U.S. Department of Energy
Voluntary Protection Program
Recertification Review of
Battelle Memorial Institute at
Pacific Northwest National Laboratory

Office of Environment, Health, Safety and Security
Office of Health and Safety

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PREFACE

The Department of Energy (DOE or Department) recognizes that excellence can be encouraged and guided but not standardized. On January 26, 1994, the Department initiated the DOE Voluntary Protection Program (VPP) to encourage and recognize excellence in occupational safety and health protection. This program closely parallels the Occupational Safety and Health Administration (OSHA) VPP. Since its creation by OSHA in 1982, and implementation by DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health.

DOE-VPP encourages DOE contractors and subcontractors to surpass compliance with DOE requirements and achieve excellence through systematic approaches emphasizing creative solutions through cooperative efforts with managers, employees, and DOE.

DOE-VPP bases program participation on the existence of comprehensive safety management systems that ensure employees are actively involved in assessing, preventing, and controlling the potential safety and health hazards at their sites. All DOE complex contractors may participate in DOE-VPP, including production facilities, laboratories, subcontractors, and support organizations. In keeping with DOE-VPP philosophy, *participation is strictly voluntary*. Additionally, any participant may withdraw from the program at any time.

DOE-VPP consists of three levels of participation (like those in OSHA VPP): Star, Merit, and Demonstration. The Star level recognizes outstanding protectors of employee safety and health. The Merit level is a steppingstone for participants that have good safety and health programs but need time and DOE guidance to achieve Star status. The Demonstration level allows DOE to recognize achievements in unusual situations that DOE needs to learn more about before determining approval requirements for the Merit or Star level.

Approving an applicant for participation in DOE-VPP demonstrates DOE recognition that the applicant exceeds the basic elements of systematic protection of employees at the site. Participants receive certificates of approval and the right to use flags showing the appropriate DOE-VPP program level the contractor has achieved. Participants may also choose to use the DOE-VPP logo on its letterhead or award items for employee incentive programs.

This report summarizes the results from the recertification review of Battelle Memorial Institute (Battelle) at the Pacific Northwest National Laboratory (PNNL) in Richland, WA, conducted from August 21 to October 26, 2023, and provides the Director of the Office of Environment, Health, Safety and Security with the necessary information to make the final decision regarding Battelle PNNL's continued participation in DOE-VPP at the Star level.

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ABBREVIATIONS AND ACRONYMS

Battelle	Battelle Memorial Institute
BM	Building Manager
BLS	Bureau of Labor and Statistics
CAIRS	Computerized Accident Incident Reporting System
COVID-19	Coronavirus Disease 2019
CSM	Cognizant Space Manager
DART	Days Away, Restricted and Transfer
DOE	Department of Energy
DSOC	Directorate Safety Operations Council
EHSS	Office of Environment, Health, Safety and Security
EHSS-12	Office of Worker Safety and Health Assistance
GSL	Grid Storage Launchpad
HAMMER	Volpentest Hazardous Materials Management and Emergency Response Federal Training Center
HAMTC	Hanford Atomic Metal Trades Council
HDI	How Do I
IH	Industrial Hygiene
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
ITS	Issue Tracking System
LEADS	Leading, Engaging, and Developing Staff
LLT	Laboratory Leadership Team
LMS	Learning Management System
LOLA	Laboratory Operations Leadership Academy
LOSA	Laboratory Operations Supervisor Academy
LOTO	Lock-out/Tag-out
M&O	Management and Operation
NAICS	North American Industry Classification System
OSD	Operational Systems Directorate
OSHA	Occupational Safety and Health Administration
PIC	Person-in-Charge
PNNL	Pacific Northwest National Laboratory
PPE	Personal Protective Equipment
SCoR	Safe Conduct of Research
SME	Subject Matter Expert
Team	Office of Environment, Health, Safety and Security DOE-VPP Team
TET	Travel Emergency Team
TRC	Total Recordable Case
VPP	Voluntary Protection Program
VPP SC	Voluntary Protection Program Steering Committee
WS&H	Worker Safety and Health
WTL	Work Team Leader

EXECUTIVE SUMMARY

The Department of Energy (DOE) Voluntary Protection Program (VPP) Assessment Team (Team) from the Office of Environment, Health, Safety and Security (EHSS) conducted the triennial review of Battelle Memorial Institute (Battelle) at the Pacific Northwest National Laboratory (PNNL), located in Richland, WA, from August 21 to October 26, 2023 and recommends that Battelle PNNL continue to participate in DOE-VPP at the Star level. This report summarizes the DOE-VPP review results supporting the Team recommendation.

Located in Richland, WA, the DOE Office of Science manages PNNL as one of 10 National Laboratories within its purview. The DOE Pacific Northwest Site Office oversees PNNL operations. Battelle is the prime contractor for management and operation of PNNL. Battelle has managed PNNL for DOE and its predecessors since 1965, and "Battelle PNNL" will refer throughout this report to Battelle's staff, facilities, and operations at PNNL. Battelle PNNL performs scientific and technological research for other DOE offices, as well as other government agencies, universities, and industry.

EHSS conducted the DOE-VPP review using a combined virtual and onsite approach to verify that Battelle PNNL continues to meet expectations for participation at the Star level. The results of the review indicated that Battelle PNNL is:

- Committed to ensuring it accomplishes its missions safely, without unnecessary or unanalyzed risks;

- Engaging the workforce in maintaining a strong safety culture and empowering workers to identify issues, recommend improvements, and stop and pause work when questions or issues arise;

- Correctly identifying and analyzing hazards using teams of subject matter experts, workers, and managers and maintaining job hazard analyses for all work;

- Properly controlling hazards using the appropriate hierarchy of controls and engaging safety and health professionals in processes to properly define, authorize, control, and complete work safely;

- Appropriately training and qualifying all workers, managers, and subcontractors to recognize and control the hazards they may encounter; and

- Maintaining accident and injury rates that are lower than the comparison industry.

Battelle PNNL continues to innovate, leveraging mechanisms like *Lab Assist*, the laboratory-wide work management tool, and organizational "right-sizing" to empower managers and workers and integrate safety into laboratory activities. The connection to Safe Conduct of Research principles resonates integrated safety management and DOE-VPP concepts throughout the workforce and enables clear communication of safety messaging. Workers have a voice to identify concerns through multiple avenues, receive high-quality support from safety professionals and subject matter experts, and encounter strong safety committee engagement to

keep safety expectations at the forefront. Battelle PNNL staff recognize that collaboration among directorates and between research and operations organizations is critical to ensure the safety of the workforce.

The Team identified some opportunities for improvement that may assist Battelle PNNL continuing efforts to empower its workforce and recognize the strengths of its staff. The Team did not identify any programmatic noncompliance with DOE safety requirements that would preclude participation in DOE-VPP.

TABLE 1: OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
Battelle PNNL senior laboratory staff should regularly prioritize and commit time towards walking through workspaces and engaging directly with individual workers or work teams, virtually if necessary, to personally reinforce safety expectations.	**8**
Battelle PNNL should evaluate the current union safety representative roles, responsibilities, and workload and consider application of a fully dedicated union safety representative role.	**9**
Battelle PNNL should consistently leverage DSOC potential to effectively address worker-raised concerns. DSOCs should reinstate the regular practice of soliciting worker input and concerns at each DSOC meeting. The worker concerns should be evaluated and tracked to closure with progress updates and discussion during DSOC meetings.	**12**
The Battelle PNNL *Lab Assist* committee should incorporate all laboratory, nonlaboratory, office, and support services spaces compliance verification inspections into a single process to ensure documentation of inspection for all spaces per applicable directives.	**17**
Battelle PNNL should review its workplace inspection policies, procedures, training, and qualification requirements to ensure that affected workers are familiar with common safety hazards and applicable abatement methods.	**25**
The Battelle PNNL training department should consider opportunities to enhance real-world applicability of practical training (e.g., chemical training for laboratory workers, arc flash training, and LOTO training) such as, dedicating permanent space for realistic training mockups.	**28**

I. INTRODUCTION

This report provides the Department of Energy (DOE) Director, Office of Environment, Health, Safety and Security (EHSS), the results of the triennial review of Battelle Memorial Institute (Battelle) at the Pacific Northwest National Laboratory (PNNL), located in Richland, WA, from August 21 to October 26, 2023. Based on this review, the DOE Voluntary Protection Program (VPP) Assessment Team (Team) recommends that Battelle continue to participate in DOE-VPP at the Star level.

Located in Richland, WA, the DOE Office of Science manages PNNL as one of 10 National Laboratories within its purview. The DOE Pacific Northwest Site Office oversees PNNL operations. Battelle is the prime contractor for management and operation (M&O) of PNNL. Battelle has managed PNNL for DOE and its predecessors since 1965, and "Battelle PNNL" will refer throughout this report to Battelle's staff, facilities, and operations at PNNL. Battelle PNNL performs scientific and technological research for other DOE offices, as well as other government agencies, universities, and industry. Battelle PNNL provides facilities, unique scientific equipment, and world-renowned scientists and engineers who work to:

- Deliver breakthrough science and technology to meet today's key national needs;
- Strengthen the Nation's scientific foundations for fundamental research and innovation; prevent and counteract terrorism through applied research in information analysis, cyber security, and the nonproliferation of weapons of mass destruction;
- Increase the Nation's energy capacity and reduce dependence on imported oil through research of hydrogen and biomass-based fuels; and
- Reduce the effects of energy generation and use on the environment.

Battelle PNNL employs approximately 6,107 staff members with a fiscal year 2022 business volume of $1.34 billion. Battelle PNNL has a variety of laboratory facilities at its main campus in Richland, WA. Facilities include the William R. Wiley Environmental Molecular Sciences Laboratory, a DOE Office of Science National Scientific User Facility; the Biosciences Facility; the Computational Sciences Facility; the Applied Process Engineering Laboratory; the Radiochemical Processing Laboratory; the Research Aircraft Facility; and the Physical Sciences Laboratory.

Battelle PNNL also operates the Marine Research Operations Facility (including the Coastal Security Institute) in Sequim, WA, and has satellite offices in Seattle and Tacoma, WA; Portland, OR; and Washington, DC. Battelle PNNL also has personnel deployed around the globe conducting a variety of scientific and engineering missions. Battelle PNNL is currently operating under a 5-year contract extension as of July 2022.

Battelle PNNL has been a DOE-VPP participant since its initial Star status award in 2001. EHSS conducted this 2023 triennial review in accordance with DOE-STD-1232-2019, *U.S. Department of Energy Voluntary Protection Program, Vol. 1-4,* requirements to verify that Battelle PNNL continues to meet DOE-VPP expectations for participation at the Star level. The Team conducted

the review in two phases. From August 21 to September 8, 2023, the Team utilized virtual methods to interview workers and managers, attend meetings, and review documents. The Team then performed onsite work observations, validations, and interviews at the Richland, WA campus and at the Sequim, WA facility between October 17-26, 2023.

Battelle PNNL commitment to safety and health programs that protect employees, and the public is strong and evident. Battelle PNNL maintains an excellent safety performance record, consistently maintaining injury rates below its comparison industry. This report contains a review and discussion of Battelle PNNL injury and illness rates and an assessment of safety management system elements compared to the DOE-VPP tenets of Management Leadership, Employee Involvement, Worksite Analysis, Hazard Prevention and Control, and Safety and Health Training.

II. INJURY INCIDENCE CASE RATES

To maintain DOE-VPP Star status, the contractor's average for both Total Recordable Case (TRC) rates and Days Away, Restricted, and Transfer (DART) case rates for the most recent 3-year period shall be at or below the most recent specific industry national average North American Industry Classification System (NAICS) code published by the Bureau of Labor Statistics (BLS). The NAICS code for Battelle PNNL and its contractors is 5417, *Scientific Research and Development Services*.

The following table presents the most recent 3-year period data validated by the Team using Battelle PNNL Occupational Safety and Health Administration (OSHA) 300 Logs, the DOE Computerized Accident Incident Reporting System (CAIRS), the Team's calculation of the TRC and DART rates, and the specific industry national average for the comparison industry.

TABLE 2: 3-Year Injury and Incidence Rates
Injury Incidence Case Rates - Contractor Employees (Battelle PNNL – CAIRS Org Code 7500503)

Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART	DART Case Rate per 200,000 hours
2020	8,613,127	12	0.28	6	0.14
2021	9,011,185	9	0.20	7	0.16
2022	9,541,256	11	0.23	6	0.13
Three Year Totals	27,165,568	32	**0.24**	19	**0.14**
(BLS-2021) industry average for NAICS 5417 Scientific Research and Development Services			0.70		0.40

Injury Incidence Case Rates – Subcontractor Employees (Battelle PNNL – CAIRS Org Code 7500504)

Calendar Year	Hours Worked	TRC	TRC Incidence Rate per 200,000 hours	DART	DART Case Rate per 200,000 hours
2020	120,561	0	0.00	0	0.00
2021	188,776	1	1.06	0	0.00
2022	177,695	1	1.13	1	1.13
Three Year Totals	487,032	2	**0.82**	1	**0.41**
(BLS-2021) industry average for NAICS 5417 Scientific Research and Development Services			0.70		0.40

3-Year *TRC Incidence Rates, including subcontractors: 0.25

3-Year **DART Case Rates, including subcontractors: 0.14

Discussion

As of September 30, 2023, Battelle PNNL employs approximately 6,107 workers and 92 service subcontractors. No temporary workers are employed. Battelle PNNL has 18 TRC and seven DART cases for the current year-to-date. The 2023 recordable cases ranged from slips, trips, and falls; ergonomic and lifting injuries; and insect bites. During the Coronavirus Disease 2019 (COVID-19) pandemic period between March 2020 and September 2023, Battelle PNNL experienced 126 work-related COVID-19 cases. The TRC/DART case rate table above does not reflect work related COVID-19 cases per DOE Deputy Assistant Secretary for Safety, Security, and Quality Assurance memo dated October 16, 2020, *Supplemental Guidance for Recording and Reporting COVID-19 Cases*. The Team did not identify any incentives that would discourage workers from reporting injuries. Interviews with workers indicate they do not fear reprisal for reporting and acknowledge managers encourage the reporting of an injury, incident, near-miss, or first aid case.

The Team conducted a random sampling of Battelle PNNL DOE CAIRS database cases, and the results indicate the recordkeeper is documenting all injuries and illnesses in the database. The contractor is maintaining complete and accurate recordkeeping logs required by Battelle PNNL Process- *Investigate and Report an Occupational Injury or Illness,* and ADM-535, *PNNL Management Notification and Classification of Injury, Illness, or Potential Exposure*, including the OSHA 300 Log, 300A Summary, and comparable 301s. The recordkeeper tracks injury or illness cases using the Battelle PNNL Occupational Injury or Illness Case File Checklist. The recordkeeper posted the OSHA 300A Summary according to the recordkeeping standard during the required periods, and it remains accessible to all personnel throughout the calendar year. The logs reflect the safety and health conditions under this contractor's control. The Battelle PNNL recordkeeper has completed CAIRS training and is knowledgeable of the recordkeeping requirements.

Conclusion

Battelle PNNL 3-year TRC and DART rates are 65 and 64 percent, respectively, lower than the BLS comparison industry average for its NAICS code and meet the expectations for continued DOE-VPP participation.

III. MANAGEMENT LEADERSHIP

Management Leadership is a key element in obtaining and sustaining an effective safety culture and implementing the guiding principles of integrated safety management. The contractor shall demonstrate senior level management commitment to integrated safety management, occupational safety and health, and meeting the requirements of the DOE-VPP. Management systems for comprehensive planning shall address safety and health requirements and initiatives. Elements of that management system shall include: (1) clearly communicated policies and goals, (2) clear definition and appropriate assignment of responsibility and authority, (3) adequate resources, (4) accountability for both managers and workers, and (5) managers shall be visible, accessible, and credible to employees. As with any other management system, the organization shall integrate authority and responsibility for employee safety and health with its management system and shall involve employees at all levels of the organization.

Since the 2019 DOE-VPP assessment, Battelle PNNL leadership has navigated the laboratory through a variety of significant changes, including a notable period of remote work restrictions during the COVID-19 pandemic. For example, Battelle PNNL completed deployment of the *Lab Assist* work management system throughout research organizations and a large portion of facility operations. Battelle PNNL also implemented a comprehensive line-management realignment to "right-size" the ratio of researchers and workers to first line team leaders and second line group leaders. These changes occurred during significant staffing level increases and turnovers, including some senior leadership. In 2023, the Battelle PNNL management team continues to recognize the criticality of safe work practices, a strong safety culture, and partnership between research and support organizations as they adapt to a new hybrid work environment and plan for future success.

Battelle PNNL has a written safety and health policy in P23/004, *PNNL Policy on Integrated Safety Management and Environmental Management Systems*. This safety and health policy focuses on hazard reporting, injury reporting, the right to stop work, and prohibition of discipline or reprisal for stopping work or reporting concerns. Battelle PNNL leadership heavily emphasizes the Battelle-developed Safe Conduct of Research (SCoR) principles to drive the safety and health policy throughout the organization's activities. The first two SCoR principles, "Everyone is personally responsible for ensuring safe operations" and "Leader's value the safety legacy they create in their discipline," set the foundation for managers to cultivate an environment where workers and researchers are empowered to identify and raise issues. The third and fifth SCoR principles, "Staff raise safety concerns because trust permeates the organization" and "A questioning attitude is cultivated," further guide the organization towards a healthy safety culture and compliance with safety and health policy expectations. Battelle PNNL managers encourage SCoR messaging through web videos, posters and branding in buildings, and in meetings to help connect safety and health policy to real-life applications. The Team observed SCoR principles referenced when discussing work practices with multiple managers and workers from a variety of directorates. For example, the Team noted that several staff, both new and long-tenure, interviewed or encountered during site walkdowns were quick to highlight their ability to report issues with a low threshold via the "2400" Security Operations Center (SOC) hotline and readily gave examples of their calls. The ease with which laboratory staff are able to fulfill their safety policy and SCoR principle responsibility to report issues is a key

example of Battelle PNNL leadership putting policy into practice. The SCoR principles have proven successful at Battelle PNNL and other Battelle-managed national laboratories for relating safety policy to laboratory culture and actions, and implementation by Battelle PNNL is a best practice among DOE-VPP peers.

Battelle PNNL defines its compliance with Title 10, Code of Federal Regulations (CFR) 851 worker protection program requirements using WSH-PD-017, *WS&H Program Description*. This and other program descriptions are readily available to staff via the company intranet. Battelle PNNL puts its worker safety and health program into practice by empowering each directorate towards safe work in accordance with the Integrated Safety Management (ISM) core function of "Line Management Responsibility for Safety." Battelle PNNL directorates leverage Directorate Safety Operations Councils (DSOC), comprised of management champions and researcher or support staff representatives, to tailor safety priorities for their specific focus areas. The VPP Steering Committee (VPP SC) similarly serves to communicate safety and health program goals and priorities throughout the laboratory. Worker Safety and Health (WS&H) organization staff support line organizations by maintaining and communicating safety program requirements and serving as subject matter experts (SME) for safety and industrial hygiene (IH). The Team met with Associate Laboratory Directors (ALD) and operations managers from several directorates and observed good program implementation partnership between line and safety organizations.

Battelle PNNL incorporates safety and health considerations when performing strategic planning and setting laboratory goals. Each ALD provides forecasts for future fiscal years (FY). Laboratory senior leadership sets FY budget priorities for operations and designates an additional Strategic Investment Reserve fund from which ALDs can request support for additional investments beyond laboratory-wide priorities. Additionally, Battelle PNNL M&O directorates can fund larger scale initiatives, such as laboratory-wide system updates though an integrated M&O investment fund. Discussions with Operational Systems Directorate (OSD) and Business Services Directorate (BSD) leaders identified that opportunities to fund WS&H staffing and other safety-focused investments are readily available and considered based on operations and safety staff inputs. Laboratory leadership noted ongoing planning to consider how the recent significant increases in Battelle PNNL workload and staffing impacts organizations and whether step changes or diseconomies of scale could affect operations. The Laboratory Leadership Team (LLT) meets weekly and at a larger periodicity for deep-dive workshops to enable focused planning. The Team received feedback that safety is a regular discussion topic among the LLT. The combination of forward-thinking LLT planning and strong WS&H leadership inputs towards OSD planning result in Battelle PNNL having adequate funding and resources to support safety programs.

During the assessment, the Team reviewed the adequacy of the safety and health program and WS&H organization to support laboratory activities. Battelle PNNL has experienced an increase in workload and overall staffing, and managers from multiple directorates recognize the need to expand safety and health support to match that growth. Although discussions with various staff indicate that expansion of support staff may have lagged behind mission growth in some areas, research directorate leaders are engaged with OSD leaders to ensure adequate support of future projects. Research directorate leaders and M&O directorate staff consistently praised the high

quality, availability, and engagement of deployed WS&H staff, program owners, and SMEs. Discussions with WS&H leaders noted that staff turnover has challenged continuity and knowledge retention within the organization. WS&H has taken actions such as "SME and me" presentations at staff meetings to combat knowledge drain and proactively place end users in front of program experts for information sharing. WS&H uses program SME qualification cards and role transfer checklists to administratively manage SME turnover without significant risk to program implementation. Interviews and discussions indicated that Battelle PNNL benefits from proactive and engaged WS&H leaders who create an environment where their deployed staff and program SMEs feel reinforced and supported in their roles. Continued resource planning from research directorates and other line organizations and engagement with OSD will be critical to ensuring adequate support for future safety and health initiatives and safe work practices.

Battelle PNNL line organizations take responsibility for safe laboratory operations. The various directorates often leverage Chief Operations Officer (COO) or operations manager roles to serve as conduits for the safety expectations of senior leadership to laboratory staff. Battelle PNNL senior leaders have also made significant efforts to "right-size", or redistribute, staffing in all directorates into smaller Group Leader (second line supervisor) and Team Leader (first line supervisor) ratios that allow more direct engagement with staff. This "right-sizing" of employees to supervisors had more visible impact for research directorate teams. However, the whole laboratory benefits from general consideration that supervisor engagement, enabled by manageable team size, is a critical element of creating a safe work environment for employees. Management and operations directorates benefit from Battelle PNNL leadership setting the tone for first line interactions and organizational structure. Similarly, Battelle PNNL leadership recognizes that promotion to supervisor and manager roles does not automatically prepare leaders to take responsibility for ensuring employees can stay safe at work. Battelle PNNL leaders from various directorates noted the high value placed on Laboratory Operations Supervisor Academy (LOSA) training, among other opportunities, and credited efforts to send staff in new supervisory or technical leadership roles or those identified as future leaders to prepare them for success. Battelle PNNL has invested resources toward reinventing laboratory work management into the *Lab Assist* system. This activity-based work management tool serves as a greater administrative control towards ensuring line organizations thoroughly analyze activities and workspaces for hazards and engage appropriate SMEs. Large initiatives like *Lab Assist*, line management reorganization, and leadership training, as well as discussions with research and operations leaders highlighting group and team level safety priorities, showed successful line ownership of safety responsibilities.

Battelle PNNL leaders recognize that visible presence is valuable towards safe laboratory operations and a safety conscious work environment and take a varied approach to employee engagement. The laboratory director and deputy directors emphasize safety during LLT meetings with senior staff. Laboratory leaders and communications staff have developed videos highlighting laboratory initiatives and SCoR principles in efforts to bridge the gap between in-person accessibility and meeting workers where they are located. The Team met with ALDs and other senior laboratory leaders who all understood the importance of employee interactions for gauging the organization's safety practices and culture. However, the Team received regular feedback that many senior leaders were unable to devote as much time to field interactions with staff as desired. Discussions with researchers and workers supported those self-evaluations,

noting that some senior leadership visibility was infrequent, especially for those not in operations-specific roles. Although pandemic restrictions and hybrid work challenged in-person engagement, those situations are now the standard. Senior leaders must normalize regular live visibility again, even if that interaction is virtual. Workers and first line supervisors see and prioritize what their leaders prioritize. Delegation of senior leader engagement to specialized operations managers, while those roles are clearly valuable, is not an equal substitute from a researcher or worker's perspective. Regular leadership engagement should occur, and leaders should take care not to only be present after issue or incident response situations. Senior leader presence only in the wake of a negative event can challenge a safety conscious work environment.

Opportunity for Improvement:

Battelle PNNL senior laboratory staff should regularly prioritize and commit time towards walking through workspaces and engaging directly with individual workers or work teams, virtually if necessary, to personally reinforce safety expectations.

The Team met with a variety of research directorate operations and OSD leaders who highlighted the importance of visibility in the workspaces and their efforts to be present and accessible regularly. The Team observed very positive direct engagement examples between OSD group leaders, team leaders, and employees within WS&H and Facilities and Infrastructure Operations (F&IO) during walkdowns and discussions. Similarly, the Team received feedback on the value of the Research Supervisor and Cognizant Space Manager (CSM) roles to maintain a positive safety culture and oversee safe work practices during research directorate turnover. The Team saw staff coming to engage with CSMs during walkdowns and showing a high degree of trust and open interaction with both the CSMs and accompanying Team members. The Team observed the positive safety culture impacts of management visibility among lower-level line managers with more direct responsibility towards research and operations staff, reinforcing the importance of such visibility at all management levels.

Battelle PNNL bargaining unit leaders, affiliated with Hanford Atomic Metal Trades Council (HAMTC), keep a focus on site-wide safety consciousness and regularly coordinate with mangers and WS&H staff to address safety concerns. Battelle PNNL bargaining unit employees participate on the VPP SC and OSD DSOC. A chief steward is engaged as a HAMTC Safety Representative, serving a variety of safety and health related functions in a part-time capacity alongside the craft role. DOE-VPP has regularly highlighted the value of union safety representatives for engaging workers and communicating safety expectations where managers and safety professionals may encounter challenges, even recognizing some best practices among member sites employing this role. Incumbents of these roles often exhibit a strong safety passion and high comfort level communicating between their craft peers and management, and the Team received feedback that Battelle PNNL staff recognize these traits in the incumbent role. Although DOE-VPP has not identified a right-size ratio of union safety representatives to the craft population they represent, applying the model in a part-time capacity can dilute the value of a peer safety leader and impose administrative distractions from the safety focus.

Opportunity for Improvement:

Battelle PNNL should evaluate the current union safety representative roles, responsibilities, and workload and consider application of a fully dedicated union safety representative role.

Battelle PNNL employees receive briefings on site safety at the start of employment through new employee orientation and a suite of initial computer-based training. Battelle PNNL exposes employees to SCoR principles and their personal responsibilities for safe work, including raising issues when concerned or unsafe. Battelle PNNL uses VPP SC mixers to connect new and long-tenure employees to each other and to various safety resources onsite. The VPP mixers, large gatherings with food, engaging activities, and booths representing various laboratory groups and safety programs have anchored other laboratory initiatives such as *WE Week* and have inspired directorate-specific connecting events, serving as a refresher to supplement the sometimes-overwhelming information provided for new employee training. The Team met with multiple staff who were familiar with VPP mixer activities, and even long-tenure staff appreciated the ability to refocus on safety practices after pandemic periods of telework. The Team spoke with a relatively new researcher during a walkdown who highlighted appreciation of the Battelle PNNL posture on asking for help when unsure and the ease with which concerns could be reported by calling the "2400" SOC hotline. Battelle PNNL managers and staff noted that the SCoR concepts can represent a large culture change for some researchers coming from less safety-conscious academic work environments or craftspeople coming from roles outside of DOE. Battelle PNNL researchers and craftspeople interviewed expressed that they felt safe and knew what to do to work safely, both individually and with their peers. Battelle PNNL employee introduction to site safety at orientation or during initial training is valuable, but the proactive opportunities to refresh staff on their resources through avenues like VPP mixers are extremely valuable for translating training into knowledge.

Subcontractors working for Battelle PNNL receive upfront exposure to safety expectations, safety program documents, and job-specific hazards during the acquisition process. Procurement officers utilize an acquisition review process that invokes safety requirements or review by safety SMEs while contracting documents are in development. Technical Oversight Representatives for each contract coordinate the requirements of subcontract work, including safety inputs. The Team met with Battelle PNNL WS&H subcontractor oversight and subcontractors constructing the new Grid Storage Launchpad (GSL) battery research facility which is in the late stages of construction. Several of the GSL subcontractors had worked previously on other projects for Battelle PNNL and noted the value of trust in their safety rigor which enabled workforce continuity. The subcontractors explained that new project workers receive GSL-specific orientation, and workers can recognize people onsite who have completed the orientation by a designated hard hat sticker for additional accountability. GSL orientation includes exposure to reporting expectations like the "2400" hotline and general construction site hazards. GSL workers receive further information in daily prejob briefings that include job safety analysis reviews for upcoming work. The subcontractors combined their own company safe work practices with baseline Battelle PNNL safety expectations. GSL orientation sets the tone for safe work, and supervisors and safety professionals use practices such as coaching and positive reinforcement of desired behaviors to maintain consistency. Battelle PNNL managers

and safety oversight noted the ability to enforce safety expectations when subcontractors do not self-regulate, including a recent line-of-fire injury at the South Campus Warehouse buildout resulting in disciplinary action and removal of a subcontractor supervisory employee from the site. The Team observed that Battelle PNNL maintains the same safety expectations when bringing subcontractors onsite as it does for laboratory staff, and the contractor has demonstrated the ability to address safety and hazard controls in subcontracts.

Battelle PNNL takes measures to evaluate its safety and health programs, as well as survey aspects of the laboratory safety culture. The Team reviewed the 2022 Operational Excellence Culture Evaluation submitted as the Battelle PNNL DOE-VPP annual report. The evaluation noted risks such as Integrated Safety Management System (ISMS) application to offsite work, Lockout/Tagout (LOTO) process improvements, and updates to high-risk project safety oversight. Battelle PNNL conducted an annual workplace survey for a third consecutive year in 2023. Battelle PNNL managers began to receive and review results of the workplace survey during the DOE-VPP recertification assessment. Senior laboratory leaders recognize the value of data-driven safety culture analysis and expect to begin seeing trends from the cumulative results. Although the results were not available to the Team at the time of the assessment, the Team observed an example of BSD DSOC members referring to the survey when determining how to engage directorate staff. Battelle PNNL WS&H leaders discussed examples of safety program assessments and further highlighted the value of feedback towards continuous improvement. The Team discussed trending with Performance Management staff, including close work with directorate COOs and operations managers on trimester trend reporting, such as *Lab Assist* data and "2400" hotline calls. The Team observed Battelle PNNL staff at multiple levels reinforcing the good utilization of feedback mechanisms towards safety improvement.

Conclusion

Battelle PNNL leadership recognizes the risk of complacency as it experiences increases in workload and high levels of hiring and employee turnover. The senior leadership team has championed initiatives, such as Lab Assist, LOSA training, and the Group/Team Leader organizational restructuring to make the human factor of the laboratory's safety practices more robust amid these changes. Battelle PNNL has infused SCoR principles in all aspects of its work, and employees voice enthusiasm for their work and a high comfort level engaging with their leaders and raising concerns. Employees receive support in their ability to give feedback and raise concerns with a variety of easily accessible avenues such as DSOCs and the "2400" SOC hotline. Battelle PNNL has opportunities to improve senior leader visibility and application of the union safety representative role. Line managers own safe research and operations, and safety professionals provide high-quality technical expertise and field engagement. Battelle PNNL meets the expectations for Management Leadership and continued participation in DOE-VPP.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels shall continue to be involved in structuring and operating the safety and health program and in decision making that affects employee health and safety. Employee involvement is a major pillar of a strong safety culture. Employee participation is in addition to the right to notify managers of hazardous conditions and practices. Managers and employees shall work together to establish an environment of trust where employees understand that their participation adds value, is crucial, and is welcome. Managers shall be proactive in recognizing and rewarding workers for their participation and contributions. Employees and managers shall communicate and collaborate in open forums to discuss continuing improvements, to recognize and resolve issues, and to learn from their experiences.

During the 2019 DOE-VPP assessment and prior, the Team noted Battelle PNNL DSOC and VPP SC as primary mechanisms for promoting employee involvement and communication. The Team observed continuing use of DSOCs among the various directorates during this assessment. Battelle PNNL intends DSOCs to foster a culture of continuous improvement and to promote behaviors throughout the directorate that support safe, secure, and reliable operations. Each directorate has an individual DSOC charter that establishes and defines the expectations for conducting the meetings. The language of multiple DSOC charters states that Battelle PNNL expects the DSOCs to "share and examine safety, health, environmental, security, and other operational-related activities and occurrences to promote resolution of issues, contribute to a safe and healthy work environment, and to further achieve exemplary operational performance in a cooperative manner and effort".

The DSOC council includes employees and managers with the collective ability to resolve issues beyond what a line supervisor can adequately address. The National Security Directorate (NSD) DSOC chair provided the Team a clear example of DSOC ability to resolve employee-raised concerns. Workers at the Radiochemistry Processing Laboratory had raised an inconsistent Wi-Fi reception concern to the DSOC representative, resulting in employee connectivity issues in those affected areas. Wi-Fi unreliability negatively impacted performance in the laboratory. The NSD DSOC representative raised the worker's concern to the NSD DSOC. DSOC line management representation recognized the issue significance and elevated it. The DSOC efforts identified funding, and an upgrade to the laboratory Wi-Fi was in progress at the time of the DOE-VPP assessment. A maintenance service request or efforts of a single Team Leader may not have achieved such a timely resolution.

The Team observed several well-organized interactions in the DSOC meetings with an emphasis on promoting presentations related to relevant safety issues affecting Battelle PNNL staff. However, interviews with DSOC members identified that during and after the COVID-19 pandemic, several DSOCs moved away from collecting and tracking to closure issues raised by workers during the DSOC meetings. In the past, workers raised issues through their DSOC representatives or directly during DSOC meetings. The DSOC tracked issues at each meeting until closure and relayed progress to workers, enhancing issue visibility and reinforcing importance of employee voices. Interviews with former DSOC chairs and co-chairs during the assessment noted benefits to DSOC reintroduction of the employee issue solicitation, tracking, and resolution.

Opportunity for Improvement:

Battelle PNNL should consistently leverage DSOC potential to effectively address worker-raised concerns. DSOCs should reinstate the regular practice of soliciting worker input and concerns at each DSOC meeting. The worker concerns should be evaluated and tracked to closure with progress updates and discussion during DSOC meetings.

The VPP SC serves the whole laboratory and is another avenue for elevating worker concerns and engaging employees with safety. The VPP SC consists of bargaining unit, research, and support staff representatives from across Battelle PNNL. VPP SC promotes safety and connects laboratory staff to safety resources through various outreach efforts. The VPP SC has organized several activities to encourage employee involvement and introduce them to available Battelle PNNL programs. Two primary activities open to all Battelle PNNL employees include the "Global Ice Cream Cool-Off" and the VPP Safety and Operations Mixer. The VPP SC intends the events as a forum to share safety messages, reinforce Battelle PNNL's safety culture, and familiarize employees with safety and health laboratory resources and points-of-contact. The Team received feedback from laboratory staff that these VPP SC sponsored safety activities were beneficial not only to newly hired employees but also to more tenured staff after COVID-19 pandemic restrictions and long remote work periods.

In 2023, VPP SC organized a widely attended mixer as an anchor event for *WE Week*, discussed later in this section. Laboratory directorates have seen value in the VPP SC mixer model, and the VPP SC has recently supported direct requests from the Physical and Computational Sciences directorate and Earth and Biological Sciences directorate to conduct "mini mixers" for those organizations. These directorates recognized a challenge presented by a large new hire population. The "mini mixers" provided opportunities to reinforce organizational safety expectations, casually familiarize workers and managers, and refresh the safety culture as staff returned to work onsite. The VPP SC focused "mini mixer" safety messaging to the individual directorate workscope and organizational requirements. The directorates funded the "mini mixers", and VPP SC members supported the events and coordinated support staff and information tables. Interviews conducted by the assessment Team identified that the directorates and participants value the mini mixers. The VPP SC members indicated that other directorates are interested in future "mini mixers" to achieve similar reemphasis on safety culture and cooperation.

Prior to the COVID-19 pandemic, Battelle PNNL began the *WE Culture* initiative to focus on laboratory staff top culture traits and leverage those traits towards building an environment of inclusion and psychological safety. The *WE Culture* initiative used a cultural insight survey to identify three traits which were most highly representative of Battelle PNNL responses: adventurous, sociable, and wise. Battelle PNNL uses these traits to focus messaging of collaboration, open communication, safety, and security in ways which would best resonate with laboratory personnel. In 2023, Battelle PNNL held a *WE Week* event to reintroduce and progress *WE* branded initiatives throughout the laboratory. *WE Week* included a VPP Safety and Operations mixer to catalyze employee participation and a *WE Summit* incorporating panel discussions from a cross-section of laboratory staff. Active Bystander training sessions were also

a key part of the event. The Active Bystander training emphasized creating a psychologically safe workplace by giving employees tools to recognize unsafe and inappropriate conduct with examples teaching how to speak up against such conduct and act inclusively. Battelle PNNL staff expressed positive feedback about *WE Week* and identified that over 2,100 employees engaged in the activities in person and virtually.

Battelle PNNL has several communication methods to relay safety information to employees. Examples include the monthly "Porcelain Press" and the "VPP/DSOC Content Integration" newsletter. The "Porcelain Press" publication provides monthly information, such as upcoming Battelle PNNL events, safety highlights, or laboratory accomplishments. The most recent "Porcelain Press" discussed the ongoing DOE-VPP review, a reminder to employees about the upcoming Employee Benefits Open Season for FY 2024, onsite flu shot availability programs, and an article on "cultivating a questioning attitude." The "Porcelain Press" is distributed in print throughout laboratory restroom facilities to attempt maximum visibility, and is also available online for employees to review. The "VPP SC/DSOC Content Integration" newsletter is distributed approximately quarterly and supports DSOC coordinators and chairs with suggested meeting content and safety highlights from throughout the laboratory. VPP SC encourages DSOC coordinators and chairs to share this information with their council members. For example, the fall season newsletter included discussions regarding the upcoming DOE-VPP onsite review, videos highlighting the SCoR principles in action at Battelle PNNL, and safety and wellness articles for employees. The Team heard positive feedback regarding the Battelle PNNL publications from staff and DSOC representatives and noted that the information was timely and relevant to current site events.

Conclusion:

Battelle PNNL continues to support employee involvement through the DSOCs and the VPP SC. Due to remote work during the COVID-19 pandemic, some DSOCs stopped soliciting worker concerns and tracking them to resolution. The DSOCs should resume that practice to ensure effective employee involvement in those meetings. The VPP SC Safety and Operations Mixers continue to be well received by employees and are now being used by some individual directorates in the "mini mixer" format to improve new employee understanding of Battelle PNNL safety culture expectations. Battelle PNNL meets the DOE-VPP expectations for the Employee Involvement tenet.

V. WORKSITE ANALYSIS

Management of safety and health programs begins with a thorough understanding of all hazards that workers might encounter during work, and the ability to recognize and correct new hazards. The first two core functions of Integrated Safety Management (ISM), *Defining the Scope of Work* and *Identifying and Analyzing Hazards*, form the basis for a systematic approach to identifying and analyzing all hazards encountered during work as work planners use the results of the analysis in subsequent work planning efforts. Effective safety programs integrate feedback from workers regarding hazards and include a system to address newly recognized hazards. Successful worksite analysis also involves implementing mitigating measures during work planning to anticipate and minimize the impact of hazards.

In 2019, Battelle PNNL had established effective programs to analyze the worksite for potential safety and occupational health hazards. Battelle PNNL has continued to improve on those programs by implementing the *Lab Assist* tool and conducting new analysis of projects under construction and coming online before this assessment. The Team reviewed WSH-MA-001, *Contractor Environment, Safety & Health Manual (CESH)*; WSH-ADMIN-07, WSH Programs Assessment; WSH-PD-004, *Construction Safety Management*; WSH-PD-017, *WS&H Program Description*; and P23/004, *PNNL Policy on Integrated Safety Management and Environmental Management Systems;* and concluded that Battelle PNNL has a robust safety program determined to identify and mitigate workplace hazards, providing a SCoR environment and supporting research activities. A combination of interviews, document reviews, tours of the site, and work observations shows management continues to have an effective system in place to identify, analyze, and correct hazards and has a thorough understanding of all hazardous conditions and practices.

Battelle PNNL has an effective industrial hygiene (IH) program described in WSH-PD-018, *Industrial Hygiene*; WSH-IH-06, *Qualitative Hazard Analysis*; WSH-IH-07, *Quantitative Hazard Analysis*; and various hazard program-specific documents designed to identify, analyze, and protect researchers and support staff across the campus. WSH-IH-06 describes the process for conducting qualitative exposure assessments for work performed by Battelle PNNL staff, nonstaff performing research, and F&IO staff at the Richland campus, satellite offices, and both on- and off-site (also off-shore) client locations. The qualitative exposure assessment provides a risk-based professional judgement of hazard magnitude and the recommended exposure controls. WSH-IH-07 describes elements of the Battelle PNNL standard quantitative hazard assessment process for the measurement of exposure to hazardous agents, including a measurement strategy for chemical agents comparing workers' inhalation exposure with occupational exposure limit values. The Team reviewed several exposure assessment documents from the past 12 months at Sequim and the Richland campuses and observed that the IH assessments are ensuring employees work in a safe environment. Battelle PNNL WS&H staff told the Team they are pursuing IH program improvement opportunities, such as software database updates, and the Team found that staff maintain good hazard recognition and control under the current program.

Battelle PNNL maintains an adequate workforce of WS&H staff to analyze facilities, procedures, projects, identify hazards, and assess employee risk. When questions arise about conducting assessments or about unknown exposures, industrial hygienists and safety specialists collaborate with facility-specific SMEs on Battelle PNNL procedures and sampling protocols. Within a

defined geographic area, safety professionals review program-specific information to assist in addressing controls and preventative actions based on past sampling results. WS&H posts Hazard Awareness Summaries generated by *Lab Assist* at the entry to each hazardous workspace identifying the location, name of space, point-of-contact, workspace hazards and controls, activity hazards, and approved activities.

Battelle PNNL staff interact with the occupation medicine provider, AnovaWorks, as needed regarding workplace conditions and surveys, potential exposure situations, work restrictions, medical considerations of work assignments, return-to-work issues, and other occupational health issues. WSH-PD-014, *Occupational Medical*, provides guidance for AnovaWorks to participate in workplace tours, visits to worksites, and periodic meetings with IH staff to maintain familiarity with job conditions and issues related to worker health. AnovaWorks staff also participate in certain committees and meetings like the DSOCs and working groups for improving or implementing new health and safety processes that relate to occupational health and safety.

The work control process at Battelle PNNL has undergone an extensive change since its last DOE-VPP assessment in 2019. Management identifies work as belonging to the Research Directorates or the Operational Systems Directorate (OSD). Research and development (R&D) work includes basic laboratory and operation practices planned using *Lab Assist*. F&IO perform planned, maintenance, or dispatched work as described in ADM-016, *Work Control*.

Lab Assist is an activity-based work planning and control platform that completely replaced the previous space-based system known as the Integrated Operations System (IOS) as of late FY 2022. The *Lab Assist* platform reinforces several elements of the ISMS, including identification of hazards and controls and effective communication to affected staff members in compliance with Battelle PNNL hazard programs. The activity traits identified in *Lab Assist*, like Activity Details, Hazard Awareness Summaries, and Hazard Cards, include information about hazards that workers will encounter and the controls they should use to keep themselves safe. Battelle PNNL continues to develop *Lab Assist* by implementing the final work process for both F&IO and R&D offsite work activities.

Battelle PNNL rolled out the functionality of *Lab Assist* in stages based on priorities and modules that were in various stages of deployment over the last 4 years. Implementors managed these improvements as part of an agile project management approach with an embedded change consultant and active engagement by a diverse team (e.g., leadership, research operations managers, research staff members including activity owners (AO), cognizant space managers (CSMs), line managers, technical oversight representatives, and operations support staff)). Deployment of each module followed a structured approach. AOs create activities identifying scope, hazards, assigned workers, and spaces in which to conduct work. *Lab Assist* assigns training and medical clearances to workers, as needed, based on the requirements for their activities. CSMs manage R&D spaces by having approval authority for all work occurring in their space, as well as identifying space hazards. *Lab Assist* greatly improves identification and mitigation of hazards in all work environments and reduces administrative requirements by centralizing work processes and controls.

ADM-016, *Work Control*, defines the work control process for dispatch and planned work for facility operations and maintenance related services at Battelle PNNL. Battelle PNNL core teams plan all facility operations and maintenance work. Each OSD project type follows the four phases of executing the project life cycle: plan, implement, control and close. The control phase runs concurrently with the implementation phase. The control phase includes managing performance and change. The four phases and the SCoR principles enable the safe completion of work. ADM-016 describes assigned craft, building engineers, building managers (BM), person-in-charge (PIC), planner, CSM, group leader or facility manager, and work team leader (WTL) roles and responsibilities.

Personnel submit electronic service requests (ESR) to conduct dispatch and planned work. BMs or their delegates triage ESRs during an initial screening that assigns work type and associated craft based on a set of established criteria according to ADM-016-001, *Triage Instructions*. BMs prepopulate the hazards and controls into their WP&C documents with Maximo®, the Battelle PNNL maintenance management software. WTLs review the work and add or remove hazards that are specific to the tasks. CSMs review and approve project planning documents that involve work on R&D systems and provide space hazard input.

Battelle PNNL staff perform dispatch projects and may include support from other organizations. The project complexity of dispatch work is either low or average. Workers mitigate low risk hazards associated with the work using existing controls identified in the Battelle PNNL "How Do I" (HDI), a web based local intranet tool providing guidance and instruction on processes and procedures, and *Lab Assist*. Planned projects include any scope of work not meeting the criteria for dispatch work or any other activity identified by the responsible BM. Dispatch and planned projects are prepared according to ADM-016-002, *Project Planning Documents*, and ADM-016-Form-01, *Project Planning Documents Review Checklist*. BMs approve emergency work by adding to the plan-of-the day per ADM-016-003, *Building Management Planning and Control*.

PICs brief workers before performing work and when the scope of work or hazards change. Craft, PICs, and WTLs conduct prejob briefings to achieve worker understanding of the proposed scope and of their role with the project activity. As determined in the project planning phase, the briefing may vary from a self-directed briefing, an undocumented face-to-face discussion between the workers and WTL or PIC, or a documented prejob briefing using ADM-016-Form-02. BMs document ongoing work status and results using ADM-016-Form-04, *Project Work Log*. BMs, PICs and WTLs may conduct postjob briefing using ADM-016-Form-03, *Post-job Review Document*. Planners upload all documents and forms included in the work package to Maximo® according to recordkeeping requirements. The Team observed and concluded Battelle PNNL staff conduct work safely in accordance with work control procedures.

Battelle PNNL staff conduct risk management, preuse analysis, and prestartup analysis of planned, new, or newly acquired facilities, equipment, materials, experiments, and processes to identify hazards, access risks, and plan for prevention and control. The risk management process includes accessing and screening risk to determine a risk level of 1-3 based on the Likelihood and Impact level of the job or task. Stakeholders, the governing bodies for managing risk collectively at Battelle PNNL, ensure implementation of controls in programs to manage the risk accordingly. Battelle PNNL staff briefed the Team on two examples of preuse and prestart up analysis, one at the Sequim campus and the other at the Richland campus as follows:

- Battelle PNNL is currently having "Resilience", a 50-foot, first of its kind diesel-electric hybrid research vessel, designed and manufactured for use at the Battelle PNNL Sequim waterfront facility. Being a first-of-its-kind vessel, it has presented some unique challenges in the aquatic vessel manufacture, procurement, and hazard identification process. Where practical, SMEs and Operations Managers have utilized existing procedures or completed hazard assessments to develop new procedures, processes, and HDIs when identified. Prior to Resilience's arrival onsite, Battelle PNNL preuse, prestartup processes and procedures will have identified and mitigated potential hazards to ensure employees have a safe and hazard free aquatic work area environment to work.

- Prior to kicking off participation in Fentanyl analogs research at Battelle PNNL, staff conducted preuse, prestartup analysis and a thorough risk assessment required by ADM-900, *Non-Nuclear Readiness Process*, to identify potential hazards associated with the specific controlled substance. The work involved handling of a dangerous drug which required understanding of the hazards associated with fentanyl and the implementation of controls to mitigate those hazards. The Team attended briefings on the program, interviewed personnel responsible for the program and toured the associated laboratory and facility and agreed it was a good example of how the preuse, prestartup process at Battelle PNNL is ensuring staff have a safe laboratory environment to conduct work.

Field observations, documents, and interviews confirmed that Battelle PNNL conducts routine hazard control compliance inspections to identify and mitigate hazards as described in WSH-MA-001, *Contractor Environment, Safety & Health Manual (CESH)*. Staff document walkthroughs and observations in a variety of ways (e.g., *Lab Assist*, walkdown cards, checklists, emails) in each of the directorates. There were over 4,754 assessments conducted by managers in FY 2022 as documented in *Lab Assist*. WS&H staff documented compliance verification inspections in IOS until it was retired in late 2022. Although there are no specific targets for conducting management walkthroughs and observations, anecdotal information suggests managers are seeing value in conversations with staff members and are promoting a culture of engagement and trust. Staff developed an online form to record Management Walkthroughs and Observations to support nonlaboratory space or task-based observations by management. However, WS&H has difficulty providing documentation of these inspections for review.

Opportunity for Improvement:

The Battelle PNNL *Lab Assist* committee should incorporate all laboratory, nonlaboratory, office, and support services spaces compliance verification inspections into a single process to ensure documentation of inspection for all spaces per applicable directives.

WSH-ADMIN-08, *Responding to Worker Safety and Health Related Employee Concerns*, provides guidance to WS&H staff on how to respond to hazard reports. WSH-ADMIN-08 directs WS&H professionals in responding to employee safety and health concerns voiced by Battelle PNNL staff. WS&H professionals use this procedure to address unique situations that are outside the scope of routine IH and occupational safety assessment and monitoring activities.

The workforce is knowledgeable of the hazards they face and are confident they can perform work safely. Interviews with employees validate that employees report hazards without fear of reprisal. Personnel discussed various methods and systems available for them to notify management about hazards. New employees received hazard reporting training during initial new employee training and then again during general employee refresher training. Employees can report hazards to the SOC hotline, referred to as "2400," 24 hours a day, seven days a week. Employees can also report to their supervisors, the onsite clinic, deployed field safety representatives, CSMs, craft stewards, and BMs or by email to worker safety and health staff listed on the Battelle PNNL Hub. Employees can also report anonymously using the Employee Concerns Program. WS&H posters posted throughout the complex provide additional instructions to employees on how to report hazards.

Battelle PNNL's accident and incident investigation program complies with WSH-OS-07, *Occupational Injury and Illness Accident Investigation, Recordkeeping and Reporting*. The program includes written procedures and guidance, written reports of findings, and hazard correction tracking, identification of causes, and provisions for preventive or corrective actions. The system provides provisions for a narrative report suitable for dissemination to all employees containing root causes, analysis, and lessons learned.

Employees or supervisors report accidents, incidents, injuries, and illnesses to the SOC around the clock as described in HDI, *Investigate and Report an Occupational Injury or Illness*. SOC Safeguard and Security officers direct the call to the applicable Responsible Person on the Action Call Tree. In the case of an injury or illness, the WS&H Services Manager receives the call and assigns action to the applicable deployed WS&H representative. Within 24 hours, the immediate manager, or the deployed WS&H representative initiates the Supervisor's Occupational Injury or Illness Report. The deployed WS&H representative completes the initial investigation and enters data into the Safety and Health Information Management System maintained in DataPipe™, and CAIRS. The WS&H services manager and recordkeeper make the decision on whether the injury or illness is OSHA recordable. Reporting in the DOE Occurrence Reporting and Processing System (ORPS) occurs if the investigation results in fact findings. HDIs describe reporting procedures for incidents like fires, government vehicle, material handling equipment, spills, etc. Results of investigations are available for employees to review on request.

Battelle PNNL is conducting trend analysis for data accumulated under the health and safety program to identify patterns that may expose problems not perceived when looking at isolated incidents. The Battelle PNNL trend analysis program includes recordable and reportable cases, reporting on accident and incidents, first aid cases, Total Recordable Case (TRC) and Days Away, Restricted, and Transfer (DART) data, body part injured, location of injury, and type of injury and accident. WS&H staff use data to implement additional mitigation efforts and emphasis or focus related programs. The safety and health injury and illness trend analysis program identifies, analyzes, and eventually prevents or mitigates injuries and illnesses. Managers, WS&H staff, recordkeepers, and SMEs review the trend analysis monthly and implement programs, processes, or procedures to prevent reoccurrence. Statistical process analysis tools identify issues management trends to get the big picture and demonstrate Battelle PNNL commitment to continuous improvement.

Conclusion

The workforce is knowledgeable of the hazards they face and are confident they can perform work safely. Field observations, documents, and interviews confirmed that Battelle PNNL conducts workplace inspections in research-related areas covered under *Lab Assist,* but it needs to ensure documentation of all work area inspections required by the DOE-VPP Standard. Battelle PNNL has established a reliable system for employees to notify management about hazards. Battelle PNNL has an adequate system for reporting and investigating accidents, incidents, injuries, illnesses, first aid, and near-miss cases. Battelle PNNL maintains a sufficient workforce of certified safety specialists and certified industrial hygienists, as well as safety and radiological control specialists to identify hazards and assess employee risk. Battelle PNNL has an effective work planning and control system to ensure a thorough understanding and mitigation of hazards encountered during work. Battelle PNNL relies primarily on *Lab Assist* to generate Hazard Cards and Summaries to identify, analyze, and control hazards. Battelle PNNL has developed and uses a comprehensive trend analysis program which enables WS&H staff to develop safety campaigns. Battelle PNNL continues to meet the expectation in Worksite Analysis for participation as a DOE-VPP participant.

VI. HAZARD PREVENTION AND CONTROL

The third and fourth core functions of ISMS, identify and implement controls and perform work in accordance with controls, ensure that hazards are eliminated by substitution or changing work methods once identified and analyzed or addressed by the implementation of engineering and administrative controls, or personal protective equipment (PPE). Equipment maintenance processes are also considered to ensure requirement compliance. Additionally, emergency preparedness plans must be implemented to respond to and mitigate the impact of incidents. Safety rules and work procedures must be developed, communicated, and understood by supervisors and employees. These rules and procedures must be followed by everyone in the workplace to prevent, control the frequency of, and reduce the severity of mishaps.

Battelle PNNL maintains qualified professionals as resources to workers for safety and health needs. Industrial safety staff include certified industrial hygienists, certified safety professionals, a certified machine guarding specialist, and certified Asbestos Hazard Emergency Response Act (AHERA) Building Inspectors and Supervisors. In addition to having a certified asbestos supervisor onsite, Battelle PNNL ensures that subcontractor employees performing asbestos work are certified and understand the associated hazards. Battelle PNNL maintains a certified aircraft accident investigator and two federal aviation safety officers to handle safety concerns related to aircraft-based research operations.

The Team confirmed that an adequate number of certified professionals are currently employed for the scope of work and size of the workforce at Battelle PNNL. Interviews with managers and workers did not raise any concerns about understaffed areas or safety initiatives that could not be implemented due to lack of certified resources. WS&H managers assign qualified safety professionals to laboratory facilities to perform walkdowns and identify and abate hazards. Battelle PNNL has created a culture where most hazards are corrected on the spot and employees understand their responsibilities to maintain a safe work environment. Interviews with workers confirmed that certified safety professionals regularly performed safety and health walkdowns. Additionally, employees interviewed know how to get in contact with safety professionals or occupational medicine services as needed.

The Occupational Medicine Program at Battelle PNNL is stipulated by WSH-PD-014, *Occupational Medical Program Description,* and the site occupational health clinic is operated by AnovaWorks, a contracted occupational medical service provider. The occupational health clinic is staffed by an Occupational Medical Director who is onsite every other week and four fulltime medical professionals that include a Nurse Practitioner, Physician Assistant, Registered Nurse, and Medical Assistant. The campus occupational health clinic provides services in areas such as: respiratory fit-testing, injury illness care, hearing tests, vision testing, wellness checks, treatment of minor injuries, and health maintenance exams. These medical services are free-of-charge for all Battelle PNNL staff. AnovaWorks administers a total of 29 medical surveillance programs at Battelle PNNL in areas such as asbestos, beryllium, hearing conservation, respiratory, and benzene among others. In addition, the occupational health clinic performs return-to-work evaluations of employees and administers influenza vaccines (i.e., flu shots). The Team observed the “Annual Flu Shot Drive” while onsite in which approximately 800 Battelle PNNL employees received the yearly flu shot. The appointment windows were well orchestrated, and AnovaWorks clinical staff allotted 15 minutes from one appointment to the next. The level

of planning and organization observed during the "Annual Flu Shot Drive" was exemplary. In addition, the occupational health clinic staff administers vaccines that employees may need prior to traveling overseas and prepares "Travel Bags" with common over the counter medications to aid employees in the event of sickness.

The medical services at Battelle PNNL provided by AnovaWorks are adequate and implemented in accordance with medical program requirements stipulated by 10 CFR 851. The occupational medicine service provider(s) have toured the laboratory space to become familiar with the workplace and to remain current on operations that workers are performing. Workspace familiarity aids in diagnosing injuries and illnesses and in understanding what type of restrictions would be necessary should an employee be injured or become ill on the job. The occupational health clinic staff works in unison with onsite emergency preparedness staff and first responders during medical emergencies to ensure that Battelle PNNL employees are offered adequate medical care.

The Battelle PNNL MA-110, *Emergency Management Plan*, describes Battelle PNNL compliance with DOE Order 151.1D, *Comprehensive Emergency Management System*, and provides an overview of the emergency management program for Battelle PNNL-managed facilities at the Battelle PNNL site, Hanford site, and Sequim. Battelle PNNL performs multiple annual drills, including virtual and in-person fire and evacuation drills for buildings with 11 workers or more and an All-Hands annual evacuation exercise. In addition, as part of the Emergency Management Plan at high hazard facilities, all Building Emergency Response Organizations must participate in emergency exercises at least once annually. During emergency drills, personnel from the City of Richland Police and Fire Departments, Hanford Fire and Patrol Departments, and the Benton County Sheriff Department participate to simulate a realistic training environment, and lessons learned are shared among all involved parties. The extent of participation of each organization is determined by the nature of the emergency drill, and not all fire and law enforcement departments may participate at all times. The average response time to Battelle PNNL from the Fire Department is approximately 2 minutes, and 7 minutes for the Police Department. These quick response times provide Battelle PNNL with adequate fire and police support in the event of an emergency. Battelle PNNL also has a Memorandum of Understanding with Kadlec Regional Medical Center, a Level II trauma center, that stipulates the procedures that must be adhered to in the event of an emergency requiring the transport of an injured employee to the hospital.

The emergency agencies tasked with responding to Battelle PNNL are physically located off campus, which can lead to unfamiliarity with all the hazards present at the different laboratory facilities. In response to this situation, Battelle PNNL Emergency Preparedness Specialists work closely with the Richland and Hanford Fire Departments to ensure knowledge of Battelle PNNL emergency management procedures and potential facility hazards. Battelle PNNL has delivered facility maps, hazardous facility information documents, and other background information to both Fire Departments to informed them of facility conditions. In addition, the Richland Fire Department has worked with Battelle PNNL fire protection personnel to develop preincident plans that include maps of buildings with locations of fire hydrants and exit doors among other pertinent rescue operations information. A further illustration of the Battelle PNNL working relationship and collaboration with emergency response partners is the creation of Quick

Reference Guides (one Quick Reference Guide per building) which further communicate information that would be beneficial to first responders in the event of an emergency. These guides include information regarding the location and types of chemicals stored at each building, alongside detailed building maps. A shared internet site contains the Quick Reference Guides to which all first responding agencies have access and are provided electronically to the pertinent Fire and Police Departments, Kadlec Regional Medical Center, as well as Emergency Management Representatives at both Benton and Franklin Counties. Battelle PNNL updates the Quick Reference Guides once building chemical storage conditions change or the buildings physically change, such as with new or updated exit door installation.

Team interviews with Battelle PNNL Emergency Management personnel demonstrated a proactive approach to the Emergency Management Plan implementation. For example, the Battelle PNNL "Pull for One Another" campaign educated employees in the importance of pulling the fire alarm if they felt that the health or safety of building staff was in jeopardy and to reiterate no negative repercussions for using the alarm system in an emergency. During this campaign, employees were provided with examples of circumstances that might merit pulling of the fire alarm, such as smoke, fumes, hazardous spills, and fire. Employees interviewed following the "Pull for One Another" campaign stated that they felt more comfortable with the expectations and requirements for pulling the fire alarm in the event of an emergency.

As part of the Emergency Management Plan, Battelle PNNL utilizes the Communicator Notification System to send automated notifications to employees, including e-mails, text messages, and desktop computer pop-ups which employees must acknowledge prior to using the computer. This system allows Battelle PNNL to inform employees of any emergent conditions that might affect the health or safety of the workers. Another example of the Battelle PNNL innovative approach to Emergency Management is illustrated by its implementation of the Travel Emergency Team (TET) which provides emergency response support to Battelle PNNL staff on official travel who are involved in an emergency or disaster. The TET includes SMEs able to effectively evaluate and address emerging situations and are prepared to arrange for personnel extractions, medical treatment, and language translations among other challenging travel situations.

In addition, Battelle PNNL uses the WorldAware® software which provides real-time personnel tracking across the globe and synchronizes their location with a systematic analysis of developing geographical, political, and disaster issues. This service allows Battelle PNNL TET SMEs to communicate directly with foreign-based or traveling employees to alert them of global upset situations and enhance employee safety. The WorldAware® software can provide a "geo-fence" that identifies safe and "no go" zones in and around an employee's specific location. Battelle PNNL TET SMEs must complete annual training dealing with potential travel emergencies and corresponding solutions. The combination of TET and WorldAware® allows Battelle PNNL to systematically handle emergencies of traveling employees while providing a consistent and adequate emergency response methodology. The Team did not observe any issues with Battelle PNNL Emergency Management program implementation.

Battelle PNNL uses administrative and engineering controls in conjunction with PPE as hazard prevention and control methodology to protect workers. Administrative controls include the use of permits such as LOTO, chemical storage tracking, and a training management system that

tracks employee training records to ensure that only fully qualified workers are performing hazardous work at specific laboratory facilities. For example, activity PPE requirements are described during the hazard analysis process and populate associated workers training requirements which must be completed prior to performing hazardous work. Interviewed workers understood PPE requirements and knew how to get in contact with their facility safety representative, if needed. Battelle PNNL utilizes engineering controls such as fume hoods and gloveboxes to minimize employee exposure to hazards throughout its facilities. Other examples of engineered controls include the use of laboratory door access locks to prevent unauthorized entry by untrained personnel and computer automated alerts to inform researchers when unattended experiments have excursions outside of established parameters. In addition, laboratory equipment has double start switches to prevent inadvertent operation. Liquid waste storage areas have secondary containment, and chemical storage in building C-1220 takes place inside vented flammable cabinets located away from the exit doors. WS&H professionals are constantly looking for methods to eliminate hazards through the implementation of the hierarchy of controls and understand that PPE is the last line of defense in keeping workers safe.

The placement of strip of masking tape inside the fume hoods located at the Controlled Substances Laboratory (Laboratory 350) to alert workers that chemical substances must be handled inside the delineated workspace demonstrates Battelle PNNL use of the hierarchy of controls. This administrative control minimizes the possibility of chemicals inadvertently becoming airborne or spilled outside the glovebox as employees always work away from the edge. Another example of the Battelle PNNL focus on constant improvement at Laboratory 350 is illustrated by the utilization of “Glow Germ” to identify the areas on the laboratory workers PPE where chemical substances contact during handling operations. The luminescent “Glow Germ” material allowed Battelle PNNL to identify that chemical substance residue was only present in the workers forearms and gloves during handling operations. Knowledge of contamination spreading patterns led Battelle PNNL to require workers to utilize a set of “Blue Arm Sleeves” over their aprons, thereby reducing the amount of contaminated waste because worn aprons are now discarded into non contaminated waste bins. The use of the arm sleeves also eliminated a potential ergonomic hazard as workers no longer needed to get into an awkward posture to remove their aprons within the confines of the glovebox.

Battelle PNNL also illustrates hazard minimization methodology with the installation of a VeriSafe™ absence of voltage tester on an overhead crane energy disconnect switch. This additional layer of safety allows facilities workers to double check the system isolation prior to performing overhead crane maintenance activities. The VeriSafe™ tester does not replace the Battelle PNNL LOTO procedures, where mangers make use of Master Lock® key boxes to maintain adequate worker accountability control while under LOTO. Each employee performing work on the LOTO energy source must attach a padlock to the Master Lock® key box to prevent unintentional access to the master key.

Being a leader in the utilization of lasers for scientific research within the DOE complex, Battelle PNNL has implemented an exemplary approach to laser safety in a laboratory setting. Battelle PNNL maintains a laser installation rule of thumb to position the laser horizontal plain at waist height (whenever possible) instead of eye level. Battelle PNNL also only provides one chair for the researcher. By having no additional chairs present, additional personnel cannot sit and be at

the same height as the laser equipment. These precautions help prevent any eye damage from lasers. Battelle PNNL employs other laser research hazard controls, such as using enclosed systems to isolate the laser beam, employing computer software to operate lasers from a safe distance, and choosing least potent laser class needed to achieve successful research results. Battelle PNNL tries to utilize Class 1 laser systems, considered safe under normal conditions, where possible to eliminate potential employee exposure to laser hazards. However, there are multiple Battelle PNNL experiments that require Class 3B and Class 4 laser usage, however, adequate training of employees and implementation of a robust hierarchy of controls have reduced the possibility of employee injury to an acceptable level. Battelle PNNL has installed defeatable interlock systems as an administrative control to allow workers to make operational adjustments to laser beams while fine-tuning experimental conditions. The interlock systems allow workers to open a laboratory door while a laser is in use for approximately 40 seconds before stopping or shuttering the laser beam. The interlock systems provide mechanisms to ensure only controlled, intentional entry is possible while preventing laser shutdown and significant equipment restart delays.

Another engineering control utilized is the installation of a wall or a laser rated curtain at the entrance to a laboratory to provide researchers with a safe space to stand. The Battelle PNNL approach to dealing with laser related hazards is to first look for ways to enclose the laser beam instead of relying on PPE. The Team reviewed Battelle PNNL ROD-504, *Laser System Work Control*, document and determined that it adequately protects laboratory workers performing laser operations. Employees have access to this document on the Battelle PNNL intranet via the HDI webpage, where a variety of safety related documents are easily accessible. Battelle PNNL safety and health professionals quickly addressed hazardous conditions when identified during laser operations by working in unison with researchers. This institutional culture of continuous improvement, cooperation among workers, and implementation of ISM allows Battelle PNNL to serve as a model to other DOE sites.

The Team observed adequate tracking and trending of hazards and deficiencies during the assessment. Battelle PNNL shares lessons learned among directorates by utilizing the Optional Tracking System (OTS) and Issue Tracking System (ITS) based on hazard severity. The OTS and ITS track hazardous conditions that present an opportunity for improvement or that are classified as ORPS reportable. The utilization of OTS and ITS allows Battelle PNNL to perform tracking and trending of lagging and leading indicators based on hazard severity and potential impact to laboratory operations.

During walkthroughs of facilities including construction activities, the Team observed multiple hazards including blocked electrical panels, blocked access to electrical disconnect switches, inadequate housekeeping, and improper material storage on racks. Other hazards noted included inadequate guarding of a benchtop band saw, access blocked to fire extinguishers, and improper usage of a Type “A” ladder.

Opportunity for Improvement:

Battelle PNNL should review its workplace inspection policies, procedures, training, and qualification requirements to ensure that affected workers are familiar with common safety hazards and applicable abatement methods.

Although, the Team observed multiple industrial hazards during the walkdowns, interviewed employees were able to explain the importance of pausing work activities during research, construction, and maintenance operations if work procedures were not clear or if they did not understand any part of the work operation.

Preventive and predictive maintenance activities are performed on schedule and safely as prescribed by OSD-PD-004, *Plant Engineering Program Description*, at Battelle PNNL. The Maximo® software tracks maintenance activity due dates and generates work orders with a minimum of 15 days of lead time to work completion. Managers responsible for maintenance activities can access Maximo® and print upcoming maintenance tasks for their assigned systems. Maximo® breaks preventive maintenance activities down into three categories as follows: Mandatory, Operationally Significant, and Discretionary. These categories allow for the prioritization of maintenance work activities based on resource availability. As part of the Battelle PNNL continuous improvement culture, the laboratory is currently moving towards Mobile Maximo®. Mobile Maximo® provides workers with a handheld tablet, allowing on-the-go access to work orders and required maintenance procedures instead of relying on physical printouts. Mobile Maximo® enables the latest procedural updates and the ability to capture field notes and potential lessons learned in real time which makes it easier to identify reoccurring equipment issues. Battelle PNNL is in the process of moving the Electronic Power Operator Logs to Mobile Maximo® where maintenance workers will be able to directly view operator comments for specific equipment. This synchronization of the operator logs into Mobile Maximo® provides a complete equipment reliability picture to maintenance workers. The Team determined that preventive and predictive maintenance activities at Battelle PNNL are adequate and performed within applicable regulations.

Battelle PNNL has a strong positive reinforcement culture where workers are recognized for their accomplishments. In addition to supervisory nominations, employees can nominate each other for a job well done. An example of a peer-to-peer recognition program at Battelle PNNL is the Business System Directorate (BSD) High-Five Program where employees can send a thank you card to a colleague for a job well done. Additionally, Battelle PNNL has several recognition programs offered throughout the year for employees. These recognition programs include the newly created pilot program *We Recognize* and Outstanding Performance Awards (OPA) where employees can get up to $1,000 but no less than $150 based on the contribution impact to the success of the Laboratory. OPA committees at the directorate level evaluate each OPA nomination and decide its merit. Once the committee approves a nomination, the employee is awarded a certificate and their accomplishments are highlighted on the employee's directorate newsletter. A variable pay budget is assigned to all directorates based on the number of employees for positive reinforcement programs. Other positive reinforcement programs at Battelle PNNL include Energy and Environment Directorate "Of-The-Year" awards, NSD

Performance Awards, Intellectual Property Recognition and Awards program, and Exceptional Contribution Program. The Exceptional Contribution Program recognizes employee contributions towards meeting the mission of Battelle PNNL or the DOE complex with a monetary award commensurate with accomplishment significance. This culture of employee recognition at Battelle PNNL creates a work environment where peers and supervisors recognize employees' efforts.

A strong and fair disciplinary system exists at Battelle PNNL where guidelines are applied consistently and objectively. The disciplinary process is only used after thorough fact finding investigations to determine the circumstances leading up to incidents. Battelle PNNL uses the fact finding efforts to ensure fair application of disciplinary actions and keeps the primary focus on correcting the root issue, not applying reactive discipline. The Team did not observe any issues with Battelle PNNL implementation of its positive reinforcement and disciplinary system during the assessment.

Conclusion

Battelle PNNL has developed processes and work procedures to analyze and address hazards and communicates those processes via training, worker engagement meetings, and company webpage postings. Managers and workers understand the hierarchy of controls applied to their various work area hazards and are confident in their ability to talk to certified safety professionals when needed. Managers and safety professionals successfully strive to ensure proper PPE access. Battelle PNNL is constantly working on methods to improve the worker safety as illustrated by the utilization of VeriSafe™ absence of voltage detectors at electrical disconnect switches and the utilization of "Glow Germ" to help identify the spread area of chemical substances. Battelle PNNL provides workers with extensive occupational medicine support, emergency response capabilities, and adequate preventive and predictive maintenance capabilities using the Maximo® software. Battelle PNNL celebrates workers accomplishments and contributions to the laboratory using a strong positive reinforcement program and controls disciplinary action system bias by focusing on the root cause of the problem instead of placing blame on employees. Battelle PNNL injury and illness rates reflect effective hazard prevention and control methods. Battelle PNNL meets the expectations for Hazard Prevention and Control and continued participation in DOE-VPP.

VII. SAFETY AND HEALTH TRAINING

Managers, supervisors, and employees shall know and understand the policies, rules, and procedures established to prevent exposure to hazards. Training for health and safety shall ensure that personnel understand their responsibilities, recognize hazards they may encounter, and are capable of acting in accordance with management expectations and approved procedures.

The Battelle PNNL training department manages safety and health training and establishes core training requirements based on employee job title and organization. When an employee is hired for a position, the training department assigns core training for that position, and the employee's supervisor adds additional training as required (such as forklift operator training, etc.). Battelle PNNL bases the core training for each position on an analysis of the job hazards and all requisite requirements such as emergency response, safety culture expectations, and SCoR. Battelle PNNL follows a systematic approach to training based on the needs analysis documents for each individual job position. Training developers work with SMEs in various disciplines, identifying and developing their individual training needs. This work results in a high-level outline of the materials needed to deliver the learning along with a list of specific objectives. Training developers process the outline further into a script using a web storyboard or a computer-based presentation program. SMEs initially develop much of the instructor-based training and hand it off to the instructional developer for final formulation. Anyone producing formal, instructor-led or on-the-job training (OJT) programs must be qualified in instructor-led classroom training or as an OJT developer. Battelle PNNL often sends individuals to the Volpentest Hazardous Materials Management and Emergency Response (HAMMER) Federal Training facility or other "train the trainer" locations for these qualifications. Discussions with a variety of managers and workers elicited consistent praise for the Battelle PNNL training program.

The Learning Management System (LMS) encompasses three primary functions – the Enterprise Learning Management (ELM), the Manage Group Training (MGT) tool, and the Business Intelligence reporting platform. The LMS also integrates with other Battelle PNNL systems to include Human Resources (HR), Business Service applications, and *Lab Assist*. These systems facilitate administrative and engineered controls to ensure the workforce remains compliant with training requirements. Battelle PNNL uses data points (e.g., job title, organization, role, etc.) documented in the individual's HR profile or in *Lab Assist* to group learners based on specific workplace requirements. Learner grouping provides greater certainty that the workforce executes the required training and helps ensure compliance with these requirements.

Managers may use the ELM to verify employees' competencies and qualifications; however, this task is often the responsibility of the training coordinators assigned to all research directorates and M&O program areas. Several training coordinator "Super Users" across the laboratory compile reports, review the data, and provide the details to line management. If a line manager is familiar with how to use the MGT tool, it also provides a route to view learner compliance status as needed.

ELM notifies the learner of upcoming training requirements at the 60-day window. It continues to provide employee notifications of training assignments that are coming due twice per month from that point forward. The learner and their immediate line manager are both notified of these pending requirements with the manager receiving coming due notices beginning at 21 days out.

The process helps supervisors ensure their staff remain qualified to perform their duties. ELM sends past due notifications twice a month to both the learner and their line manager for action.

Currently, the Battelle PNNL training department executes instructor-led training in a variety of locations. Some of the hands-on training classes, such as arc flash and laboratory chemical handling, require significant set up and tear down. A dedicated set of training rooms would allow the training department to configure the rooms to mimic actual work locations, maximizing the training effectiveness.

Opportunity for Improvement:

The Battelle PNNL training department should consider opportunities to enhance real-world applicability of practical training (e.g., chemical training for laboratory workers, arc flash training, and LOTO training) such as, dedicating permanent space for realistic training mockups.

The Team observed an example of process feedback being incorporated into LOTO program improvements and subsequent training redevelopment. Multiple changes to the LOTO process over several years resulted in a difficult to navigate system, unclear or conflicting procedures, and specific inaccessible work documents on the referenced web page. In an effort to streamline the process while improving LOTO training and implementation, the LOTO lead assembled a 20-employee committee consisting of SMEs, craft, researchers, along with worker safety and health representatives. The group met on a weekly basis over a 9-month period and succeeded in bringing the program and training to its current improved and fully supported state. In June 2023, the workers accepted the implementation of the newly designed, revamped, and improved process. The new process eliminates the confusion and simplifies the workflow. Training was an active part of the process redesign, as the SMEs own and shape the training process. Workers are now able to find needed direction and documentation without having to cross-reference multiple source documents or conflicting web pages.

Battelle PNNL recognizes the need to train managers and supervisors to communicate safety culture, keep their staff safe, and improve communications. Those needs are addressed using two Battelle-developed programs: LOSA and Laboratory Operations Leadership Academy (LOLA). LOSA is a 2-day simulation-based training focused on maturing a leader's safety culture and is administered at the Columbus, OH, Battelle headquarters. Trainees develop their employee feedback abilities and receive practice managing difficult situations during role playing scenarios. The training exercises a leader's understanding of SCoR principles and how to apply them towards strengthening safety culture and building psychological safety among the workforce. Training coaches provide the attendees with real time feedback on strengths and areas needing improvement.

LOLA exposes trainees to the fundamentals of senior laboratory management and provides a controlled environment in which to experience the fast-paced, high-pressure business. LOLA provides situation-based learning opportunities by engaging seasoned leaders directly into the instruction and providing real-world insights to future leaders. Battelle PNNL has an active

community of practice of LOSA and LOLA graduates serving as mentors and steering committees for future leaders.

Recognizing a key need for first line manager development in the changing workforce, Battelle PNNL independently developed and implemented Leading, Engaging, and Developing Staff (LEADS). The course is designed to create a manageable training plan and structure for Battelle's first-line leaders. LEADS consolidates the various goals, directions, and cultures within Battelle PNNL, creating a cohesive program for its managers to follow. LEADS equips Battelle PNNL managers with the skills and resources needed to lead effectively, to engage and develop their staff while maintaining a safe and inclusive workplace tailored to the model of 10-15 staff under each manager. LEADS training occurs quarterly and is broken up into three different training sessions, with 25-30 new managers per cohort. The target audience for LEADS are new Team Leads, Group Leads, and Division Directors. Over 500 individuals have completed LEADS training since its inception in 2019.

During the assessment, the Team witnessed an OJT session for operation of an aerial lift. The training is a two-part instruction, with the first, regulation-based portion conducted in a classroom at HAMMER. The second part is held at Battelle PNNL and covers field use and how to operate aerial lifts properly. The instructor used videos of three separate aerial lift accidents to illustrate the inherent damages of aerial lift operation and guided a discussion of aerial lift accidents and their causes. Instruction also covered preuse inspection, common hand signals used in aerial lift operations, typical field use, and an extensive question and answer session. The employees each operated two types of aerial lifts during the training. The instructor engaged the trainees by having them "teach back to the instructor" to ensure that learning had occurred. The training was well run, with strong instruction and maximum employee participation.

The Team observed a Mechanical Material Handling presentation developed by multiple Battelle-managed National laboratories. The one-day presentation covered multiple mechanical material handling accidents in the laboratories. The initial presenter from Idaho National Laboratory covered a significant event involving the movement of a 6,000-pound piece of equipment using small dollies that required multiple readjustments during the operation. At one point, the equipment became over balanced and toppled, nearly striking his fellow co-workers. The presenters engaged the audience by asking the attendees, "What would you have done differently, and why?" During this portion, the presenters discussed some of the suggestions raised by the attendees, such as using a gantry crane or moving the equipment using a different path. The presenters used the suggestions to create examples in which management was not receptive to ideas and pushed back on their feasibility. The presentation attendees and presenters discussed options for responding to management's reluctance to accept their suggested solutions.

The consistent theme among these incidents centered around the changing conditions within the work and inadequate planning or hazard analysis for the changes. There were also concerns that stop-work was not being used. A Battelle PNNL SME for material handling then covered some of the Mechanical Material Handling incidents and what could have been done differently. He then discussed the changes put in place to help prevent incidents. The changes included the following:

- Changed work control,

- Briefed staff on changes,
- Changed HDI to simplify the process,
- Updated procedure,
- Revised training,
- Required checklist to be maintained as a record,
- Required worker safety and health to be present while work is being done, and
- Conducted observations.

Battelle PNNL held the Mechanical Material Handling presentation on 5 consecutive days to ensure maximum participation for workers, supervision, and management, and received excellent reviews from the attendees. The presentation travels from one national laboratory to another, and work has already begun to plan a similar traveling training event for LOTO.

Conclusion

The Battelle PNNL worker safety and health training program continues to provide workers, supervisors, and managers with updated training. The training department established processes to ensure training and qualification records are current, via the ELM tool. Battelle PNNL uses program descriptions to analyze and define workers' required training by job title to establish required training requirements. Battelle PNNL provides required reading subjects and lessons-learned safety topics to improve safety awareness at the site. Battelle PNNL meets the expectations for Safety and Health Training and continued participation in DOE-VPP.

VIII. CONCLUSIONS

Battelle PNNL continues to innovate, leveraging mechanisms like *Lab Assist* and organizational "right-sizing" to empower managers and workers and integrate safety into laboratory activities. The connection to SCoR principles resonates ISM and DOE-VPP concepts throughout the workforce and enables clear communication of safety messaging. Workers have a voice to identify concerns through multiple avenues, receive high-quality support from safety professionals and SMEs, and encounter strong safety committee engagement to keep safety expectations at the forefront. Battelle PNNL staff recognize that collaboration among directorates and between research and operations organizations is critical to ensure the safety of the workforce. Battelle PNNL thoroughly analyzes hazards using the *Lab Assist* framework and works towards continued improvement in hazard prevention and control. Interviewed workers consistently responded positively about their Battelle PNNL work experience, their empowerment to work safely, and contributions to a safe work environment. The Team identified some opportunities for improvement that will help Battelle PNNL continue towards excellence in safety and health. The Team did not identify any programmatic noncompliance with DOE safety requirements that would preclude participation in DOE-VPP. Battelle PNNL continues to meet all the expectations for DOE-VPP, and the Team recommends Battelle PNNL continue to participate in DOE-VPP at the Star level.

APPENDIX A: Onsite DOE-VPP Assessment Team Roster

Management

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TABLE A-1: Review Team

Name	Affiliation/Phone	Project/Review Element
Matthew M. Ramsey Team Leader	DOE/EHSS	Management Leadership
Wallace E. Czapla	DOE/EHSS	Worksite Analysis, Recordkeeping
Moises Atiles Team Leader-in-Training	DOE/EHSS	Hazard Prevention and Control
Robert N. Meloche Team Leader-in-Training	DOE/EHSS	Safety and Health Training
Michael S. Gilroy (Virtually)	DOE/EHSS	Employee Involvement
Bruce Hill	Mission Support and Test Services, LLC/Los Alamos Operations	Hazard Prevention and Control
Wade Bruemmer	Washington River Protection Solutions/Hanford Tank Operations	Hazard Prevention and Control, Safety and Health Training