were inadequately modified and some controls such as fixative were not adequately defined. Finally, Operations Authorization dictates that the preparations include verifying that work methods and controls are understood; that work conditions will be as expected and will not introduce unexpected hazards; and that the necessary controls are implemented. Project Management, operations, demolition, radiological controls, and radiological engineering missed the opportunity to stop work when unexpected hazards were observed during expedited demolition. Further analysis is needed to determine the needed corrective actions in the area of Operations Authorizations to improve PFP demolition performance.
13	William Miller EA-30 301-903-5635	General	General	Suggested	ISM Core Function Develop/Implement Hazard Controls - In section 2.3 *Controls and Indicators*, the last sentence of paragraph 3 states that “While contamination protocols were followed for each of these events, the repetitive identification of radon impacts human performance by decreasing the concern and sensitivity of personnel over time. At this location in the report there is not a discussion of these protocols. These protocols should be reviewed to see if they are adequate.

					The direction provided from the CHPRC ALARA Management Worksheet is that if removable contamination >20 dpm/100cm2 is detected outside the CA or HCA/ARA/RA boundaries, the area will be decontaminated, posted and covered with soil/gravel. The lack of needed approves to restart demolition in the above procedure clearly provided the impression that recovering from a contamination event was not difficult. In the discussion under RC-02 after the first sentence, it states that "Available CHPRC processes to manage emerging and changing conditions were not consistently utilized". It was a missed opportunity that a detailed procedure was not included in the work package to instruct Project management when contamination was found outside the radiological protection boundaries to fully investigate the causes before continuing demolition (to include approval by senior CHPRC management). Within the section JON2, a new Judgement of Need is needed that specifically requires the development and implementation of a new formal procedure to be executed by the Project when contamination is discovered outside the radiological protection boundaries to stop work, investigate and obtain high level approval to restart demolition.
14	William Miller EA-30 301-903-5635	General	General	Suggested	Core Function Perform Work In RC-02 paragraph six, first sentence, the report states "As management responded to individual contamination events, these individual events became routine responses, which normalized the condition over time." Normalization of responses to events by project management shows a weakness in the management team to maintain the necessary safety culture for safe operations. It is recommended that a Judgement of Need be added under RC-02 to include actions to improve the safety culture of the PFP Project management team.
15	William Miller EA-30 301-903-5635	General	General	Suggested	Core Function Feedback and Improvement - In ECAQ-02 it states that "PFP Management did not adequately address all employee concerns and suggestions". In Section 5.0 *Evaluation of Assessment Performance*, a significant weakness was identified in the report that the PFP management assessments did not identify potential weaknesses that might have served as leading indicators of the present event. Many of the assessments were focused on radiological practices rather than reviewing the conduct of the demolition and did not review if demolition actions were in accordance with the work package and other technical documents. A Judgement of Need is needed to be added to ECAQ-2 that PFP management assessments should be improved and implemented to ensure normalization of responses to events over time does not occur with the PFP Project Management team.
16	Chip Lagdon AECOM 301-471-1013	General	General	Suggested	Based on the report, it appears that a few of the contamination events detected outside of established contamination areas were on the swing or back shift. This could indicate that RADCON ground deposition and boundary verification surveys during actual demolition

					activities on day shifts may not have been performed adequately to promptly detect the loss of contamination control. The discussion of HP performance contained in several portions of the report lacks analysis with respect to governing procedures that would typically address anticipated actions for contamination control, monitoring activities, and establishing radiological boundary control. A further explanation of what procedures were being used and an evaluation of their effectiveness with respect to HP practices is necessary to provide a basis for future cleanup work. This evaluation should also address the HPT responses during the identification of contamination outside the existing boundaries on December 15-18, 2017. The identification of contamination issues identified in November 2017 by the Central Radiological Control Organization is not completely analyzed to explain why there wasn't increased monitoring to determine the effectiveness of additional measures relating to fogging and fixative application. The changes to the demolition procedure on November 30 that removed restrictions on the rate of demolition did not add any additional monitoring requirements. On page 26, the RCA states: "Project management made the collective decision, based on prior success, to allow demolition rate to be controlled based on feedback from radiological workplace indicators and the CAM array. Debris piles were allowed to remain at the demolition site and were managed through the use of fixative as a near term control and soil coverage as a longer-term control. These controls were believed to provide equivalent protection to containing the debris as it was created." This control strategy was not contained in the revised procedure and it isn't clear what instructions, if any, were provided to the workers to monitor these conditions. It is not clear when the surveys of the facility were done and what the measurements were. There is no discussion regarding how workers determine when a disposal box has reached its limits on Pu? PNNL-20173 calculations were based on the assumptions that debris would be contained and that a conceptualized rate of demolition would be maintained. How was this rate determined and maintained? In relation to the calculation and the work package? Please provide sequence and location along the timeline with respect to glovebox removal and strongback removal.
17	Chip Lagdon AECOM 301-471-1013	8	3.2	Suggested	On December 15, the notification process was not accomplished in accordance with the procedure, ZCR-022. The RCA does not explore training, drills or emergency training processes and their effectiveness that would have mitigated the delay in notification.

18	Chip Lagdon AECOM 301-471-1013	27	7.0 RC-02	Suggested	For outdoor open air demo, changing meteorological conditions can challenge contamination control that can go beyond the bounds of the model and human reaction. The report indicates that 15 mph winds shut down work. This number should be evaluated and matrixed into a process where the levels of contamination, type of activity, and any additional controls, i.e. fixatives, containment, etc.… should be factored in. This could result in a lower acceptable mph limit for the scheduled activity for that day. Representative wind-speed measurements should always be taken at the actual jobsite and not solely obtained thru a call to a Control Room or Met Tower elevation that is not indicative of the real time conditions at the work-site. Frequent measurements and at numerous locations at the jobsite should be obtained to ensure the speed remains below the documented approved limit. Sustained versus gusts is always an agreed upon challenge for the management team as well as the verbiage in the corresponding work package.
19	Chip Lagdon AECOM 301-471-1013		3.2 Attach 5	Suggested	If an Events and Causal Factors Chart is created, then the following should be considered for inclusion and further analysis developed: The identification of the time and date of the fixative being diluted and associated timeline identifying subsequent changes for effective contamination control Plotting the timeline of available Pu to be released versus the rate of demolition to identify when greater potential existed and providing a means to validate the model What change control process is used for demolition activities? Describe how the changes were documented for the change to the teardown procedure that was accomplished on November 30, 2017. Discuss the process controls that were implemented when the spread of airborne radioactivity was discovered in January 2017. Discuss the radiological surveys that are done as parts are torn down. Explain how the bucket surveys are performed and what levels were observed. Is there a procedure for what actions workers take when the 200,000DPM limit is exceeded?
20	Chip Lagdon AECOM 301-471-1013	Iv	Last paragraph	Suggested	In the discussion about the condition of the facility, if there was such a concern about exposed material and lack of effectiveness of the exhausters, why wasn't around the clock demolition and debris cleanup initiated?
21		7	3.2	Suggested	On December 13, demolition activities were halted before work began for the day, and a Stop Work was issued for all demolition activities. It is not clear what happened between the

					13th and 14th that allowed the stop work to be lifted. It is also unclear what process was used and who made the decision was it to lift the stop work?
22	Chip Lagdon AECOM 301-471-1013	18	6	Suggested	Revision 6 to Procedure 2Z-15-06342/ M WCN#006, Building 236-Z Demolition that removed limitations on building demolition rates to keep potential contamination rates within the bounds of the air modeling is not evaluated. Along with the needed change analysis, the following needs to be added to the ECF timeline. The times and dates of indication of contamination occurring including surveys and lapel monitors. Identifying when previous corrective actions were implemented and whether subsequent evaluations were performed to determine effectiveness. Identifying when contamination drills or other simulated operational upsets were conducted to support training of personnel and provide contamination control. Identification of Radiological Boundary conditions and changes over time with respect to demolition activities. Abnormal response and notification procedures for contamination released outside of the radiological boundaries and an analysis of how well they performed. The scheduled demolition dates for being “slab on grade” and other milestone dates such as those from the tri-party agreement. The identification by the Central Radiological Control Organization that identified contamination issues in November 2017 and subsequent actions that were thought to be working. Meteorological data should also identified on the timeline for each release. Identifying what time the roof was removed from PRF that rendered the exhausters ineffective and whether or not that was raised by workers or project personnel.
23	Chip Lagdon AECOM 301-471-1013	18	6	Suggested	Rates of removal and contamination levels during the subsequent days of demolition where strongbacks and portions of the building were demolished at a greater rate than originally planned. Impacts and size of debris build up during demolition and the subsequent measurements observed during surveys.

24	Chip Lagdon AECOM 301-471-1013	18	6	Suggested	Contamination Discovered inside the demolition zone, January 27, 2017. Contamination during Gallery Glove box removal demolition activities, June 8, 2017. Worker concerns being raised at various times during demolition as they are identified.
25	Steven Feinberg, DOE EMCBC 518-395-4580	31-35	Corrective actions	Suggested	An important point made in RCER was the assumption in the emission modeling that debris piles would be minimized, and resuspension of particulates would not occur. Expected to see a Justification of Need(s) and corrective actions to train personnel on modelling assumptions, to ensure that the modelling assumptions are known, protected, and reflected in in work packages and radiological work permit controls to protect the assumptions. Recommend add additional corrective actions to train personnel on the assumptions, and ensure assumptions are carried forward into work packages and radiological work permits.

Attachment 4

Expert Panel Comments on "Plutonium Finishing Plant Demolition Option Evaluation Report", Draft A

Expert Panel Review of the "Plutonium Finishing Plant Demolition Option Evaluation Report" CHPRC-03673 Draft A

Panel Objectives

The charter of the Plutonium Finishing Plant (PFP) Expert Panel was established to review and challenge the cleanup contractor's (CH2M Plateau Remediation Company or CHPRC) proposed approach to fully recovering from the recent spreads of contamination and safely completing the demolition of the PFP. To that end, the panel members reviewed the draft Plutonium Finishing Plant Demolition Option Evaluation Report, CHPRC-03673 Draft A intended to assess the state of the PFP demolition area, reviewing available and current data to provide options for resuming demolition activities. The Panel has completed our review and on behalf of the team we agreed that the analysis was undertaken using a process-based approach and was well documented, generally disciplined and comprehensive. However, execution in accordance to the plans flowing from these selected options will define overall success.

Observations:

Several panel members pointed out challenges associated with the analysis specifically noting that with all of the detail focused on process we were left with the impression that it was a foregone conclusion that the current approach, with enhanced controls, was going to be the chosen alternative. In addition, we generally feel that the analysis of the various options was, at times overly qualitative and could have been better substantiated. There were also a number of general statements that could have used more detailed definition such as "*Provide and rank **achievable** options for completing PFP demolition that improves the safety margin for the worker and environment while managing existing and future risk*s." and "*not meeting **end state** documentation*". These pointed to extremely subjective goals that allowed for broad interpretation. Finally there was a view that the report lacks a sense of urgency in the analysis considering that we are in the middle of an ongoing release with existing risks.

Conclusions:

The panel generally agreed that the analysis resulted in consideration of an adequate range of options and that the selection of the preferred alternatives was appropriate.

Expert Panel Comment Sheet
Document: CHPRC-03673, Plutonium Finishing Plant Demolition Option Evaluation Report, Draft A

ID Number	Commenter Name/Phone	Page Number	Section/ Paragraph	Significant/ Suggested	Comment
1	T. Lapointe, (202) 287-5716	General	General	Significant	While we might question the mechanics of the analysis and the apparent subjective nature (or selection thereof) of the criteria and the options, overall the effort was undertaken using a disciplined, process based approach and was general generally comprehensive.
2	J. Armstrong, (865) 574-7612	General	General	Significant	Overall, the options report did a pretty good job of addressing air sampling, 835 ops and employment of physical controls such as fixatives.
3	J. Tappert, (301) 415-1158	General	General	Significant	My overarching observation is that the contractor appears to have used a disciplined approach to generate and assess a comprehensive range of options to complete the PFP demolition. And that the selections of the preferred options and associated enhanced controls should serve as a basis for the resumption of work plan.
4	J. Tappert, (301) 415-1158	General	General	Suggested	Regarding the expansion of the radiologically controlled areas to ensure that no contamination occurs beyond the boundaries, I would hope that it would not be expanded excessively such that some areas end up being contaminated that didn't need to be.
5	C. Lagdon, (803) 502-9755	General	General	Significant	I agree with the results of the options report, however, it could have been better substantiated. For example, safety systems and fire protection systems are only a disadvantage in terms of cost, but not in terms of safety. The costs numbers provided are not well substantiated ($1.4B for tent coverage/$100M for cap, etc.) and for others are not provided.
6	C. Lagdon, (803) 502-9755	General	General	Significant	The overall options report lacks a sense of urgency in the analysis. In my view, we're in the middle of an ongoing release with risks. The mode of current containment is temporary and has not been proven to be a long term solution. What is missing is the discussion of the duration of some of the options that would take much longer to implement and the resulting risk exposure that is not easily quantified.
7	T. Lapointe, (202) 287-5716	4 and A-1	Paragraph 4, Formal Problem Statement and Appendix A, Paragraph A1.1, Purpose	Significant	In establishing the Options Engineering Process the problem statement identifies the criteria as to "Provide and rank achievable options for completing PFP demolition that improves the safety margin for the worker and environment while managing existing and future risks." What is not clear is what is intended by the term "achievable". This appears to be a subjective term that may have inadvertently restricted the options considered based on misconceived or other soft criteria that have not been defined. At a minimum this constraint should be described and likely agreed upon with DOE-RL.

8	T. Lapointe, (202) 287-5716	5	Paragraph 5, Constraints	Significant	One of the bases for selecting the preferred option for debris dispositioning of the Main Processing Facility (234-5Z) involved the other options being considered as "not meeting end state documentation". It is not clear what this means or why it was not among the primary attributes established for consideration.
9	T. Lapointe, (202) 287-5716	5 and 6	Paragraph 6, Table 2	Significant	The rationale for the weighting of several of the primary attributes, while loosely defined, does not provide criteria that would lend itself to allowing for consistent application across the range of options. It appears overly subjective.
10	T. Lapointe, (202) 287-5716	8	Paragraph 9	Significant	It is not clear why other alternatives among the entire list of options considered were screened out from consideration for debris dispositioning of the Main Processing Facility (234-5Z). Specifically why were the options for grouting (process of injection) not among those considered. The water bath and saturated soil entrainment options also appear to be reasonable for consideration and screening yet these were also excluded and it is not clear why.
11	T. Lapointe, (202) 287-5716	9 and D-2	Paragraph 10, Subparagraph 10.2 and Appendix D, Table D-1	Significant	The preferred option for demolishing the Main Processing Facility (234-5Z) and Vault (except the Processing Lines, and Tunnel) is segmented modular demolition. In considering this tenting was screened out due to perceived financial costs. These rough order of magnitude costs were estimated as extremely high (>$1B) but it is not clear what that estimate was based on. The Department has a history of performing tended demolition particularly at Idaho and it's not clear that the costs estimated in this case are consistent with past experience. Additionally, if considered in total (low risk 234-5Z Main Processing Plant demolition as well as higher risk Main Processing Facility Processing Lines and Tunnel, it's not clear that tenting remains financially prohibitive.
12	T. Lapointe, (202) 287-5716	9 and 10 and E-5 through E8	Paragraph 10, Subparagraph 10.3 and Appendix E, Tables E-2 and E-3	Significant	For demolishing the Process Lines (A&C) in the Main Processing Facility and Tunnel there is limited analysis to support the use of ventilated modular demolition in combination with shrouding (large or small). CHPRC may want to consider this if they have not already.
13	T. Lapointe, (202) 287-5716	10 and F-13 through F-15	Paragraph 10, Subparagraph 10.4 and	Significant	The preferred option for dispositioning the Plutonium Reclamation Facility (PRF) rubble pile discounts grouting (either injection or processing) as not meeting similar technical, environmental or health and safety attribute performance attribute criteria acceptability. It is not clear how these were considered less acceptable particularly since once the saturate soil

			Appendix F, Tables F-6 and F-7		cap is breached during removal the potential for airborne release (puffs) logically appears more or similarly likely.
14	S. Feinberg, (518) 395-4580	15	(briefing)	Significant	As a Guideline DOE recommends non-monitored workers be exposed to less than 25 mrem/year. In the case of PFP demolition efforts where the primary radio nuclides of concern are plutonium, internal monitoring and air sampling are the primary means for determining potential worker, and site employee exposure. The briefing summarizes air monitoring being conducted. It appears the primary concern is the demarcation of potential airborne radiation areas. The site already uses air monitoring; however, the following is noted: a.) The site does not appear to have monitoring stations that can be used to verify the boundary, or isopleth, that demarcates the area which is between the airborne radiation area and the area where workers could receive up to 25 mrem exposure owing to the demolition effort. Air monitoring to verify this boundary would be preferable to bioassays or other means for internal monitoring. The site should consider using AERMOD to estimate the location of this boundary and verify the boundary with air samples. b.) The site currently is counting air samples to E-12 for alpha activity. This value may be useful on a daily basis; however, SPRU project found that a weekly air sample was necessary for the purposes of verifying the 25 mrem boundary. The site should be able to achieve a minimum detectable activity (MDA) of E-15 on weekly air samples, after allowing for radon decay of up to week, which is necessary to monitor potential low exposures.
15	T. Lapointe, (202) 287-5716	C-2 though C-4	Appendix C, Table C-1. Tent Full Coverage (Option 1)	Significant	For the complete list of options considered it isn't clear why partial tenting was not among the overall list. From the description there appears to be a distinction between shrouding (large and small) since these are considered open-ended tenting vs. the full (or partial) closed-ended tenting. In addition the significance of considering tenting when compared to open-air demolition may not adequately compare the drawbacks of continued Pu spread/migration and that overall impact to cost and schedule.
16	M. Moury, (202) 586-1285	General	General	Suggested	While a process was described, it appears that it was virtually assured that the current approach, with enhanced controls, was going to be the chosen alternative. While the cost of ARP-8 (full containment) is listed at $1.4B, making it cost prohibitive, it is not clear why that was necessary at Idaho and not at Hanford. Was it for weather protection or

					contamination control? If it was for contamination control, various containment tent configurations should have been examined more closely. Regardless, I think it is a better use of the expert panel's time to focus on the Work Resumption Plan now that a decision on the planned approach has been made.
17	S. Feinberg, (518) 395-4580	15 and 20	(briefing)	Suggested	The site is currently conducting air monitoring and achieving a minimum detectable activity (MDA) of E-12. If not already doing so, consider recounting after 16 hours or more to allow radon to decay. You may be able to achieve an MDA of E-13, which would give the site a better idea of the actual airborne activity concentration and identify changing conditions in the field when this data is tracked and trended daily.
18	S. Feinberg, (518) 395-4580	15 and 20	(briefing)	Suggested	The enhanced contamination monitoring includes direct probe surveys twice per day. Suggest prior to the next work day, cookie sheets be wiped with a large area wipe to assess deposition that is occurring and clean the cookie sheet for the next work day. The data obtained should be recorded and tracked daily to determine trends.
19	S. Feinberg, (518) 395-4580	24	(briefing)	Suggested	The site is using three fixatives (Soil Cement, Envirotac II, and Polymeric Barrier System) to control dust. All of these products are good and will provide a long lasting solid barrier once dry which controls dust from a debris pile or other surfaces. The cured barrier will also inhibit penetration of water into the debris pile. During removal of the debris, a working face will naturally be established which will disturb the cured barrier and expose drier material. The site will use foggers to control dust during the debris pile removal and loading operations. The site should consider using a water soluble dust control additive particularly at the end of the day on the exposed face of the debris pile. This type of fixative has the benefit of being causing the small particles to stick together as it dries and will not inhibit water penetrating into the debris pile as much as the other fixatives in use. This type of fixative is used by the agricultural industry to control dust.
20	C. Lagdon, (803) 502-9755	C-9	Table C-4	Suggested	It isn't clear what "could be perceived as over-exuberant approach" means as a disadvantage for the enhanced controls portion of table C-4.
21	J. Tappert, (301) 415-1158	F-15	Table F-7	Suggested	The grouting option in App F (which covers the rubble pile) discusses the A and C lines.

Attachment 5

Expert Panel Comments on "Plutonium Finishing Plant Work Resumption Plan", Draft B

Expert Panel Review of the Plutonium Finishing Plant (PFP) Demolition Resumption Expert Panel on the Plutonium Finishing Plant Work Resumption Plan, CHPRC-03689, Draft B

Panel Objectives

The charter of the Plutonium Finishing Plant (PFP) Expert Panel was established to review and challenge the cleanup contractor's (CH2M Plateau Remediation Company or CHPRC) proposed approach to fully recovering from the recent spreads of contamination and safely completing the demolition of the PFP. To that end, the panel members reviewed the Plutonium Finishing Plant (PFP) Demolition Resumption Expert Panel on the *Plutonium Finishing Plant Work Resumption Plan*, CHPRC-03689, Draft B intended to summarize CH2M HILL Plateau Remediation Company (CHPRC) actions 3 to resume demolition activities at the Plutonium Finishing Plant (PFP) Complex. This review provides the collective opinion of whether the contractor's proposed approach appears technically sound and, if effectively implemented, protective of the workers, the public and the environment for your consideration and are not intended to constitute authorization for CHPRC to initiate its proposed approach for resuming PFP demolition.

Conclusions:

In summary, the latest draft of the Plutonium Finishing Plant Work Resumption Plan (Plan) is substantially improved over the previous draft A. It is evident that feedback provided by the expert panel on products such as the *Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities Root Cause Evaluation Report* and the *Plutonium Finishing Plant Demolition Option Evaluation Report* has been considered. While there is still an opportunity to provide additional clarity in the Plan on implementation of the senior supervisory watch, radiological data trending, and the work control process, the panel is confident that if executed with appropriate rigor of operations, contractor assurance oversight, management controls and communications along with appropriate federal oversight and engagement that the remaining demolition can be successful.

While not necessarily an element that needs to be captured within the plan, DOE, and in particular DOE-RL, also needs to consider how they, as the owner/regulator, will provide adequate and effective oversight of the demolition activities. During earlier demolition activities at PFP it was not clearly evident that issues were being identified and communicated up through leadership among the federal staff. Similarly, if these issues were being communicated it is not clear if or how they were considered and dispositioned (internally, or with CHPRC).

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Substantive Comments

ID	Commenter Name/Contact	Page(s)	Line(s)	Comment/Observation
1	J. Tappert, (301) 415-1158 john.tappert@nrc.gov	iii	1-29	There are numerous discussions that fixative will be applied to debris piles at the end of each shift and that it is acceptable to have debris piles at the end of the shift. Section 4.3.3. (lines 25-27) and 4.3.6 (lines 13-15) further note that debris must be size reduced and removed prior to resuming building demolition. As the deviation from the original work plan and accumulation of significant amounts of debris was a significant factor in the December event, I think the commitment to remove the debris pile each shift before resuming demolition activities should be highlighted and included in the executive summary.
2	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	9	1-2	Recommend deleting “are bounded” and replacing with “were established”, for clarity.
3	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu and K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	9	3-6	It is not clear what this rather long sentence is trying to say. It refers the reader to Section 5.4 for discussion of “concerns for single contamination particles”, but there is no such discussion, in fact, I could not locate the term within that section. It would seem, from the discussion in the plan that the approach to contamination control would be more precisely described as: ‘conservatively established contamination control boundaries, active monitoring for the potential of airborne dispersion, along with regular and active assessment for migration of contamination. There radiological practices are coupled with work management controls, such as the application of fixatives and overburden, to reduce the potential for future unanticipated releases.’
4	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	9	7	What risk is posed by the packaged waste? And how does waste removal contribute to stabilization?
5	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	11	1-7	This part of Section 4.2 describes the “assessment scope” by listing “general topical areas” for the management assessment to be performed prior to resumption of D&D operations; it would seem appropriate for one of these topical areas to be to review of resumption pre-start actions to assure that actions taken have met the intent of the identified shortcomings.

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6	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	11	8-9	States a "management assessment will be conducted prior to the start of both low and higher risk demolition work scopes." I am assuming these are the "independent" management assessments discussed earlier.
7	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	17	Figure 17	Row identified by 'boundaries control set' – the statement that the enhanced controls 'significantly enlarged to ensure no contamination, even below posting limits, is found outside of boundaries' sets the plan up for potential failure. Contamination found outside the boundary could have originated from other Hanford activities.
8	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	17	Figure 17	Row identified by 'waste packaging' – the statement is made that wider use of respiratory protection at ERDF, based on waste profile…. Reference the dose basis used to justify the added burden of respiratory protection imposed on the workers.
9	J. Tappert, (301) 415-1158 john.tappert@nrc.gov	18	Figure 18	"Tunnel" is listed as an additional control. Not clear to me what that thought is.
10	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	18-19	18, 5 thru 19, 6	For Phase A, is the MAR low risk because it is a different type of MAR that the high risk MAR or is it of similar characteristics, just less concentrated. If it is of the same characterization as the high risk material, the low risk activity is characterized as low risk because the probability of release is low; but the consequence of an event would be similar. If this is the case, are the controls for this low probability "high" consequence event acceptable to DOE given the potential political ramifications of an event?
11	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	21	12	Something apparently left out in this line, perhaps this was meant to read: "debris co-located next to 234-5Z"?
12	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	21	30-31	This discussion can leave one with the impression that debris can continue to accumulate; however, in Section 4.3.6, the direction is clear, where it adds: "…at the end of shift; however, debris must be size reduced and removed prior to resuming building demolition." This latter wording is more clearly consistent with the intent of CHPRC as briefed to the panel—is there a reason that the wording is different elsewhere? In addition, it would seem to be wise for some specific wording addressing securing work for the weekends.
13	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	25	8-9	Logical fallacy – how will fixative be applied to a work area when it is unmanned?

14	W. Miller (301) 903-5635 william.miller@hq.doe.gov	25	10	"some debris may be left overnight." Comment: The amount of debris to be left overnight should have a limit.
15	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	28	1-15	How the ventilation system shroud will be used to allow the capture of particulate that may come loose during demolition is unclear.
16	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	28	7-8	How does the shroud work? Is there an image?
17	W. Miller (301) 903-5635 william.miller@hq.doe.gov	28	13-14	"Debris piles are acceptable to leave at the end of shift;" Comment: Same as above, I would suggest a size limit for the debris pile be defined.
18	W. Miller (301) 903-5635 william.miller@hq.doe.gov	29	10	"If air does not indicate inward flow" Comment: How is this determined/measured and what is acceptable?
19	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	29	16-17	It is not clear why this sentence needs to be made conditional; i.e., when would CHPRC not expect the FWS to verify ventilation controls are operational and adequate and that the work crew is briefed on the status?
20	W. Miller (301) 903-5635 william.miller@hq.doe.gov	29	18	"Once a single bay is removed, the tunnel piping will be exposed for removal and backfilled immediately." Comment: What action is taken to perform the backfill?
21	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	29-30	Figures 34, 35 and 36	The distinction between the PRF demolition, 236-Z building rubble piles is not clear in the figures.
22	W. Miller (301) 903-5635 william.miller@hq.doe.gov	31	8-10	"Water or approved fixative delivery devices should be used in conjunction with the conceptual spray patter for a minimum of 15 minutes prior to the star of removal of the rubble (Figure 39)." Comment: The expected conditions to reach saturation level is to implement Figure 39 with four water canyons spraying in a rectangle pattern for 15 minutes to have the center circle (unknown diameter) obtain these conditions. Later on Page 32 Line 2 under "Physical Work Activity" the section does not mention that saturation level should be reached prior to performing the work activity as defined in Figure 39. It mentions a minimum 15 minute spray time with two water or fixative application delivery systems prior to the start of removal. Is this in addition to the previous requirement to obtain saturation level as supported by Figure 39 requiring four

				water canyons? Does the saturation levels only apply to the center circle? Can a single canyon operating for a longer time obtain saturation conditions?
23	W. Miller (301) 903-5635 william.miller@hq.doe.gov	32	10	"Again, working from north to south, equipment shall remove foundation walls," Comment: There should be a new paragraph that discusses demolition of the remaining PRF structure. It should include required initial conditions and the water canyons placement for performing the work.
24	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	33	11-13	Does this discussion anticipate that "engineering" will be called to the field to evaluate the abnormal conditions?
25	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	33	27-37	Define or cite criticality incredible.
26	S. Feinberg, (518) 395-4580 steven.feinberg@emcbc.doe.gov	38-39	38, 29-36 and 39, Table 2	As a Guideline DOE recommends non-monitored workers be exposed to less than 25 mrem/year. In the case of PFP demolition efforts where the primary radio nuclides of concern are plutonium, internal monitoring and air sampling are the primary means for determining potential worker, and site employee exposure. The briefing summarizes air monitoring being conducted. It appears the primary concern is the demarcation of potential airborne radiation areas. The site already uses air monitoring; however, the following is noted: • The site does not appear to have monitoring stations that can be used to verify the boundary, or isopleth, that demarcates the area which is between the airborne radiation area and the area where workers could receive up to 25 mrem exposure owing to the demolition effort. Air monitoring to verify this boundary would be preferable to bioassays or other means for internal monitoring. The site should consider using AERMOD to estimate the location of this boundary and verify the boundary with air samples. • The site currently is counting air samples to E-12 for alpha activity. This value may be useful on a daily basis; however, SPRU project found that a weekly air sample was necessary for the purposes of verifying the 25 mrem boundary. The site should be able to achieve a minimum detectable activity (MDA) of E-15 on weekly air samples, after allowing for radon decay of up to week, which is necessary to monitor potential low exposures.
27	S. Krahn, (615) 585-1541	38-41	38, 17 thru	This section does not outline any expectations for the regular communication of radiological data and trends from the RadCon organization to the D&D operations

	steve.krahn@vanderbilt.edu		41, 10	organization—since communication of radiological trends was a concern in the December 2017 incident, it would seem to be appropriate for this section to have a clear discussion of the anticipated information to be shared and how frequently.
28	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	39	Table 2 CAMs	The 'during demolition' column under the Continuous Air Monitors notes that up to two additional CAMS will be deployed 'downwind' of job. This implies that the CAMS are going to be mobile and moved according to wind conditions? Is this correct, or are they going to be situated in predominant downwind locations?
29	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	39	Table 2 CAMS	The action level will be set at 50% of the alarm set point. How is this going to be implemented? Will RCTs have remote readouts from the CAMs? Or will they cycle between stations reading the display? Do the CAMs have a continuous paper trace of activity level that can be scanned?
30	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	39	Table 2	Cookie Sheet survey frequency during demolition. There are 77 cookie sheets inside and outside control areas. Statement is made that results will be measured in real time. What is the approximate count time for each cookie sheet? How many RCTs will be needed to provide 'real-time' surveys of the cookie sheets? Is the intention to have RCTs circling the site, reading and reporting on CAMS and cookie sheets?
31	S. Feinberg, (518) 395-4580 steven.feinberg@emcbc.doe.gov	41-43	41, 11 thru 43, 15	The site is using three fixatives (Soil Cement, Envirotac II, and Polymeric Barrier System) to control dust. All of these products are good and will provide a long lasting solid barrier once dry which controls dust from a debris pile or other surfaces. The cured barrier will also inhibit penetration of water into the debris pile. During removal of the debris, a working face will naturally be established which will disturb the cured barrier and expose drier material. The site will use foggers to control dust during the debris pile removal and loading operations. The site should consider using a water soluble dust control additive particularly at the end of the day on the exposed face of the debris pile. This type of fixative has the benefit of being causing the small particles to stick together as it dries and will not inhibit water penetrating into the debris pile as much as the other fixatives in use. This type of fixative is used by the agricultural industry to control dust.
32	T. Lapointe (202) 287-5716 todd.lapointe@nnsa.doe.gov	48	36-41	Nowhere in Section 6, Conduct of Operations, is the need to communicate with DOE noted. In fact, while one of the significant issues identified in the EM-RL--CPRC-PFP-2017-0018, CR-2018-0022, Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities Root Cause Evaluation Report; was lack of or ineffective communication, this not really captured in the revised approach to demolition either internally or with DOE. Highlighting when and how issues that arise

				will be communicated effectively within the workforce and with the regulators should be included in the plan.
33	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	51-52	51, 26-27 and 52, 19-22	The first statement says, "All changes, modifications, and revisions to work packages must be approved by the HRB or HRB chairperson," with no exceptions; however the very next page the "work package change process" is described, which permits "technical changes" to be made via "pen and ink" with the approval of "the responsible manager"; this apparent conflict should be resolved.
34	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	51	28-30	The statement is made that lessons learned will be discussed and documented. What will be the form of documentation of this process?
35	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	52	19-22	Who has the authority to initiate work package changes? Where is the formal documentation of the change archived?
36	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	52-53	52, 30 thru 53, 19	Employee Engagement – It is not clear what process an employee can use to raise issues outside the times when their input is being solicited, i.e., after each phase, during plan of day meetings, during change management reviews. There should be a process they can go to anytime.
37	J. Tappert, (301) 415-1158 john.tappert@nrc.gov	55-56	55, 16-20 and 55, 38 thru 56, 12	Appendix F provides a comprehensive checklist of attributes to be assessed by the Senior Supervisory Watches but states that stationing of the SSWs is at the discretion of the PFP Project Manager or Deputy PM without indicating what factors would be considered in the exercise of the PMs discretion as to when the SSWs will be deployed. Section 6.5 provides a list of activities for which they may be deployed and Section 6.4.3 states that SSWs will observe drills. I think a little more description on how SSWs will be used might be beneficial such as at the beginning of each new phase, beginning of each new activity, or other relevant considerations. Also what kind of frequency is envisioned?
38	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	55-56	55, 38 thru 56, 12	Senior Supervisory Watch. There should be a predefined set of activities where an SSW must be present, a set of situations where it is evaluated if one is needed, and a set where they are not required unless directed by DOE or the PFP Project Manager.
39	M. Moury (202) 586-1285 matthew.moury@hq.doe.gov	55-56	55, 38 thru 56, 12	Does the SSW have stop work authority?

40	J. Tappert, (301) 415-1158 john.tappert@nrc.gov	B-1	n/a	Appendix B lists a number of work packages and most them are annotated as to whether they will be approved by the HRB or the HRB Chair (HRB-C). However, several of them don't have either designation.
41	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	D-1	Logic Tree	This logic tree does not show how baseline data is integrated into the decision-making process. It also does not show how the estimation of personnel, equipment and resource requirements relies on any information or decisions made in other parts of the logic tree.
42	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	F-2	n/a	The SSW is assigned no responsibilities for assisting with emerging radiological conditions, which was concern in the December 2017 incident.
43	S. Krahn, (615) 585-1541 steve.krahn@vanderbilt.edu	F-3	n/a	The SSW qualification process appears modest; would one not expect the SSW to be more than "familiar" with the SSW procedure (PRC-PRO-OP-53077) which they are implementing and the Stop Work procedure (DOE-343)? Would one not expect them to be very familiar with this resumption plan?

Editorial Comments

ID	Commenter Name/Contact	Page(s)	Line(s)	Comment/Observation
1	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	iii	All	The executive summary could use a good review by a technical writer.
2	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	iii	4-6	The sentence is not complete.
3	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	iii	6	Sentence is not clear. The suggested rewrite should be something like: "Resuming those activities that involve relatively small amounts of plutonium…."
4	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	iii	20	Substitute 'end of each shift' for 'end of the shift'
5	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	2	17	Clarify wording such as 'Activities include demolition of remaining portions of Building 234-5Z and removal of associated debris…'

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6	J. Tappert, (301) 415-1158 john.tappert@nrc.gov	18	Fig. 19	"Equipment Placement" and "Single Removal Location" appear to have been inadvertently repeated.
7	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	26	Fig. 28	The text and numbering on this figure is illegible.
8	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	29	Fig. 33	The text and numbering on this figure is illegible.
9	W. Miller (301) 903-5635 william.miller@hq.doe.gov	31	13	“one location” Comment: Add “ at a time” after “one location”
10	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	39	Table 2	Is table numbering correct? This is just a general observation, but numerous ‘figures’ are actually tables. It would make the document more accessible if they are correctly listed as tables. In addition, responses should be added to the table consistent with the title.
11	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	45	Fig. 41	Figure is difficult to read; the quality of the image is poor.
12	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	51	32	‘Any employee may request work’. What does this mean? Is there a better way to phrase this statement?
13	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	52	7-9	I find this wording to be very confusing. Is there a better way to phrase this?
14	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	53	21-22	What does this sentence mean? Is there a better way to phrase this?
15	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	55	22	Timely notifications *is* should be written: ‘Timely notifications are….’
16	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	B-1	n/a	This table, presumably inserted as a figure, has legibility issues.

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17	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	E-1 to E-5	n/a	There has got to be a better way of merging other PDFs into this document while maintaining viewability.
18	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	F-iii	n/a	Error in book marks.
19	K. Higley (541) 737-0675 kathryn.higley@oregonstate.edu	F-1 to F-14	n/a	There has got to be a better way of merging other PDFs into this document while maintaining viewability.