

**Office of Enterprise Assessments
Follow-up Assessment of the
Bonneville Power Administration
Safety Management Program**



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**Office of Worker Safety and Health Assessments
Office of Environment, Safety and Health Assessments
Office of Enterprise Assessments
U.S. Department of Energy**

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Acronyms

AIB	Accident Investigation Board
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APM	Accident Prevention Manual
BFTE	Bonneville Full-Time Equivalent
BPA	Bonneville Power Administration
BPI	Bonneville Purchasing Instructions
CFR	Code of Federal Regulations
CFTE	Contracted Full-Time Equivalent
CRAD	Criteria and Review Approach Document
CSP	Certified Safety Professional
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
E-CHP	E-Colors in Human Performance
ES&H	Environment, Safety, and Health
FY	Fiscal Year
HOP	Human and Organization Performance
HPI	Human Performance Improvement
IAP	Incident Assessment Program
IAT	Incident Assessment Team
IH	Industrial Hygiene
J-1	Job Briefing
JHA	Job Hazards Analysis
NFC	Construction and Contractor Safety Team
OSHA	Occupational Safety and Health Administration
RCP	Regulatory Compliance Program
S&H	Safety and Health
SCARB	Safety Corrective Action Review Board
SME	Subject Matter Expert
SMS	Safety Management System
SSSP	Site Specific Safety Plan

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Safety Management Program

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted a follow-up assessment of the Bonneville Power Administration (BPA) safety management program. The BPA Chief Safety Officer requested this assessment as a follow-up to an Independent Oversight assessment conducted by EA's predecessor organization in 2013, with the report published in February 2014. The previous assessment reviewed several BPA initiatives to improve safety management in response to four fatalities that had occurred during BPA work activities since 2010, two of them in the second half of 2013. The primary focus of this current EA assessment was to provide an independent review of the status of BPA actions to address the 16 recommendations from the previous assessment. EA assessed the progress using multiple techniques, including document reviews, interviews, and field observations. EA conducted the onsite portions of this assessment October 15-19, 2018, and October 29 – November 1, 2018.

In many areas, BPA has shown substantial progress in improving its safety management program since the previous Independent Oversight assessment. BPA has implemented a Safety Management System process that is effective in identifying and focusing on the safety and industrial hygiene programs with the highest risk, and has increased the Safety organization's visibility and influence with senior BPA management by elevating the Chief Safety Officer to a member of the Executive Team and the Chief Administrative Officer Leadership Team. A number of BPA safety initiatives, such as the Human and Organization Performance initiative, have been effective in improving workers' and their supervisors' safety awareness. Incident assessment teams and the Safety Corrective Action Review Board are new initiatives with increased focus on root cause evaluation of safety incidents; these initiatives have resulted in a formal approval process that better ensures accountability for corrective action completion. For major contracted construction projects, safety is better integrated throughout the procurement process, and contractor safety performance and BPA safety oversight have improved. BPA also established a formal requirements management system including associated implementing procedures. A few safety programs, such as the fall protection program, have matured sufficiently to provide controls that reduce worker risk to adequate levels.

Although BPA has improved its safety management program since the previous Independent Oversight assessment, many programs have not yet achieved effective implementation. EA observed a number of work activities in which the hazards were not adequately identified, analyzed, and/or controlled, thereby presenting undue risk to workers. Additionally, BPA has not yet developed an effective process to identify hazards and appropriate controls for all work. BPA recognizes this issue and has identified the pre-job briefing and job hazards analysis process as the top risk improvement priority for fiscal year 2019.

The BPA Safety Manual is a comprehensive collection of BPA safety and health policies, programs, procedures, and requirements. However, many of the BPA Safety Manual requirements are not integrated into work activities or implemented by line management, and BPA workers are generally unaware of the BPA Safety Manual. Line managers and supervisors lack awareness of and are not being held accountable for many of the safety responsibilities outlined for the various programs and procedures in the BPA Safety Manual. A number of fundamental safety and health programs are not implemented in the field, so some Occupational Safety and Health Administration requirements for these programs are not met.

Limitations on safety and health resources and capabilities continue to negatively impact the development and maturation of BPA safety programs, and the lack of qualified safety technical specialists within the field safety organization has slowed progress in improving and implementing BPA industrial safety and industrial hygiene programs. Continued training gaps and the inability to track and verify training for all workers contribute to undue risks to workers. The previous Independent Oversight assessment highlighted the absence of a centralized training program, and although BPA has improved the course content and presentation in some areas, such as fall protection, significant gaps remain in BPA's safety training program. Overall, BPA continues to lack an agency-wide learning management system that can effectively identify, schedule, and track all required worker safety and health training.

In summary, BPA has made progress in addressing each of the recommendations from the 2014 Independent Oversight assessment report. For some recommendations, this progress has been significant. For example, BPA has made significant improvements in human and organization performance and safety culture, which have set the stage for future success. A few safety programs, such as the fall protection program, have matured sufficiently to provide controls that reduce worker risk to adequate levels. However, gaps in accountability and ownership of safety and health program responsibilities by line management and the lack of an adequate hazard analysis process continue to put workers at increased risk. Finally, the lack of an agency-wide learning management system or process is a significant barrier to ensuring that all workers are properly trained and qualified to perform assigned work.

EA's recommendations in this report provide an independent perspective for BPA's consideration to adjust their focus on the path forward in addressing safety and health issues. The recommendations address improvements in the following areas:

- Line management accountability and ownership of safety and health responsibilities
- BPA's ability to identify, analyze, and control hazards
- Training management.

Office of Enterprise Assessments
Follow-up Assessment of the Bonneville Power Administration
Safety Management Program

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted a follow-up assessment of the Bonneville Power Administration (BPA) safety management program.¹ The BPA Chief Safety Officer requested this assessment as a follow-up to an Independent Oversight assessment conducted by EA's predecessor organization in 2013, with the report published in February 2014. The previous assessment reviewed several BPA initiatives to improve safety management in response to four fatalities that had occurred during BPA work activities since 2010, two of them in the second half of 2013. EA conducted this current assessment to provide BPA management with information to assist BPA's continuing efforts to improve and maintain its safety management program. EA conducted the onsite portions of this assessment October 15-19, 2018, and October 29 – November 1, 2018.

2.0 SCOPE

EA conducted this assessment in accordance with its *Plan for the Office of Enterprise Assessments Follow-Up Assessment of the Safety Management Program at the Bonneville Power Administration, October – November 2018*. The primary focus of this assessment was to examine the status and adequacy of BPA actions to address the 16 recommendations from the previous Independent Oversight assessment, *Independent Oversight Review of the Bonneville Power Administration Safety Management Program – February 2014*. EA also reviewed the new or revised safety management programs referenced in the recommendations from the previous Independent Oversight assessment and evaluated the extent and effectiveness of implementation of those programs. During the current assessment, EA specifically focused on BPA safety policies, procedures, and practices (performance) as applied to BPA and contracted work, as well as BPA governance and performance assurance processes and practices.

3.0 BACKGROUND

BPA is one of four power marketing administrations, which are semiautonomous organizational elements within DOE that market and transmit electricity from hydroelectric plants and other sources. BPA is a nonprofit Federal power marketing administration based in the Pacific Northwest, with headquarters in Portland, Oregon and a support facility – the Ross Complex – in Vancouver, Washington. To facilitate remote field operations, BPA also operates district offices in 13 locations within its service territory. Although BPA is part of DOE, it is self-funding and covers its costs by selling its products and services.

BPA markets wholesale electrical power from 31 Federal hydroelectric projects in the Northwest, one non-Federal nuclear plant, and several small non-Federal power plants. BPA provides about 28% of the electric power used in the Northwest. BPA also operates and maintains about three-fourths of the high-voltage transmission network in its service territory. BPA's territory encompasses approximately 300,000 square miles and includes Idaho, Oregon, Washington, western and small parts of eastern

¹ As used in this report, the terms "safety management" and "safety management program" should be interpreted to include occupational health and occupational medical aspects of a safety and health program, as well as all aspects of industrial and construction safety.

Montana, California, Nevada, Utah, and Wyoming. As part of its transmission service activities, BPA operates and maintains about 15,000 circuit miles of transmission lines, 43,200 transmission towers, 285 substations, and 73,000 wood poles. Most of BPA's potentially hazardous work is related to power transmission lines, and substations, as well as the associated support activities.

The BPA workforce consists of approximately 2,900 Federal workers (full-time equivalents). Due to limitations on the number of full-time equivalent Federal employees, BPA also has approximately 1,250 contracted staff; these individuals are employed by contractors but typically are co-located with, and under the direction and supervision of, BPA Federal workers. BPA also contracts with companies to perform various projects, such as construction and vegetation control.

In accordance with Section 19 of the Occupational Safety and Health Act, BPA is subject to Occupational Safety and Health Administration (OSHA) regulations and OSHA inspections. BPA contractors are also under OSHA regulatory jurisdiction, rather than the DOE worker safety and health regulation, 10 Code of Federal Regulations (CFR) 851, *Worker Safety and Health Program*.

4.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*. EA implements the independent oversight program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. Organizations and programs within DOE use varying terms to document specific assessment results. In this report, EA uses the term "recommendation" as defined in DOE Order 227.1A, which defines recommendations as "suggestions for senior line management's consideration for improving program or management effectiveness. Recommendations transcend the specifics associated with findings, deficiencies, or opportunities for improvement and are derived from the aggregate consideration of the results of the appraisal."

As identified in the assessment plan, this assessment considered requirements uniquely related to the BPA safety management program, as well as selected portions of Criteria and Review Approach Document (CRAD) 32-03, *Industrial Hygiene Program*, Rev. 0, June 1, 2016; CRAD 45-21, *Feedback and Continuous Improvement*, Rev. 1, December 4, 2012; and CRAD 45-31, *Chemical Management Implementation*, Rev. 1, June 30, 2011, as applicable to BPA.

EA examined key documents, including procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs; observed work activities; and walked down significant portions of selected facilities. The members of the EA assessment team, the Quality Review Board, and EA management responsible for this assessment are listed in Appendix A. Detailed assessments of each of the 2014 Independent Oversight recommendations are provided in Appendix B. EA provided additional details of EA's field observations separately to BPA.

5.0 RESULTS

BPA has shown progress in improving its safety management program since the previous Independent Oversight assessment. In some areas, this progress has been substantial. From a programmatic standpoint, BPA has developed a Safety Management System (SMS) designed to implement the American National Standards Institute (ANSI)/American Industrial Hygiene Association (AIHA) Standard Z10-2012, *Occupational Health and Safety Management Systems*, which provides an effective

mechanism for identifying and focusing on those safety and industrial hygiene (IH) programs with the highest risk. The BPA Safety organization uses its SMS risk-based process to identify and focus on the top five environment, safety, and health programmatic risks each year. For example, BPA made significant process improvements in the hearing conservation program in fiscal year (FY) 2018 as a result of this process. For FY 2019, the SMS risk-based process has appropriately identified five top priorities, the highest of which is the development of a job briefing (J-1)/job hazards analysis (JHA) process.

Since the previous Independent Oversight assessment, BPA has increased the Safety organization's visibility and influence with senior BPA management. The Chief Safety Officer is now a member of the Executive Team and the Chief Administrative Officer Leadership Team. Additionally, the BPA Safety organization, through initiatives described in the next paragraph, has a greater opportunity for involvement in BPA management decision making than was evident during the previous assessment.

A number of BPA safety initiatives have been effective in improving workers' and their supervisors' awareness of safety. The Human and Organization Performance initiative and associated training provided to workers and managers has fostered a culture of safety being everyone's responsibility. Inherent in this initiative is the Safety Leadership for Managers and Supervisors training and Incident Assessment Team (IAT) training, which BPA has presented to over half of its first line supervisors to date. The near-hit/safety concern reporting program has become an effective leading indicator of safety performance, particularly given the demonstrated improvements in employee participation. BPA has also revitalized the Safety Proctor program, resulting in a broader level of safety advocacy for front line workers across BPA. BPA has used the Safety Proctor program as a means to introduce BPA's safety core values to the workers and to encourage and strengthen safety awareness within the front-line workforce. IATs and the Safety Corrective Action Review Board are new initiatives with increased focus on root cause evaluation of safety incidents; their implementation has resulted in a formal approval process for IAT-proposed corrective actions that ensure better accountability for corrective action completion. BPA has also established four new safety committees (Office, Executive, Central, Contractor) that provide a high-level focus on safety in their respective areas.

BPA has other safety initiatives under development. For example, the nascent Safety by Design initiative is intended to apply design methods to minimize occupational hazards early in the design process, with an emphasis on optimizing employee health and safety throughout the life cycle of materials and processes. In another example, the Standards Harmonization program is designed to minimize redundant or conflicting standards that may have evolved independently over the years.

Although many safety programs continue to evolve, the fall protection program has reached an effective level of maturity and implementation, and has directly reduced the risks associated with working at elevated heights. BPA developed the program after benchmarking with other DOE and commercial fall protection programs. The program improvements included developing more effective fall protection engineering controls for towers and retrofitting towers to incorporate those controls. Personal protective equipment for fall protection has been improved, and the associated training was redesigned and implemented across the BPA organization. For example, EA observed a worker installing a solar panel at height. The worker was well prepared for the fall hazards associated with this work; he had a ladder with a lift box to get to the top of the trailer and a fall restraint hooked to a horizontal crane to provide fall protection.

For major contracted construction projects, safety is better integrated throughout the procurement process, and contractor safety performance and BPA safety oversight have improved. BPA now uses ISNetworld, a web-based subscription service that provides a third-party verification and rating of a bidder's safety performance. BPA clarified contract safety requirements by consolidating 11 Bonneville Purchasing Instructions clauses into two and incorporating the *Contractor Safety and Health Requirements For Prime*

and Subcontractors document by reference. The Safety organization has prepared tailored, site-specific safety plan (SSSP) guidelines that are included with the post-award contract documents and have resulted in improved SSSPs. For example, the SSSP for the new substation construction at the Quenett Creek Substation is comprehensive and well written, and it includes a clear and concise procedure for worker safety stop-work authority. The BPA Safety organization has created a Construction and Contracting Safety team. The BPA Contractor Safety Committee (mentioned above) is an excellent forum for integration of procurement, contract management, line organizations, and safety. The BPA Construction Management and Inspection group has improved its oversight of safety by providing appropriate OSHA training to the BPA construction inspectors. Workers acknowledged and endorsed stop-work authority at all visited contract construction sites. Finally, IH monitoring at construction projects has significantly increased since the previous Independent Oversight assessment.

The previous Independent Oversight assessment identified some significant problems in the areas of requirements management and performance assurance. To address these issues, BPA established a formal requirements management system that identifies applicable safety and health requirements and governance documents. These include appropriate program documents and implementing procedures governing many SMS functions, including performance assurance. For example, self-assessments that incorporate job safety observations and facility inspections are being performed on a regular basis. Incident reporting has substantially improved, particularly in the areas of near-hit/safety concerns, injury and illness, and motor vehicle incidents. The previous Accident Investigation Board (AIB) process has evolved into IATs that use assessments covering a broader range of incidents. BPA has also made improvements in the area of corrective action management, including a new corrective action program database and a new SMS program document and implementing procedure governing the issues management process, including capturing, monitoring, tracking, and trending issues.

Although BPA has made many improvements since the previous Independent Oversight assessment, the success of safety improvements depends on effective implementation, and in many programs, implementation has not yet been achieved or is not effective. As in the previous assessment, EA observed a number of work activities in which the hazards were not adequately identified, analyzed, and/or controlled, thus presenting undue risk to workers. A number of impediments have contributed to continued problems in the identification of hazards and appropriate controls.

One of the major impediments to a fully functional and mature safety management system is that BPA has not yet developed a process for identifying hazards and appropriate controls for all work. A JHA process meeting the guidance in ANSI/AIHA Standard Z10-2012 has not been designed or implemented for BPA. In many cases, EA observed work that was not adequately planned to ensure safe performance: workers moved an ungrounded metal structure near an energized 115 kV substation overhead bus; an individual not qualified to perform atmospheric testing in a confined space performed an inadequate atmospheric test (did not adequately analyze the space for potential stratification), and a worker entered that confined space based on the inadequate test results; workers cut tile without adequate assessment of silica hazards; and shop workers used equipment with inadequate machine guarding. BPA recognizes these issues and has identified the J-1/JHA process and the confined space program as the number one and number four risk priorities, respectively, for FY 2019. However, no compensatory measures are currently in place to minimize these risks to workers. (See Section 6, **Recommendation 1**.)

BPA Manual 420, *BPA Safety Manual*, is a comprehensive collection of BPA safety and health policies, programs, procedures, and requirements and contains over 80 separate documents. However, the requirements of this manual are generally not integrated into work activities or implemented by line management. Overall, line managers, supervisors, and workers lack awareness of, and accountability for, many of the safety requirements in the BPA Safety Manual. For example, in the paint shop, a supervisor was not aware of the respiratory requirements in the BPA Safety Manual to support respirator or

respirator cartridge selection for workers using the sand blast booth. In another example, shop workers performing welding on aluminum and their supervisor were not aware of the BPA Safety Manual procedures for respiratory protection, and the workers were not wearing respiratory protection in the presence of hazardous welding fumes. During EA's observation of routine testing of emergency lighting in the Dittmer Building, interviews with the Federal manager and supplemental labor contractor supervisor indicated that BPA does not take steps to ensure that contractor employees are properly trained for all of the safety and health hazards to which they may be exposed. (See Section 6, **Recommendation 2.**)

The Accident Prevention Manual (APM) and Work Standards, which are the hazard control documents best known and used by most of the workforce, do not address many fundamental safety and health programs, such as respiratory protection and hazard communication. Consequently, some of the OSHA requirements for these programs are not being implemented. In general, there is minimal connection between the APM, Work Standards, and the BPA Safety Manual. Therefore, much of the BPA workforce is not aware of and/or does not follow the procedures and requirements of the BPA Safety Manual.

Limited safety and health resources and capabilities have delayed safety program improvement and continue to negatively impact the development and maturation of BPA safety programs. The reduction of IH staff, following an initial buildup directly after the previous Independent Oversight assessment, has resulted in insufficient IH resources to adequately implement the IH program as defined in the BPA IH program procedure. Further, the lack of qualified safety technical specialists within the field safety organization has been detrimental to the improvement and implementation of BPA industrial safety programs. Within the BPA industrial safety organization, there are seven BPA field safety specialists who are industrial safety "generalists," deployed throughout the 16 BPA regions. However, the BPA industrial safety organization does not have subject matter experts (i.e., qualified safety technical specialists in most individual industrial safety disciplines such as confined space or motor vehicle safety) who have the technical expertise and dedicated time to develop industrial safety programs and procedures in their area(s) of expertise. As a result, many industrial safety programs either have no procedure or the procedure is inadequate with respect to OSHA general industry requirements. BPA recognized this need and identified two full-time equivalent positions for safety technical specialists, but based on budget limitations to not exceed current full-time equivalent levels, cannot add staff.

Inadequate training or the inability to track and verify training for all workers has contributed to workers' exposure to unacceptable risks. The 2014 Independent Oversight report highlighted the absence of a centralized training program, and although BPA has improved the course content and presentation in some areas, such as fall protection, significant gaps remain in BPA's safety training program. A BPA gap analysis, KSI 1.1, *Job Specific Safety Training - OSHA Safety Training Gap Analysis of High Risk Safety Programs*, identified a number of gaps, including a lack of some OSHA required training or substandard training in some areas, such as hoisting and rigging, ergonomics, welding and cutting, and confined space; and continued difficulty in tracking, or inability to track, worker training requirements and status. As previously discussed, EA observed some instances in which either the workers performed activities without being qualified, or the supervisor did not have a way to verify workers' training. Additionally, training records indicated that the workers in the Hazmat storage building who operate the aerial lift had not received the required training to operate that lift. A significant problem is that operations and management supplemental labor contract workers were not always appropriately trained, and BPA cannot determine their training status. Overall, BPA continues to lack an agency-wide learning management system that can effectively identify, schedule, and track all required worker safety and health training. (See Section 6, **Recommendation 3.**)

EA also identified problems related to oversight, assessments, and corrective actions:

- In the area of supplemental labor contractor oversight, BPA still does not provide adequate oversight. For example, quality assurance/quality control oversight of electrical contractors is performed by BPA high-voltage electricians who are not always adequately knowledgeable of applicable electrical codes and standards for low-voltage work. Further, operations and management supplemental labor contractors do not provide adequate onsite supervision for their workers to ensure that work is performed safely. Finally, some supplemental labor contractor workers do not receive medical surveillance as required by OSHA health standards, such as the Hearing Conservation Standard.
- With respect to assessments, the Safety organization performs routine facility inspections and job safety observations. Facility inspections have identified many safety concerns, but job observations have not been effective in identifying and documenting any hazard control deficiencies requiring formal corrective action. EA readily identified such deficiencies during this assessment.
- In the area of corrective actions, the IAT approach to incident assessment is a major improvement over the old AIB process. However, some corrective actions continue to focus too narrowly on addressing the causes of specific events, without proper consideration of the extent of the condition and/or the need for interim compensatory measures while awaiting completion of corrective actions for similar work across BPA.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Overall, BPA has made significant progress in addressing the recommendations from the 2014 Independent Oversight assessment report. BPA has made significant improvements in human and organization performance and safety culture, setting the stage for future success. A few safety programs, such as the fall protection program, have matured sufficiently to provide controls that reduce worker risk to adequate levels. However, gaps in management, supervisor, and worker knowledge, accountability, and ownership of safety and health programs continue to put workers at increased risk. The lack of an adequate hazard analysis process continues to inhibit BPA's ability to identify, analyze, and control hazards. Finally, the lack of an agency-wide learning management system or process is a significant barrier to performing work safely.

EA identified the following recommendations for improvement of BPA safety and health programs and associated management systems. BPA should evaluate and prioritize their implementation to focus on reducing the likelihood of accidents and injuries.

1. **Develop a project plan with specific milestones and dedicated resources to guide the upcoming J-1/JHA process development.** Ensure that the process includes specific triggers to require reviews by appropriate safety professionals when needed to ensure that all hazards and controls are identified. While the JHA process is being developed and implemented, consider implementing compensatory measures for higher risk work activities.
2. **Increase line management and supervisor accountability and ownership of safety and health programs for all BPA and contractor work activities.** Consider developing and implementing a process, supported and championed by executive-level line management, to ensure that management and supervisors are informed and aware of, and accountable for, their responsibilities outlined in the BPA Safety Manual.

3. **Implement an agency-wide learning management system or process to address the significant gaps in training across BPA.** In the interim, consider implementing compensatory measures (such as requiring review of worker training requirements and training status during J-1 job briefings) to ensure that all Federal and supplemental contractor workers have the prerequisite and required training for all tasks. Revisit Recommendation 6 from the 2014 Independent Oversight assessment report and the BPA training gap analysis when addressing these longstanding training deficiencies.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: October 15-19 and October 29 – November 1, 2018

Office of Enterprise Assessments (EA) Management

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Appendix B
Status of Actions Addressing the 2014 Independent Oversight Recommendations

Bonneville Power Administration (BPA) Management Actions

B.1 February 2014 Independent Oversight Recommendation 1: Ensure that an extent of condition review is performed in the near term, addressing all Bonneville Power Administration (BPA) operations, facility conditions, contracted work, site specific safety plans (SSSPs)/job hazards analyses (JHAs), safety and health (S&H) programs, training processes, assurance systems, requirements management, and governance processes to determine the extent to which the deficiencies identified during this Independent Oversight review (including the appendices) exist in other BPA District locations and facilities and job sites.

In September 2015, BPA contracted with a third party (FDRsafety, LLC) to perform an independent extent-of-condition evaluation of BPA actions and progress in addressing the 2014 Independent Oversight report recommendations. Two certified safety professionals worked with BPA safety specialists to perform the evaluation. The evaluation was performed at two BPA facilities that Independent Oversight visited in the previous assessment and an additional BPA facility not addressed in the previous assessment. The extent-of-condition evaluation identified a few additional problems, and BPA entered newly identified corrective actions into the safety corrective action program, which was created in March 2016.

In fiscal year (FY) 2017, BPA performed an internal audit of the FDRsafety, LLC report as part of a broader internal audit of actions related to the Independent Oversight recommendations. The internal audit was comprehensive in its review of how the FDRsafety report addressed Independent Oversight report subject areas. The internal audit found that although BPA had not completed action on all the items, the extent-of-condition review did adequately address the specific comments made by the previous Independent Oversight assessment.

Overall, the extent-of-condition review was comprehensive and also provided a valuable progress report to BPA on safety management program actions and improvements at that time. The FY 2017 BPA internal audit further confirmed the review results. However, approximately a year and a half expired between the issuance of the Independent Oversight assessment report and the performance of the extent-of-condition review. During that period, BPA determined that other suggested action items in the report related to this recommendation, such as developing an implementation plan with milestones to correct deficiencies, identifying and prioritizing hazards, and developing interim compensatory protective measures, could not be done until the extent-of-condition review was complete. Some progress has been made on these action items in the three years since. However, the lack of an adequate mechanism for hazard analysis or identification of hazard controls continues to pose a serious risk to workers across the BPA complex (see Section B.4, below).

B.2 February 2014 Independent Oversight Recommendation 2: Establish mechanisms to ensure that management and supervision at all levels understand, accept, communicate, and instill in subordinates the need for and expectations that BPA will become a learning organization that proactively identifies, evaluates, and effectively addresses safety problems and expresses that safety is everyone's responsibility.

BPA has prepared, published, and posted its Core Value statement, which includes taking time to work safely, taking actions to prevent and eliminate hazards, taking actions when unsafe situations are discovered, and incorporating safety into all activities. In 2016, BPA implemented an Occupational

Safety and Health policy committed to creating an open and safety-driven culture toward its employees in the workplace and at home, and with the general public.

BPA also improved its organizational structure to elevate safety in the organization. The Chief Safety Officer now reports to the Chief Administrative Officer, who in turn reports to the Administrator and Chief Executive Officer. The Chief Safety Officer is now assigned as a member of the executive team.

BPA's occupational S&H policy adequately sets the framework for implementing a safety management system (SMS) and defining the roles and responsibilities for the key elements of the organization, including the employees. The BPA vision states that safety is integrated into all aspects of its work, and individuals take ownership of their safety on and off duty. To achieve this policy, BPA adopted American National Standards Institute (ANSI)/American Industrial Hygiene Association (AIHA) Standard Z10-2012, *Occupational Health and Safety Management Systems*, for the purpose of integrating S&H into work practices at all levels in the planning and execution of work. The Safety organization has implemented regular communication with employees via emails and the BPA intranet to promote safety across BPA. Additionally, safety alerts and notices are posted on the safety website, and a link to report a near hit or safety concern is available on its homepage.

BPA's organizational structure creates a pathway for its Safety organization to bring S&H concerns to the attention of the Administrator. This structure ensures the BPA Safety organization's ability to involve senior executives in the conversation on industrial safety and occupational health matters.

Overall, BPA has established mechanisms and set expectations that BPA will become a learning organization that proactively identifies, evaluates, and effectively addresses safety problems.

B.3 February 2014 Independent Oversight Recommendation 3: Provide direction and resources to and monitor the effectiveness of improvement initiatives.

BPA has completed a number of activities to benchmark program development and implementation and has worked with industry peers, such as the Western Area Power Administration, to identify new and best practices for work planning and control, requirements management, and assurance systems. In 2014, BPA conducted a safety perception survey to establish a baseline of employee safety perceptions and to obtain their feedback. BPA completed a review and gap analysis of U.S. Department of Energy (DOE) guidance and directives in 2015, which resulted in the adoption of one DOE directive, DOE Order 210.2A, *DOE Corporate Operating Experience Program*, and the adoption of ANSI/AIHA Standard Z10-2012 as its SMS. Adopting this ANSI/AIHA Standard allowed BPA to obtain an equivalency for DOE Order 225.1B, *Accident Investigations*; DOE Order 450.2, *Integrated Safety Management*; and DOE Policy 450.4A, *Integrated Safety Management Policy*. A third-party review of BPA's progress in addressing the Independent Oversight recommendations resulted in a detailed and comprehensive report issued in September 2015 and demonstrated BPA's commitment to monitor the effectiveness of the improvement initiatives.

Data from the new initiatives, such as the near-hit and safety concerns programs, facility inspections, and job safety observations, provides lagging and leading indicators to direct resources to specific safety program areas. New auditing procedures, such as the Safety Management Internal Audit procedure #420-100-08, have been implemented to define the steps necessary for conducting internal audits of the effectiveness of the SMS and to identify areas needing improvement. BPA created the new Safety organization database to track near-hit and safety concern items, job observations and facility inspections, and all issues management corrective action items.

BPA has made progress in providing direction and resources to address many of the Independent Oversight recommendations, resulting in success in some high-risk areas, such as the fall protection program, which is mature and generally effective in protecting workers. It is notable that BPA has not reported a fall incident from elevated work since the implementation of the program. Other areas where BPA safety program initiatives have been effective are the Human and Organization Performance (HOP) initiative and the near-hit and safety concerns reporting programs. These programs, along with the new databases to track near-hit and safety concern items, job observations and facility inspections, and all issues management corrective action items, have improved BPA's ability to monitor the effectiveness of improvement initiatives. Overall, these efforts have resulted in a visible and obvious improvement in the overall safety culture across the complex.

Despite these improvements, these efforts have only been partially successful, because most S&H programs and procedures are not fully developed and implemented, and many workers across BPA continue to be exposed to serious, unmitigated S&H hazards. BPA has internally identified gaps in programs, and the Office of Enterprise Assessments (EA) identified others during this assessment, as detailed throughout this appendix. The initial increases in the Safety organization's staffing have been partially negated by the subsequent loss of some of these subject matter experts (SMEs) for various reasons, and these positions remain unfilled.

Work Control Processes for BPA Employees and Supplemental Labor

B.4 February 2014 Independent Oversight Recommendation 4: Design and implement a comprehensive and consolidated safety management system, including a work planning and control process that is to be followed by all BPA managers and workers.

In March 2015, in the *Bi-Annual Progress Review of BPA's Response to the DOE Independent Oversight Review of the Bonneville Power Administration Safety Management Program*, BPA identified five keys to success in fulfilling this recommendation, and in the same year BPA adopted ANSI/AIHA Standard Z10-2012 as the SMS process for BPA. BPA recognized this effort to be a multi-year project, phased in gradually by tasking the Safety & Occupational Health team to tackle the highest-consequence hazards first, while working with the BPA Safety Training Manager to develop associated training modules. In 2015, a project team composed of employees and managers was established to identify gaps in meeting ANSI/AIHA Standard Z10-2012 requirements and to develop the appropriate program documentation, process maps, and a Z10 toolkit. In 2016, BPA issued Procedure 420-100, *Safety Management System*. In 2017, the BPA audit management system (TeamMate) reviewed the BPA work completed on each of the 16 Independent Oversight recommendations. In summary, the BPA audit team concluded that although work remains to be done on developing and implementing a JHA procedure, the elements for each of the five keys in the March 2015 *Bi-Annual Progress Review of BPA's Response to the DOE Independent Oversight Review* had been identified and incorporated into the SMS program and "a proper *Safety Management System* is in place and has taken into consideration DOE recommendations."

BPA has met a number of milestones in implementing this recommendation. In March 2016, BPA issued the second revision of Procedure 420-100, as well as 10 implementing procedures defining the structure of the SMS for BPA and the required BPA safety program aspects for compliance with ANSI/AIHA Standard Z10-2012. One important element of the BPA SMS procedure is the risk assessment process for integrating injury and illness data, safety concerns, near misses, and management priorities for safety. This process facilitates the systematic assessment and identification of S&H programs that pose the greatest risk of injuries and adverse health effects to the BPA workforce. With BPA S&H programs out of compliance with many Occupational Safety and Health Administration (OSHA) and Department of Transportation regulations, as further discussed below in Section B.5, the BPA risk assessment process is a valuable mechanism for assessing worker risk resulting from these non-compliances and assigning

priorities (i.e., triaging safety programs) with respect to safety program development. This risk assessment process is of particular importance given BPA's limited S&H resources (BPA S&H resource limitations are discussed below in Section B.9). BPA initially implemented the risk assessment process in FY 2017 for FY 2018 and in FY 2018 for FY 2019, and for FY 2019 they have identified the top five programmatic risks as job briefing (J-1) and JHA, motor vehicles, strains and sprains, confined spaces, and cranes and load hauling, respectively. During FY 2018, BPA achieved successes in the risk assessment process, particularly with respect to the hearing conservation and medical surveillance programs. Other BPA successes in implementing this recommendation include: (1) the development and implementation of a BPA-wide Safety Leadership for Managers and Supervisors training course that provides an introduction to the BPA SMS, with a focus on line management responsibility for safety and hazard assessments; (2) the initiation of a "Safety by Design" program for BPA construction contractors, which is intended to eventually provide a basis for a BPA work planning and control process; and (3) the initial stages of transforming line manager accountability for safety from lagging performance indicators (e.g., injuries, illnesses, and fatalities) to leading indicators (e.g., near hits, safety concerns, and corrective action status).

However, as BPA recognizes, the development of a comprehensive and consolidated SMS process is only in the beginning stages. During many field observations, EA noted workplace hazards that had not been identified, documented, and/or analyzed and hazard controls that had not been developed, documented, and/or implemented. For example, workers moved an ungrounded metal structure near an energized 115 kV substation overhead bus, a worker inappropriately entered a confined space where the atmosphere had been inadequately tested by an individual not qualified to do the testing, workers were cutting tile without adequate assessment of silica hazards, and shop workers were using equipment with inadequate machine guarding. BPA does not have an adequate process for identifying, analyzing, documenting, and controlling workplace hazards and hazard controls. Such a process is a cornerstone of an SMS process as defined by ANSI/AIHA Standard Z10-2012, and without it, workers are at increased risk of injury and illness. Work groups used the current J-1 process, as described in the BPA Accident Prevention Manual (APM) Section J-1, *Job Briefing*, at the beginning of most of the work activities observed by EA. However, some job briefings did not discuss either the hazards or the hazard controls, such as applicable personal protective equipment requirements, associated with the planned work activity. As a result of the significant shortcomings in the hazard analysis process, BPA has prioritized the development of the J-1 and JHA processes as the top safety programmatic risk for FY 2019.

The bulk of this recommendation was directed at the lack of BPA formal work planning and control processes that proactively involve environment, safety, and health (ES&H) SMEs in the planning and performance of work. Most BPA work observed is currently identified and processed with work requests and orders, including drawings. In some cases, procedures and Work Standards are followed, but these work processes do not include ES&H or the identification of hazards and hazard controls. Furthermore, there are no work control mechanisms to include ES&H in the planning and performance of work, including when safety permits (e.g., lead and confined space permits) are involved. S&H is typically involved only reactively (i.e., responding to safety events or safety requests from line managers) and is seldom involved proactively in the planning of work or in the identification of hazards and controls.

Overall, BPA has made progress in establishing an SMS designed around ANSI/AIHA Z10-2012 and in recognizing the critical importance of developing a hazard identification, analysis, and control process (i.e., the J-1/JHA process). However, the development and implementation of this process is only in the beginning stages. BPA also recognizes that an effective JHA process is the first step in developing a work control process and that the development of a work planning and control process with ES&H involvement has not yet begun.

B.5 February 2014 Independent Oversight Recommendation 5: Establish and implement a formal requirements management system and document hierarchy that ensures all applicable S&H regulatory requirements are appropriately identified, documented, understood, and flowed down into implementing procedures.

The BPA Safety organization addressed this recommendation by establishing policy initiatives that included adoption of ANSI/AIHA Standard Z10-2012. In conjunction with the policy revision, the Safety organization created a new SMS program document and various SMS implementing procedures, including new document and record control procedures defining standardized formats and content requirements for all SMS documents, such as SMS policy documents, program documents, and program implementing procedures. Although BPA has made significant progress in developing program documents and implementing procedures governing performance assurance activities (see Section B.15, below), many gaps remain in translating identified industrial safety requirements into implementing procedures (see Section B.8, below).

At the time of the previous Independent Oversight assessment, BPA executive management had already tasked the BPA Compliance and Internal Controls group with creating a program, called the regulatory compliance program (RCP), to identify all of the legal and regulatory requirements to which BPA must adhere. After several years of working with teams across the agency to identify applicable laws and regulations, the BPA Compliance and Internal Controls group created a list of domains identifying all programs in BPA that had applicable laws and regulations, including the Safety organization. This effort began shortly after the previous assessment through collaboration with BPA's Chief Administrative Officer project management office and the Compliance and Internal Controls group. In 2016, the Safety organization completed the work to list all safety regulations in a spreadsheet format provided by the Compliance and Internal Controls group. The spreadsheet included all applicable OSHA safety regulations, as well as a smaller subset of regulations from six other Federal agencies, called safety domains within the RCP. The Safety organization grouped the regulations within the spreadsheet by safety domain at the regulatory subpart level, and the Compliance and Internal Controls group uploaded these into the RCP, which offers the ability to track the regulatory requirements and associated compliance status.

While the current RCP indicates non-compliances in many regulatory areas, a formal requirements management system is in place and functional, representing a vast improvement from the previous Independent Oversight assessment. Based on the number of non-compliant areas, the Safety organization recognizes full compliance will not occur quickly. However, the RCP and SMS annual audit are identifying gaps, and BPA used the annual Safety Issues Analysis and Prioritization Report process to effectively identify the high risk areas of non-compliance and prioritize completion of new safety initiatives, such as the J-1/JHA process, to address during the upcoming year, as discussed above in Section B.4.

B.6 February 2014 Independent Oversight Recommendation 6: Establish and implement a formal centralized institutional training program, separate from the line organizations, with responsibility for identifying, developing, managing, scheduling, and implementing BPA S&H training for all BPA employees and supplemental workers/augmentees, where appropriate.

BPA identified several actions in response to this recommendation. These included actions to perform a training gap analysis, develop and document course materials, manage and schedule training, deliver training, and provide for retraining as required for all employees and contractors. Efforts to enhance BPA's safety-related training included the hiring of a full-time training manager in 2015. This individual was assigned responsibility for developing and implementing most, if not all, elements of the training of employees, including development of the following: an employee training database; qualification for

trainers; a written S&H training program; training qualifications for supplemental labor; training qualifications for outside contractors; and conduct of a compliance verification of training content. Lastly, BPA hired training contractors to develop and deliver the OSHA-required courses identified in KSI 1.1, *Job Specific Safety Training - OSHA Safety Training Gap Analysis of High Risk Safety Programs*; some courses are either still under development or awaiting delivery to BPA workers. After the initial training delivery, BPA is responsible for retaining ownership of the training materials and continuing future delivery.

EA evaluated the area of safety training through corrective action document review, training records review, interviews with safety and engineering personnel designated as owners of the various corrective action plan items, and discussions with BPA and contract workers in the field. Many of the corrective actions BPA identified were completed in the 2015-2017 timeframe. These actions have resulted in significant progress in the area of training since the previous Independent Oversight assessment. BPA is closing many identified gaps in training, including ongoing development of courses, such as those listed above.

Although progress is evident, the BPA benchmarking and safety training gap analysis identified many training curriculum shortfalls, including the lack of some OSHA-required training in such areas as hoisting and rigging, ergonomics, welding/cutting, and confined space. For example, training records indicate that the workers in the Hazmat storage building who operate the aerial lift have not received the required training to operate that lift. In field observations, EA identified workers in strategic operations who were not trained and qualified to perform the assigned tasks, or the supervisors lacked the ability to verify the required training. Some of these workers were supplemental contractor labor, and supervisors had the most difficulty in verifying training for these workers. During one observation of workers testing emergency lighting, EA's interviews with the Federal manager and supplemental labor contractor supervisor indicated that BPA does not take steps to ensure that contractor employees are properly trained for all of the S&H hazards they may be exposed to. Training records provided by the supplemental contractor were incomplete, in that they did not indicate which employees were trained on specific subjects. Additionally, the adequacy of S&H training in satisfying OSHA training requirements could not be determined from the records provided. The gap analysis states that "tracking initial or refresher training is conducted by a combination of Human Resources Management Information System reports and Excel spreadsheets and is not considered widely effective" and further states that "lack of a Learning Management System at BPA and the geographic dispersal of BPAs operations make the tracking of individual training attainment post-apprenticeship cumbersome and open to missteps." Interviews also confirmed that BPA lacks an agency-wide process that can effectively identify, schedule, and track all required worker S&H training (i.e., a learning management system).

B.7 February 2014 Independent Oversight Recommendation 7: Develop and implement a BPA industrial hygiene (IH) program with responsibility for identifying, establishing requirements for, and developing procedures and programs for identifying, evaluating, and controlling workplace exposures (e.g., noise, lead, respiratory protection, hazard communication). Provide adequate resources (i.e., staff, IH monitoring equipment, exposure database software) to implement the IH program.

BPA has taken steps since the previous Independent Oversight assessment in developing and implementing IH programs to control workplace exposures. These programs are in various stages of development, ranging from fully implemented (e.g., hearing conservation program) to initial conceptual stage (e.g., hazard communication). The most progress made in developing IH programs typically comes as a result of Fiscal Year Key Initiative focus. In the past few years, the BPA Safety organization has ranked the S&H risks currently faced by BPA personnel. They then make a concerted effort during that fiscal year to reduce those risks, typically by improving the quality of the associated S&H program or, in some cases, establishing a whole new program altogether.

Two personnel in BPA's Corporate Safety organization are currently responsible for identifying and controlling IH hazards. First, the IH program manager is responsible for developing and executing the requirements of IH programs. An IH program (Safety Manual 420-200) has been developed and provides a level of structure for gathering data in support of specific programs (e.g., the hearing loss prevention program). Second, an industrial hygienist is responsible for performing the duties of an SME, including oversight of contractor resources available to perform IH monitoring in the field. In 2016 and 2017, these contractor IH resources started conducting baseline monitoring for airborne contaminants, as well as noise dosimetry. This baseline monitoring has been a good step forward in gathering data for the effort to conduct effective workplace exposure assessments in the future.

Overall, BPA has made progress in the development of an IH program document, performance of a number of baseline IH monitoring projects in FY 2016 and FY 2017, and further development and implementation of IH programs with respect to noise and hearing conservation and medical surveillances.

Although an IH program has been developed, full implementation has yet to occur. The IH program manager currently has two IH programs (respiratory protection and industrial ergonomics) scheduled for development as Key Initiatives in FY 2019. Many other IH programs are also in need of development, and the potential risks associated with them may not be known because no comprehensive exposure assessment program has been implemented to determine the extent of the associated conditions. Also, the lone industrial hygienist on staff is primarily dedicated to ongoing facility projects (e.g., demolition and modification of buildings). Interviews with the Federal Corporate Safety staff indicated that around 85% of IH work involves building inspections related to narrow-scope construction projects. Although construction projects are important work, this approach leaves insufficient resources dedicated to identifying, evaluating, and controlling workplace exposures as a fundamental IH program strategy. Similar to the J-1/JHA process initiative, the IH exposure assessment program is a large-scope project that needs more attention than it currently receives. Although three contracting companies exist for the purpose of supplementing IH tasks (including IH monitoring) throughout BPA's wide geographical range, the IH hazards that most of BPA's workers encounter in most of BPA's workplaces have not been investigated and enumerated.

B.8 February 2014 Independent Oversight Recommendation 8: Consolidate and strengthen the current BPA industrial safety program to ensure that applicable industrial safety requirements (material handling, fall protection, welding, etc.) are identified, translated into procedures, and communicated and implemented in the shops and in the field.

The BPA industrial safety program is currently managed by the BPA Director of Field Safety, who has 7 field safety specialists distributed throughout the 16 BPA regions. The current field safety staff has increased by one field safety specialist since the previous Independent Oversight assessment. In April 2015, BPA filled the contracted full-time equivalent (CFTE) Certified Safety Professional (CSP) position; that position was vacated in January 2016 and later eliminated. The field safety organization has been focused on the following five core functions: job observations, facility inspections, conduct of safety meetings, tracking and following up with near hits and safety concerns, and maintaining industrial safety programmatic policies and procedures.

Overall, BPA has achieved progress in identifying the applicable industrial safety regulatory requirements applicable to BPA work activities, compiling non-compliances with OSHA requirements in each of the BPA industrial safety programs, and clarifying training gaps in the current BPA industrial safety programs. The industrial safety program has also benefitted from the development of the SMS risk assessment process, as further discussed above in Section B.4, with four of the top five programmatic risk areas for FY 2019 being related to industrial safety. The industrial safety programmatic risk areas are motor vehicles, strain and sprains, confined spaces, and cranes and load hauling.

The most significant industrial safety program success since the previous Independent Oversight assessment has been the development of a more comprehensive fall protection program. As a result of a number of fall protection injuries during the past decade, including a fatality in 2013, both the BPA Safety organization and BPA senior management have been aligned in the importance of developing and implementing a robust fall protection program. In August 2015, BPA added a fall protection specialist to the Field Safety staff, who continues to be instrumental in the development and implementation of fall protection initiatives. A BPA Fall Protection Committee was established, a Fall Protection Handbook was developed after benchmarking with other DOE and commercial fall protection programs. Fall protection training was expanded to a full day that included practical factors. Fall protection engineering controls were developed and implemented, including retrofitting towers with vertical lifeline support systems, and new fall protection personal protective equipment was acquired. Overall, the fall protection program is a fully functioning program, and EA field observations indicated that it is adequately implemented in the field. For example, EA observed a worker installing a solar panel at height. The worker was well prepared for the fall hazards associated with this work. He had a ladder with a lift box to get to the top of the trailer and a fall restraint hooked to a horizontal crane to provide fall protection.

However, while EA acknowledges these accomplishments, BPA has not completed many of the actions for this recommendation. A key element of this recommendation is to “ensure that applicable industrial safety requirements (material handling, fall protection, welding, etc.) are identified and translated into procedures.” BPA has made progress in the identification of industrial safety requirements, but many gaps remain in translating these requirements into procedures. For example, BPA has identified 55 procedures contained within 8 sections of the BPA Safety Manual as being necessary to implement the identified industrial safety requirements. However, according to the BPA Safety organization, only four of these procedures adequately address current regulations and BPA requirements; many procedures are old documents that require revision or deletion. In 28 cases, the procedure has yet to be drafted. Furthermore, as further discussed below in Section B.9, there are insufficient resources and capabilities to effectively develop these industrial safety programs and procedures.

A second problem is the current complexity of the administrative mechanisms for developing, updating, and implementing industrial safety procedures. Safety procedures primarily reside in three separate document sets: the APM, which applies only to workers in the Transmission Department and is maintained by the craft-based Central Safety & Health Committee; the BPA Work Standards, which are owned by and of greatest use to those BPA organizations responsible for developing each standard; and the BPA Safety Manual maintained by the BPA Safety organization, which applies to the entire BPA organization. Of the three safety document sets, the APM is the primary set of safety procedures used by workers in the transmission field organizations, which constitute most of the BPA workers. The APM, however, focuses on the electrical craft and does not address a number of safety areas that are not typically significant in work performed by high-voltage line electricians (e.g., respiratory protection, hazard communications). Eleven safety procedures in the BPA Work Standards were developed by and apply to specific organizations based on hazards of concern to those organizations (e.g., Chainsaw Use Policy, Confined Spaces, and BPA Rescue Policy). Safety procedures that are not in the APM or the Work Standards, as well as duplicative safety procedures, are included in the BPA Safety Manual. However, there is no linkage to the BPA Safety Manual through the APM or the Work Standards, and worker interviews indicated that they are not aware of procedures in the BPA Safety Manual, nor do some workers and supervisors acknowledge a responsibility to follow the BPA Safety Manual.

A third problem in implementing industrial safety policies and procedures is the lack of an effective process for proactively involving the field safety organization in the planning and conduct of work activities. While the field safety specialists observe selected work activities and perform building inspections, there are no mechanisms to proactively involve them in planning work, identifying industrial hazards, or assisting in the development of hazard controls, as further discussed above in Section B.4.

B.9 February 2014 Independent Oversight Recommendation 9: Strengthen the BPA Federal Safety organization staff by adding certified safety professionals, certified industrial hygienists, and a fire protection engineer.

Since the previous Independent Oversight assessment, the number of SMEs in the fields of safety, IH, and fire protection initially rose as a result of hiring priority and then subsequently fell due to attrition, performance issues, and recent budget constraints. In April 2015, BPA filled both the CSP and the two certified industrial hygienist positions with contracted CFTE positions, resulting in the addition of one CSP and two industrial hygienists, one of whom was a certified industrial hygienist. In the same month, the fire protection engineer position was also posted, but after a national recruiting campaign and multiple unsuccessful attempts to fill the position, the position was reclassified, and further attempts to hire a fire protection engineer were postponed until FY 2017. By February 2017, the CFTE fire protection engineer position was filled.

In August 2016, the CSP position was eliminated due to budgetary constraints and was never re-competed after the CSP left in 2016. In the same year, the certified industrial hygienist resigned, and after a rigorous but unsuccessful recruiting campaign, BPA management decided not to pursue filling the CFTE certified industrial hygienist position. Instead, BPA hired a Bonneville Full-time Equivalent (BFTE) Federal industrial hygienist while maintaining the services of the remaining CFTE industrial hygienist. In 2017, the remaining CFTE industrial hygienist position was terminated, and in 2018 a BFTE IH program manager position was defined and filled.

At present, the staffing of the IH program relies on a BFTE IH/Medical Surveillance/Fire Protection Program Manager and a BFTE industrial hygienist, supported by supplemental contractor support from three IH companies. The industrial safety program is staffed by a BFTE Director of Field Safety and seven BFTE field safety specialists, similar to the industrial safety staffing at the time of the previous Independent Oversight assessment. The fire protection staff consists of one CFTE fire protection engineer.

A problem that BPA continues to face is retention of safety SMEs. Of all of the industrial hygiene, industrial safety, and fire protection SMEs hired after the previous Independent Oversight assessment, only a BFTE Federal industrial hygienist and a CFTE fire protection engineer remain on staff. The CSP and the two CFTE industrial hygienists were not retained. This level of attrition over a relatively short period of time (a few years) amplifies the difficulty of creating and maintaining a viable set of safety programs. Competition for talented SMEs is undoubtedly keen in the BPA regions and metropolitan area. However, the ability to recruit and retain quality safety subject matter expertise, especially for Federal program management, is vital to the growth and ultimate compliance of BPA's safety programs.

Within the Safety organization's industrial safety group, safety expertise is insufficient to develop the number of safety programs currently identified by BPA to be compliant with OSHA regulations, and no effective mechanisms have been defined to resolve this staffing issue. At present, BPA is "full time equivalent neutral," implying that no new safety positions (either Federal or contractor positions) are available to the BPA Safety organization. As a result, although the BPA Director of Field Safety has been allocated two new field technical specialists (safety SMEs) to develop industrial safety programs, the organization cannot add staff to fill these positions.

For the IH organization, experienced and certified IH resources are lacking to assist the IH program manager (who has no IH training and experience), in developing and implementing a strategy for IH program development and exposure assessments. Although three IH consulting companies are available for support, BPA lacks its own trained and qualified IH staff to effectively direct the use of these resources.

In summary, BPA has not maintained adequate staffing and resources to develop and maintain IH and industrial safety programs as defined in the BPA Safety Manual and associated policies and procedures.

B.10 February 2014 Independent Oversight Recommendation 10: Build on the positive Substation Operations human performance improvement (HPI) initiative/experience to establish and implement a formal institutional program for training all employees and managers in the application of HPI concepts and techniques to all work activities and safety issue evaluations.

The HPI program, or what BPA now refers to as the HOP program, has been an important development for the entire organization. The HOP program has grown from a concept originally developed in the Transmission Divisions and the Safety organization in 2013 into a BPA-wide application today. In 2015, BPA hired a human performance specialist to work in the Safety organization as a resource for implementing HOP concepts on a broader scale within the organization and to provide training to multiple levels of the BPA workforce. The centerpiece of the HOP program is the E-Colors in Human Performance (E-CHP) system of personality assessment. BPA has applied the E-CHP system to provide individuals with an idea of their communication and learning preferences, as well as guidance on how to communicate with fellow BPA employees who have different communication and learning preferences. BPA has also leveraged HOP concepts and techniques to transform its accident investigation program into the Incident Assessment Team (IAT) process in order to look at behavior and cultural factors as they relate to mishaps and unsafe conditions.

The HOP program has provided the tools needed to ensure a thriving safety culture within BPA. The fundamental applications of the HOP program focus on three fundamental functions: prevention, detection, and correction. The prevention function applies HOP through job observations and training. The detection function identifies HOP traps and triggers in communications between coworkers, and the correction function is used during the IAT process.

BPA employees receive HOP training from the human performance specialist on a routine basis. As of June 2018, over 50% of BPA employees and contractors had been trained on E-CHP and as part of participating with the IAT. Additionally, most managers and supervisors have received more comprehensive two-day E-CHP and IAT training. Senior managers (including the Chief Administrative Officer, the Chief Operating Officer, and the BPA Administrator) have received executive E-CHP training. These training opportunities demonstrate a concerted effort to apply HOP principles at all levels of the organization. BPA has also leveraged E-CHP training to advance its Diversity and Inclusion program by improving communication through non-traditional methods. BPA has provided its workforce with sufficient training in the area of human and organizational performance to serve as a foundation for the safety programs as they mature.

B.11 February 2014 Independent Oversight Recommendation 11: Systematically address worker concerns associated with the proposed revision of cable splicing practices.

During the previous Independent Oversight assessment, BPA workers raised concerns about the safety and reliability of a proposed new cable splice technique specified in Appendix O of the BPA Substation Construction Specifications, *Cable Splice Guidance*, and the non-lead sheathed splices made by contractors. Ensuring the reliability of the cable shield safety function was a particular area of worker concern.

BPA identified several actions in response to this recommendation. These include BPA's solicitation of information from cable splice kit vendors about designs and availability of qualified splicing kits; submergence testing of remaining lead sheath spliced poly cable samples; revising Appendix O of the BPA Substation Construction Specifications to reflect changes in splicing techniques; revising Appendix

O to reflect other qualified splicing methods, including specifics on the method to address flexing and cable pulling concerns; addressing the additional testing of existing spliced lead sheathed cables to demonstrate that they are both safe and reliable; inserting any revised Appendix O cable splicing guidance as requirements in the technical specifications for new construction, modification, or maintenance contracts; and developing and implementing a strategy to identify and repair previous Appendix O cable splices that may not meet revised BPA safety and environmental reliability expectations.

BPA identified many of the actions as completed in the 2014-2015 timeframe, including the revision of Appendix O to no longer require the use of lead in the cable splice technique (i.e., discontinuing the use of lead splices). Additionally, various testing and implementation schedules were established for transition to new non-lead cable splicing techniques. Many of the actions conducted early on have been overtaken by events, such as BPA's establishment of requirements that all new construction will use panels and new cable runs, eliminating the need for splices. BPA policy SOE-P-020, *Low Voltage AC Power Distribution*, was revised to state: "Cable splicing is no longer a standard practice for tapping a circuit and may only be used in emergency situations." Current standards require cables to be brought to terminal strips instead of being spliced. Substation upgrades have included replacement of all spliced cables, thereby also eliminating the lead spliced cables. Interviews with substation upgrade project foremen indicated that these actions are sometimes difficult because they require adequate conduit or trench system space. BPA has also implemented other actions to eliminate cable splices, such as strategically installing termination enclosures or boxes along the route of the cable that would have previously been spliced. These actions result in existing cables being terminated on terminal strips and new cables being run from the new terminal enclosure to the end device(s), thus adequately addressing worker concerns about the proposed revision of cable splicing practices, including their concerns about the reliability of splices.

Work Control Processes and Contractual Safety Provisions for Contracted Work

B.12 February 2014 Independent Oversight Recommendation 12: Strengthen the policy and process for worker stop work authority. Consider making stop work a stand-alone section in the planned Contractor Safety and Health Requirements for Prime and Subcontractors document and address the Independent Oversight team's comments on the stop work aspects of this document which were provided separately to BPA.

BPA has added requirements in the Bonneville Purchasing Instructions (BPI), Sections 14.12.5, 15.6.1, and 15.6.3, and Clause 15-12(e), and in the Contractor Safety and Health Requirements for Prime and Subcontractors document, Section 1.5, to make it clear that BPA employees have the authority to stop contractor work for safety concerns and that contractor employees have the right to stop work, without reprisal, when they have a safety concern. In addition, Clause 15-12(e)(4) requires the contractor to "establish procedures that allow workers to cease or decline work that may threaten the safety and health of the worker or other workers."

BPA's standalone safety stop-work policy allows both BPA and contractor employees working on BPA property to raise safety concerns by temporarily stopping contracted work to resolve the concerns. The authority for contractor employees to raise safety concerns and temporarily stop work is a contract requirement through Clause 15-12.

Contractor employees interviewed by EA during onsite field observations were aware of their authority to raise concerns and stated that they were willing to raise issues if needed. The SSSP (Section 2.3.3, *All Employees Stop Work Authority*) for the Quenett Creek Substation contracted construction project is a good example of a clearly stated and readily available stop-work authority procedure. However, formal

safety stop-work implementing procedures, as required by Clause 15-12, were not readily available at most worksites or not included in most of the contractors' SSSPs. Typically, all contractor employees read the SSSPs, and contractors maintain SSSPs on site for ready reference. The current BPA SSSP guidance/templates provided to contractors at contract award do not currently include the direction to address worker safety stop-work procedures in their submitted SSSPs.

B.13 February 2014 Independent Oversight Recommendation 13: Systematically evaluate contracts and direction to contractors with the goal of providing clarity in the safety requirements for contracted activities.

BPA established the Construction and Contractor Safety team (NFC) in 2015 to focus on ensuring that contracted construction work on BPA property and right-of-ways is performed safely. The NFC, in coordination with the Construction Acquisition Team, revised the BPI to ensure that safety requirements are conveyed to contractors performing construction and other high-risk work. The BPI has been revised to combine 10 safety-related contract clauses into two primary safety contract clauses and provides instructions on which contracts require the inclusion of these clauses. Clause 15-12, *Contractor Safety and Health*, is to be included in contracts where work is performed on BPA property, and Clause 15-13, *Contractor Safety and Health Requirements*, is to be included in contracts when work involves vegetation management, when aircraft is used as part of the work, when the work involves potential hazards that require the contractor to develop and implement an SSSP, or as directed by the BPA Safety organization.

The NFC has developed the *Contractor Safety and Health Requirements For Prime and Subcontractors* document, which is incorporated by reference into Clause 15-13 and contains a set of safety requirements that appropriately addresses OSHA, selected consensus standards, and BPA-unique requirements. The BPA-unique requirements reflect those included in the APM for BPA self-performed work, particularly for electrical work and high-risk work activities, such as excavation and work at height, as well as standardized electrical hazard demarcation methods. As recommended by EA, these primary safety clauses include the requirements for contractors to provide BPA with safety training documentation for their workers and, upon request, any medical information needed for incident investigation purposes.

In addition, other clauses are now included in construction contracts that help provide for the safety of contractor construction workers:

- 3-10, *Contractor Employee Whistleblower Rights*
- 15-2, *Drug-free Workplace*
- 15-4, *Contractor Compliance with Bonneville Policies*
- 15-6, *Hazardous Material Identification and Material Safety Data*.

EA evaluated the current BPI safety-related procedures and clauses, the *Contractor Safety and Health Requirements For Prime and Subcontractors* document, and three construction contracts for projects observed while on site (along with an associated subcontract for a subcontractor working on site). The BPI clearly states the safety requirements and when contracting officers are to include them in construction contracts. As part of the recent BPA Safety by Design initiative, the NFC now provides a useful *Project Safety Risk Assessment Worksheet* to contracting officers to help them identify where safety risks should be clearly identified in the scope of work and the contract clauses, and addressed in project planning documentation.

EA observed onsite contracted construction work at seven projects, including construction of electrical substations, civil engineering work for new building construction, and well drilling. EA reviewed BPA prime contracts for three of these projects, as well as a subcontract for work under the prime contract. The BPI-required clauses were clearly stated in the prime contracts. In addition, for three subcontractors

working on site during EA field observations of contracted construction projects, the subcontracts contained all clauses that are required to be flowed down into subcontracts. The contractor and subcontractor personnel interviewed by EA were knowledgeable of the requirements as implemented in their SSSPs.

According to an interview with the Manager, Construction Management and Inspection, and Director, NFC, the Contractor Safety Committee is currently working on updating the *Contractor Safety and Health Requirements For Prime and Subcontractors* document to ensure that contractor safety requirements keep current with the changes in BPA requirements reflected in the APM. In addition, the NFC and Internal Standards (within the Engineering and Technical Services office) have started the Standards Harmonization initiative, which is designed to readily identify and give contractors quick access to safety-related requirements (e.g., those included in BPA work or maintenance standards) applicable to their contracted work.

B.14 February 2014 Independent Oversight Recommendation 14: Systematically evaluate BPA capabilities and processes for managing and overseeing contracted work with the goal of providing an appropriate level of BPA SME involvement in the contract and SSSP and sufficient qualified BPA oversight of contracted work in the field and job sites.

BPA Supply Chain Purchasing Operating Procedure 15-2, *Contractor Safety Program Requirements*, describes the implementation of the BPA contractor safety program, including the use of ISNetworld, a web-based subscription service which provides a third-party verification of a bidder's safety performance. Procedure 15-2 also addresses the Safety organization's review of SSSPs and attendance at pre-work meetings. The roles and responsibilities of the Safety organization in the contract process are documented in BPA Policy 130-7 and the Safety Management System Document. The Safety organization is developing a process called Safety by Design, which encourages the consideration of safety at the design stage of the project. Also, a Contractor Safety Committee has been established to identify and address emerging issues in contracted work.

BPA established the NFC in 2015 to focus on ensuring that construction work is performed safely. The NFC includes a deputy director and a staff of six safety managers/specialists, including a Contractor Oversight Safety Manager. The qualification requirements for individuals who oversee the safety of contracted work activities are defined in the position descriptions, and the Safety organization has developed a multi-year Safety Organization Staff Training Planner. The Construction Management and Inspection group also requires OSHA training for the field quality assurance representatives.

Overall, BPA has made progress in providing an appropriate level of BPA SME involvement in managing and overseeing contracted construction work. The Safety organization is better integrated throughout the pre-award phase of the contract process through the use of new technologies (e.g., ISNetworld) and processes (e.g., Safety by Design) and continues to provide appropriate support to post-award activities. The Safety organization Contractor Oversight Safety Manager provided an example of his pre-construction meeting kickoff notes, which included appropriate topics, such as stop-work authority, incident reporting, SSSPs, daily tail-board meetings, and safety watchers. Additionally, the Contractor Safety Committee is an effective method for integration and communication among the Safety organization, the procurement office, and the line organization. The roles and responsibilities of the Safety organization in the BPA procurement process are appropriate and formally documented.

The establishment of the NFC provides a focus for this area. The one safety manager assigned to oversee contracted work currently has approximately 22 to 24 active contracted construction projects in a geographically dispersed area. BPA's current plan is to regionalize oversight so that three members of the NFC staff (contractor oversight, construction, and the fall protection specialist) will be assigned

specific geographical regions. Additionally, one safety specialist (contractor) is responsible for reviewing all of the SSSPs (400 documents last year). There is no backup for this safety specialist position.

In the previous Independent Oversight assessment, EA noted that the Safety organization did not have an inspection/assessment scheduling tool to help target field activities and ensure that field oversight expectations are met. Discussions with the Construction and Contractor Oversight safety managers indicated that a scheduling tool has still not been implemented.

The multi-year Safety Organization Staff Training Planner includes appropriate training and qualification requirements and both regulatory and elective training classes. The position description for the safety and occupational health specialist includes appropriate knowledge, skills, and abilities. The Contractor Oversight Safety Manager has significant experience and training in construction oversight, including working for OSHA, and is well qualified to perform his job.

Assurance Systems

B.15 February 2014 Independent Oversight Recommendation 15: Establish and implement a formal, corporate level, assurance management system and implementing procedures.

As with the February 2014 Independent Oversight Recommendation 5, the BPA Safety organization addressed this recommendation by establishing policy initiatives, including a major revision of BPA's S&H policy to adopt and incorporate ANSI/AIHA Standard Z10-2012. In conjunction with the rollout of new SMS program documents and procedures, BPA also hired an Operating Experience Manager in April 2016 to develop and oversee an Assurance Management System in support of the new SMS. This effort included development of formal assurance management programs and/or procedures governing routine safety self-assessments, incident assessment and incident reporting, employee concerns, and corrective action management and tracking.

Since the previous Independent Oversight assessment, the Safety organization has developed new self-assessment procedures to guide performance of both job safety observations and facility inspections, and has also created new program documents and implementing procedures that govern a range of new incident reporting and incident assessment requirements. These include procedures for near-hit/safety concern reporting, motor vehicle incident reporting, and injury and illness reporting. Near-hit/safety concern reporting also serves as an additional mechanism beyond the existing BPA employee reporting hotline for workers to raise concerns, including the option to report anonymously. In concert with new HOP initiatives (discussed in Sections B.10 and B.16), the Safety organization also replaced the former AIB process with a new incident assessment program (IAP) document and associated procedures, which are also further discussed in Section B.16. Lastly, the Safety organization has developed a new corrective action program document and implementing procedure that govern the management of all identified issues requiring corrective action, as well as a newly developed procedure that standardizes the process for distributing lessons-learned information, such as safety notices and alerts, to communicate information captured from the assurance mechanisms noted above.

BPA currently has appropriate program documents and implementing procedures governing the conduct of safety management self-assessments, incident assessments, incident and concern reporting, and management of corrective actions. The new safety documents follow a consistent format and generally provide an adequate level of detail to accomplish the assigned functions. For example, occupational injury and illness reporting is now governed by Procedure 420-120-01, *Injury/Illness Reporting Procedure*, which effectively communicates the necessary injury and illness reporting requirements, and the safety data analyst assigned to manage the process is knowledgeable of the relevant OSHA injury and illness recording and reporting requirements. EA reviewed OSHA 300 Logs for 2016 through 2018,

along with a sample of OSHA 301 Injury and Illness Incident Reports, and found them to be accurate and sufficiently detailed. Ongoing injury and illness cases are properly tracked to ensure that changes in classification, or in days away, restriction, or transfer, are updated in a timely manner.

Overall, the new performance assurance programs and procedures represent a big improvement from the previous Independent Oversight assessment. Self-assessments, including facility inspections and job safety observations, are being performed; near-hit and safety concern reporting has increased dramatically since inception, indicating worker acceptance and improved safety culture; incident assessment protocols are in place and cover a broader range of incidents than before; and incident reports are thorough and include causal factor analysis. Additionally, a formal corrective action management program is in place, and there is evidence that the Safety organization is capturing, monitoring, tracking, and trending issues using Safety organization database tools.

While recognizing these vast and generally effective improvements, EA identified a few problems in aspects of performance assurance, including electronic recordkeeping for injury and illness, job observation rigor, and the annual SMS internal audit process. These are briefly discussed below.

The overall BPA injury and illness recordkeeping and reporting process is performing well, but the limitations of the current “Ecomp” electronic recording system have been only temporarily mitigated through the diligence of the safety data analyst, who has had to create some “work-arounds.” Also, a lack of trained backup personnel in case of the safety data analyst’s absence creates the potential for temporary lapses in the timeliness of recording incidents. However, to address these and other recordkeeping concerns, BPA is transitioning to a new Occupational Health and Safety electronic recording and tracking system, which is scheduled for completion in mid-2019.

In reviewing corrective action database entries resulting from facility inspection and job observation self-assessments in 2017 and 2018, EA found that facility inspections are the only self-assessment-related safety concerns in the corrective action database. The database contains no corrective action entries from BPA job observations that were similar to the types and examples of missing or ineffective hazard controls that EA identified during field observations (as discussed in other sections of this appendix). This limited input to the database indicates a lack of rigor or insufficiently defined expectations for ensuring that job hazards and controls are effectively examined and discussed in job observation reports. The Safety organization’s FY 2018 Safety Issue Analysis and Prioritization Report also identified concerns in this area.

Lastly, EA reviewed the annual audits of the BPA SMS to determine its compliance with ANSI/AIHA Standard Z10-2012 requirements. EA identified several areas where there was insufficient objective evidence supporting a determination of compliance. Specifically, many ANSI/AIHA Standard Z10-2012 elements require action to implement the requirements, such as conducting assessments or implementing a proper hierarchy of controls. However, in some cases, the annual SMS audit referenced the existence of a policy or procedure as evidence of compliance without ensuring that the policy or procedure was actually implemented properly.

B.16 February 2014 Independent Oversight Recommendation 16: Strengthen BPA injury, illness, and event investigation processes and implementation to integrate established HPI concepts and techniques to focus on identifying and addressing latent BPA and contractor organizational and management weaknesses that are contributing to poor S&H performance.

As indicated in Section B.10, BPA began to expand existing substation HOP initiatives to other BPA organizations starting in 2015. In 2016, BPA also moved away from the prior accident investigation methodology and culture by replacing the former AIB concept with IATs, including a new structure that includes process-driven causal analysis as part of all incident assessments. Incorporation of HOP training

as a requirement for all IAT members started in 2016 and was a large component of the transition, along with development of the SMS IAP program document and associated implementing procedures. The responsibilities of the newly created HOP manager position also include serving as a focal point and mentor/facilitator for the IATs. IAT leaders and team members are qualified through specific IAT training that includes HOP principles, concepts, and applications. Lastly, BPA instituted the Safety Corrective Action Review Board (SCARB), which meets formally after an IAT completes an incident investigation and issues a draft report. The SCARB meeting serves as a means for discussing, validating, and modifying IAT proposed corrective actions and ensuring accountability for corrective action completion. SCARB participation includes line management and senior executive representation from the affected line organizations, IAT members, and various representatives from the BPA Safety organization, such as the Chief Safety Officer, HOP Manager, Operating Experience Manager, and Director of Corporate Safety.

The IAP provides much formality and significantly broader coverage of incident assessments than the former AIB process. While previous AIBs were convened only after accidents involving major property damage, serious injuries, or fatalities, the new IAP requires incident assessments for a wide range of incidents, including those much less significant than just serious injuries or fatalities. Criteria for conducting the various types of incidents requiring an assessment are formally defined in the IAP program document.

EA reviewed several recent incident assessment reports and attended a SCARB meeting that was reviewing and approving incident assessment reports and proposed corrective actions. The incident assessment reports provided a high level of detail surrounding the incident, including valuable discussion and insights related to possible causal and contributing factors for the event. The SCARB is new since the previous Independent Oversight assessment, and the meeting EA observed was well attended, with participation by Transmission Field Services and Engineering and Technical Services senior management representatives, IAT members, the Chief Safety Officer, and various Safety organization staff, including the HOP Manager, Operating Experience Manager, and Director of Corporate Safety. The meeting effectively discussed the details of the incident, in addition to validating and modifying IAT proposed corrective actions in real time, along with assignments and due dates for corrective action completion.

With one exception, the BPA actions taken to address this recommendation have been effective. The lack of extent-of-condition reviews and interim compensatory measures within the IAT process remains problematic. The IAT corrective actions reviewed by the SCARB were narrowly focused on addressing specifically identified event causes, without evaluating and addressing the extent of the condition and/or interim compensatory measures for the conditions described in the report. For example, a strain pole flashover event report indicated that the craft was not well acquainted with a relevant work standard published in 2017. The report went on to state: “Similar issues have been noted by previous IAT’s in the way work standards are published and the lack of verification that the intended audience have received the updates, they have been read, and workers understand the expectations set forth in the standard. This is a much larger issue than just one craft. Any standard work process that if done incorrectly could result in serious injury or fatality must be published in a way that there is formal assurance of receipt, understanding, and verification of that understanding.” However, the corrective action was to add information to the specific work standard in question and verify that it was distributed and received. There was no extent-of-condition review or other appropriate corrective actions to address the broader concern – namely, the lack of understanding of other work standards across BPA that contributed to this and other events.

Similarly, during the observed SCARB meeting, the IAT noted that while this event did not result in a recordable injury, under the right conditions it could have resulted in a serious injury or fatality. The IAT also pointed out that similar shock events not resulting in injury have likely occurred but were never

reported. The proposed corrective actions from this report were properly reviewed, modified, and assigned for completion during the SCARB, but the corrective actions require up to one year to complete and fully implement. One of the corrective actions already taken was to issue a safety alert on this event; however, like the above concern about work standards, there is no mechanism to ensure that all potentially affected workers read and understand it. In this case, there was also no discussion of the extent of the condition or the need for interim compensatory measures, such as a requirement for independent SME review of job conditions and briefings for future work of this type to ensure worker safety while awaiting completion of corrective actions.