



Defense Nuclear Facilities Safety Board

29th Annual Report to Congress April 2019

**Required by Section 2286e(a) of the
Atomic Energy Act of 1954, as amended**

“The mission of the Board shall be to provide independent analysis, advice, and recommendations to the Secretary of Energy to inform the Secretary, in the role of the Secretary as operator and regulator of the defense nuclear facilities of the Department of Energy, in providing adequate protection of public health and safety at such defense nuclear facilities.”

42 U.S.C. § 2286a(a)

Bruce Hamilton, Chairman
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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



April 1, 2019

To the Congress of the United States:

The Defense Nuclear Facilities Safety Board (Board) is pleased to submit to Congress its Twenty-Ninth Annual Report for Calendar Year 2018. The Board is an independent executive branch agency responsible for making recommendations to the Secretary of Energy, and in certain cases to the President, to provide adequate protection of public health and safety at the Department of Energy's (DOE) defense nuclear facilities. As required by 42 U.S.C. § 2286e(a), this report describes our current safety initiatives and assesses improvements in the safety of defense nuclear facilities, as well as safety issues yet to be resolved.

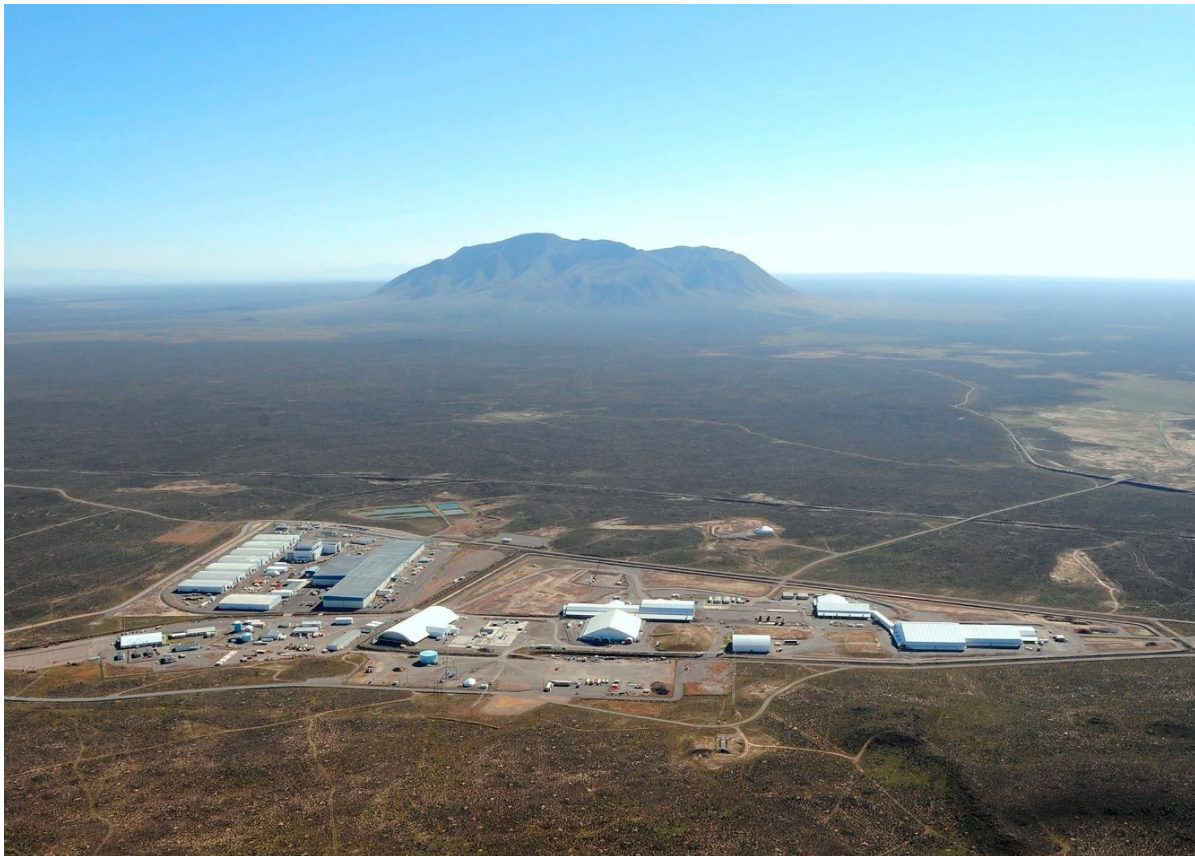
Respectfully submitted,


Bruce Hamilton
Chairman

c: The Honorable James Richard Perry

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Solid Waste Storage and Processing Areas at Idaho National Laboratory

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EX. Executive Summary

Under the Atomic Energy Act of 1954, as amended, the Defense Nuclear Facilities Safety Board (Board) is charged with providing independent safety oversight of the Department of Energy's (DOE) defense nuclear facilities complex—a complex with the mission to design, manufacture, test, maintain, and decommission nuclear weapons, as well as other national security priorities. The Act mandates that the Board reviews the content and implementation of DOE standards, facility and system designs, and events and practices at DOE defense nuclear facilities to provide independent analysis, advice, and recommendations to inform the Secretary of Energy regarding issues of adequate protection of public health and safety at DOE defense nuclear facilities.

The Board prioritizes its safety oversight activities on the basis of risk to the public and workers, types and quantities of nuclear and hazardous material at hand, and hazards of the operations involved. This Annual Report summarizes the Board's significant safety oversight initiatives and some high-priority safety issues at defense nuclear facilities subject to the Board's oversight during 2018. The Board discussed several of these issues in its June 4, 2018, and July 23, 2018, initial letters to the Assistant Secretary of Energy for Environmental Management (EM) and to the Administrator of the National Nuclear Security Administration (NNSA) following their confirmations. Foremost among these initiatives and issues were:

- *New DOE Directive on Interface with the Board*—In May 2018, DOE issued DOE Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*, to replace the prior directive on interface with the Board, DOE Manual 140.1-1B. DOE Order 140.1 incorporated major changes including new restrictions and protocols regarding the Board's access to information, facilities, and personnel that could diminish the Board's ability to effectively perform its statutory mandate under the Atomic Energy Act of 1954, as amended. As written, DOE Order 140.1 could limit Board oversight of many defense nuclear facilities. The Board has communicated its concerns regarding DOE Order 140.1 to the Secretary of Energy in its letters of September 17 and December 21, 2018, and has held two public hearings to gather information on its implementation by DOE. In its December 21, 2018, letter, the Board reiterated its commitment to collaborate with DOE to resolve these concerns.

- *DOE Rule on Nuclear Safety Management*—DOE has begun the process to revise Title 10, Code of Federal Regulations, Part 830 (10 CFR Part 830), *Nuclear Safety Management*, which is the cornerstone of DOE's regulatory framework to ensure adequate protection of public health and safety. The Board has identified several concerns with DOE's notice of proposed rulemaking and communicated its comments to DOE in its letter of October 5, 2018. The Board is concerned that the proposed revision will make it more difficult for the Department to exercise consistent oversight across the complex and loosens requirements upon which DOE and the public rely to ensure adequate protection of public health and safety.

- *Safety Control Strategies for Nuclear Explosive Facilities at Pantex*—The Board reviewed the safety basis and control strategy for nuclear explosive operations at the Pantex Plant. The Board approved the conduct of a preliminary safety inquiry, which is a type of safety

investigation under 42 U.S.C. § 2286a(b)(2) and 10 CFR Part 1708, regarding implementation of 10 CFR Part 830 at Pantex. The preliminary safety inquiry found that portions of the safety basis for Pantex nuclear explosive operations do not meet 10 CFR Part 830; that multiple components of the process for maintaining and verifying implementation of the Pantex safety basis are deficient, including completion of annual updates as required by 10 CFR Part 830; and that, to date, the NNSA Production Office and the Pantex management and operating contractor have been unable to resolve known safety basis deficiencies. The Board posted documents describing these conclusions on its public website on September 10, 2018.

- *Nuclear Criticality Safety at Los Alamos National Laboratory (LANL)*—Based on an evaluation of the LANL nuclear criticality safety program, the Board in its November 28, 2018, letter to the Secretary of Energy, identified the following related to this vitally important safety program: (1) lack of concrete milestones in corrective action initiatives for weaknesses in the program; (2) inadequate staffing in the nuclear criticality safety division; (3) inadequate documentation for daily work activities with the potential to impact nuclear criticality safety; (4) instances of poor operational quality in implementing nuclear criticality safety requirements; and (5) repetitive, ineffective corrective actions for weaknesses in the program.

- *Combined Tritium Facilities Safety Basis at the Savannah River Site (SRS)*—In a June 4, 2018, letter to the Secretary of Energy, the Board stated it was concerned that there is a need to evaluate and implement additional safety controls for the SRS Tritium Facilities to address accident scenarios that may result in high radiological dose consequences to co-located workers or off-site public. The Board also noted concerns with how the facility worker is relied on to self-protect during events, DOE’s application of administrative controls, and various analytical assumptions used in the safety basis for the facilities.

- *Drum Over-Pressurization Event at Idaho National Laboratory (INL)*—In April 2018, multiple drums at INL containing solid radioactive waste underwent over-pressurization and ejected radioactive materials. The Board is continuing to gather information and evaluate the safety implications at INL and at other DOE sites and plans a public hearing in May 2019 on the safety of solid radioactive waste storage and processing.

The Board contracted with the National Academy of Public Administration (NAPA) to perform a comprehensive assessment of the Board’s operations. In November 2018, NAPA issued its report, which provided numerous recommendations for improving the Board’s operations and mission effectiveness. The Board has begun to address the NAPA recommendations and will continue this effort in 2019.

This Annual Report organizes the Board’s oversight activities into four strategic areas: nuclear weapon operations; defense nuclear waste operations; design and construction of new defense nuclear facilities and major modifications to existing facilities; and safety standards and programs. The table on the following page summarizes substantive Board communications to DOE in 2018. Appendix A summarizes the status of all Board recommendations open in 2018. Appendix B summarizes safety items that the Board identified in 2018.

Substantive Board Communications to DOE in 2018

TECHNICAL REPORT	
March 15	Deficiencies in DOE Standard 5506-2007, <i>Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities</i> (DNFSB/TECH-43)
LETTERS	
January 4	Conduct of Operations Safety Management Program at the Savannah River Site
March 26	Design Documentation for Confinement Ventilation at the Waste Isolation Pilot Plant
March 27	Safety Basis for the Integrated Waste Treatment Unit at Idaho National Laboratory
April 24	Fire Protection at the Solid Waste Management Facility at the Savannah River Site
April 27	Atmospheric Dispersion Modeling at the Savannah River Site
May 17	Structural Integrity of the H-Canyon Exhaust Tunnel at the Savannah River Site
May 24	Fire Protection in Area G at Los Alamos National Laboratory
June 4	Tritium Facilities Safety Basis and Analyses at the Savannah River Site
June 4	Summary of Board Nuclear Safety Oversight Activities for DOE-EM Facilities
July 23	Summary of Board Nuclear Safety Oversight Activities for NNSA Facilities
August 14	DOE Progress on Recommendation 2012-1, <i>Savannah River Site Building 235-F Safety</i>
August 14	Use of the DOE Operating Experience Program by the Savannah River Site
September 7	Radiological Practices and Safety Strategy at the 324 Building B-Cell at Hanford
September 7	DOE Standard 3016-2016, <i>Hazard Analysis Reports For Nuclear Explosive Operations</i>
September 7	Safety Analysis of Fires at the Y-12 National Security Complex
September 7	H-Canyon Facility Exhaust Tunnel at the Savannah River Site
September 17	DOE Order 140.1, <i>Interface with the Defense Nuclear Facilities Safety Board</i>
September 24	Maintenance Processes and Procedures at the Waste Isolation Pilot Plant
October 5	Proposed Revision to 10 CFR Part 830, <i>Nuclear Safety Management</i>
October 17	Special Tooling Program at the Pantex Plant
November 28	Nuclear Criticality Safety Program at the Los Alamos National Laboratory
December 7	Structural Integrity of H-Canyon Exhaust Tunnel at the Savannah River Site
December 19	Safety Basis for the U1a Complex at the Nevada National Security Site
December 21	DOE Order 140.1, <i>Interface with the Defense Nuclear Facilities Safety Board</i>
Public Hearings or Meetings	
August 28 and November 28	Department of Energy's Interface with the Defense Nuclear Facilities Safety Board

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I. The Board's Statutory Mission

Congress established the Board in 1988 as an independent federal agency within the executive branch of government, answerable to the President and subject to congressional oversight and direction. Five Board members, appointed by the President subject to confirmation by the Senate, are required to be “respected experts in the field of nuclear safety with a demonstrated competence and knowledge relevant to the independent investigative and oversight functions of the Board.” The Board is a collegial agency, meaning that its actions are determined by the Board as a whole. The Board’s chairman serves as the chief executive officer, and performs this function subject to Board policies.

The Board’s essential mission is to provide independent analysis, advice, and recommendations to the Secretary of Energy to inform the Secretary, in his or her role as operator and regulator of DOE defense nuclear facilities, in providing adequate protection of public health and safety, which includes the health and safety of workers. As noted above, the Board’s jurisdiction covers DOE’s “defense nuclear facilities” – a term defined in the Atomic Energy Act of 1954, as amended. The Board only is concerned with facilities operated by DOE that are: (1) covered by the Atomic Energy Act; and, (2) have a function related to national defense. The phrase “defense nuclear facilities” thus excludes two major classes of government-regulated nuclear facilities: DOE’s nuclear projects that are civilian in purpose, and commercial nuclear facilities regulated by the Nuclear Regulatory Commission (NRC). The Board’s oversight jurisdiction also does not extend to the U.S. Navy’s nuclear propulsion program or to environmental hazards regulated by other federal and state agencies. (The table on page 3 lists the major sites that the Board oversees.)

The Board’s oversight mission covers all phases in the life of a defense nuclear facility: design, construction, operation, and decommissioning. Congress granted the Board a suite of statutory tools to carry out its mission. Principal among these is the formal Board recommendation issued to the Secretary. The statute requires the Secretary to either accept or reject the Board’s recommendation, and in the case of an acceptance, to write and execute an implementation plan. This process all takes place on the public record. In cases involving an “imminent or severe threat” to the public health and safety, the statute also requires the Board to send its recommendation to the President, who makes the final decision on actions to be taken. In addition to recommendations, the Board is empowered to hold public hearings (and subpoena witnesses, if necessary), conduct investigations, obtain information and documents needed for the Board’s work from DOE and its contractors, and review and comment on DOE requirements and standards affecting safety at defense nuclear facilities. DOE is required by law to grant the Board “ready access to such facilities, personnel, and information as the Board considers necessary to carry out its responsibilities.” Finally, the statute authorizes the Board to seek assistance from other federal agencies (such as NRC) and from organizations outside the government (such as the National Academy of Sciences), as needed.

As discussed further in Section V, the Board is concerned that DOE Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*, issued in May 2018, threatens to

undermine the Board's ability to execute its statutory mission under the Atomic Energy Act. DOE Order 140.1 improperly attempts to diminish the Board's statutory mandate in four principal ways, all of which are inconsistent with the text of the Atomic Energy Act:

- The Order contains a narrow definition of "Public Health and Safety," which only includes individuals located outside of DOE site boundaries (i.e., excluding onsite individuals and workers);
- The Order provides exemptions allowing DOE and contractors to not provide access to facilities that DOE determines do not have the potential to adversely affect public health and safety, which could limit Board oversight at many defense nuclear facilities;
- The Order lacks a clear provision to provide the Board with ready access to such information, facilities, and personnel as the Board considers necessary to carry out its responsibilities; and
- The Order provides an allowance for DOE to deny Board requests for relevant deliberative and pre-decisional information.

The Board held two public hearings in 2018 to address these concerns with DOE senior leadership. By the end of 2018, it was not clear whether DOE intends to revise DOE Order 140.1 to address the inconsistencies with the Atomic Energy Act. The Board will continue to pursue resolution of these concerns and endeavor to ensure that the Board can perform its statutory mandate.

Major Sites Subject to the Board's Jurisdiction

Site	Location	Operations	Website
Hanford Site	Richland, Washington	Management and treatment of radioactive wastes; facility decommissioning	http://www.hanford.gov
Idaho National Laboratory	45 miles west of Idaho Falls, Idaho	Storage and processing of radioactive waste	http://www.inl.gov
Lawrence Livermore National Laboratory	Livermore, California	Research to support the nuclear weapons arsenal	https://www.llnl.gov
Los Alamos National Laboratory	Los Alamos, New Mexico	Research to support the nuclear weapons arsenal; manufacturing of nuclear weapon components; disposition of legacy transuranic waste	http://www.lanl.gov
Nevada National Security Site	65 miles northwest of Las Vegas, Nevada	Disposition of damaged nuclear weapons; critical and subcritical experiments; waste management	http://www.nnss.gov
Oak Ridge National Laboratory	Oak Ridge, Tennessee	Energy research; treatment and disposal of radioactive wastes	http://www.ornl.gov
Pantex Plant	17 miles northeast of Amarillo, Texas	Maintenance of the U.S. nuclear stockpile	https://pantex.energy.gov
Sandia National Laboratories	Albuquerque, New Mexico	Nuclear research; support for the weapons stockpile maintenance program	http://www.sandia.gov
Savannah River Site	Aiken, South Carolina	Tritium extraction, recycling, and storage; management and treatment of radioactive wastes; nuclear materials storage and disposition; research and development	http://www.srs.gov
Waste Isolation Pilot Plant	26 miles east of Carlsbad, New Mexico	Disposal of transuranic waste in underground repository	http://www.wipp.energy.gov/
Y-12 National Security Complex	Oak Ridge, Tennessee	Manufacturing and surveillance of nuclear weapons components; processing of weapons-grade uranium	http://www.y12.doe.gov/

II. Nuclear Weapon Operations

Pantex Plant

Safety Control Strategies for Nuclear Explosive Facilities

Uncontrolled Hazard Scenarios and 10 CFR Part 830 Implementation—The Board evaluated the adequacy of safety controls for Pantex nuclear explosive operations and the processes that ensure those operations have a robust safety basis. The Board and its staff undertook two separate efforts on these topics in 2018 at Pantex. The first effort involved a review of the safety basis and control strategy for the B61, W76, W78, W87, and W88 operations. The Board then approved the conduct of a preliminary safety inquiry, which is a type of safety investigation under 42 U.S.C. § 2286a(b)(2) and 10 CFR Part 1708, regarding implementation of 10 CFR Part 830, *Nuclear Safety Management*. The preliminary safety inquiry found the following:

- Portions of the safety basis for Pantex nuclear explosive operations do not meet 10 CFR Part 830. For example, there are high consequence hazards that are not adequately controlled, or have controls that are not sufficiently robust or that lack sufficient pedigree to reliably prevent or mitigate the event.
- Multiple components of the process for maintaining and verifying implementation of the Pantex safety basis are deficient, including completion of annual updates as required by 10 CFR Part 830.
- To date, the NNSA Production Office and the Pantex management and operating contractor have been unable to resolve known safety basis deficiencies.

The Board posted documents identifying conclusions from these evaluations onto the Board's public website on September 10, 2018. At year's end, the Board was considering further action on these matters. (The Board subsequently issued Recommendation 2019-1, *Pantex Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant*, on February 20, 2019.)

Consequence Definition Changes in DOE Standard 3016—The Board provided oversight of NNSA's efforts to revise the definitions established in DOE Standard 3016, *Hazard Analysis Reports for Nuclear Explosive Operations*, for categorizing the consequences of postulated accident scenarios for nuclear explosive operations at the Pantex Plant. The Board issued a September 7, 2018, letter to the Secretary of Energy requesting a briefing on NNSA's planned implementation of the new definitions, including any changes in safety control strategies as a result of the revision. Representatives from NNSA, the Pantex management and operating contractor, and the weapon design agencies briefed the Board on their plans on October 19, 2018.

The Board's staff held discussions with personnel from NNSA, the Pantex management and operating contractor, and the weapon design agencies regarding the technical

underpinnings of the consequence definition changes. Additionally, the Board's staff reviewed the technical basis for the proposed change at Los Alamos National Laboratory. The Board and its staff will continue to assess the implementation of this change at the weapon design agencies and Pantex.

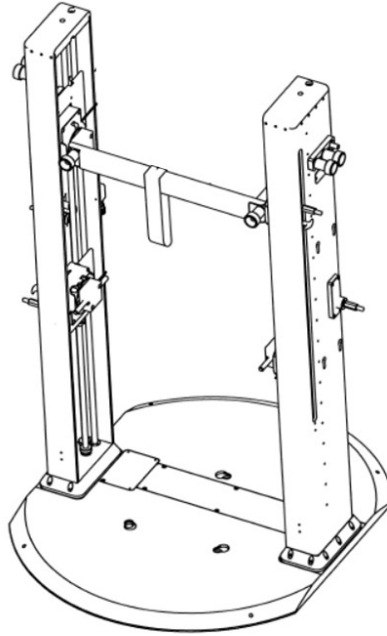


Test Detonation of High Explosive (photo from the Nevada National Security Site)

Special Tooling Program

The Board evaluated the Pantex special tooling program, which governs the design, fabrication, and maintenance of tooling that performs safety significant and/or safety class functions during nuclear explosive operations. The Board evaluated more than 75 special tooling designs, including a vertical slice of special tooling for the B61 program and a horizontal slice of special tooling designs common across weapon programs.

The Board communicated the results of this review to the Secretary of Energy in an October 17, 2018, letter. The Board identified deficiencies in the following areas: (1) application of the special tooling design manual, (2) weld quality and application of non-destructive evaluation techniques, (3) pedigree of preventive maintenance and in-service inspection programs, (4) performance criteria within safety basis documentation, and (5) special tooling loading conditions (e.g., non-conservative assumptions regarding placement and distribution of loads in falling technician scenarios).



Example Workstand for Nuclear Explosive Operations

Nuclear Explosive Safety

During 2018, the Board and its staff provided oversight of the safety of nuclear explosive operations at Pantex. The Board's staff assessed NNSA's nuclear explosive safety evaluations for new and ongoing activities including a limited duration warhead measurement campaign, a programmatic evaluation of special tooling used in nuclear explosive operations, modifications to the B61 process that are being fielded for the B61-12 program, and an evaluation of the facilities in which nuclear explosive operations are performed. The Board's staff also evaluated the design and implementation of new electrical testers that will support the B61-12 program and an upcoming W88 alteration campaign.

The Board's staff evaluated a unique process modification needed to safely address a workstand that experienced a mechanical problem during a nuclear explosive operation. Correcting the problem required partial disassembly of the workstand while it still supported the nuclear explosive.

Los Alamos National Laboratory (LANL)

Nuclear Criticality Safety

Since 2014, LANL has continued to make progress in resuming operations that were paused at the Plutonium Facility due to long-standing deficiencies in its nuclear criticality safety program. In 2017, the LANL contractor declared its formal resumption plan completed. Beyond the scope of the formal plan, LANL completed readiness preparations in early 2018 for electrorefining operations. The Board's staff provided oversight of these activities.

The Board completed a comprehensive review of LANL's nuclear criticality safety program. On November 28, 2018, the Board transmitted to the Secretary of Energy a letter that identified five safety items related to the program: (1) lack of concrete milestones in corrective action initiatives for weaknesses in the program; (2) inadequate staffing in the nuclear criticality safety division; (3) inadequate documentation for daily work activities with the potential to impact nuclear criticality safety; (4) instances of poor operational quality in implementing nuclear criticality safety requirements; and (5) repetitive, ineffective corrective actions for weaknesses in the program.

The Board noted the progress that NNSA and LANL have made in improving the nuclear criticality safety program but cautioned that significant work remains to enable the organizations within LANL that develop and implement criticality safety requirements to achieve compliance with applicable industry standards.

Plutonium Facility Safety Posture

On May 12, 2016, the Board transmitted to the NNSA Administrator a letter that identified issues with the fire suppression system at the Plutonium Facility. The Board concluded that the fire suppression system cannot be credited as a seismically qualified safety class control for post-seismic fires without further analysis, significant system modification, or potential replacement. In an August 29, 2016, letter, the NNSA Administrator committed to completing actions to address the issues raised by the Board. In 2018, the Board's staff reviewed actions that LANL has taken on this matter. The LANL actions include development of a comprehensive list of seismic interaction concerns with the fire suppression system, material testing of portions of the system, and an analysis of the seismic performance of the system.

During 2018, the Board's staff continued its review of the Plutonium Facility safety basis and supporting documents. As part of the review, the Board's staff focused on the safety posture of the facility, the methodology for calculating the facility leak path factor used to gauge the magnitude of radiological releases during postulated accident scenarios, and the hazard and accident analyses. The Board's staff also evaluated the biological modeling used to calculate the dose consequences for potential intakes of heat source plutonium in the Plutonium Facility safety basis. After evaluating the questions raised by the Board's staff, LANL declared a Potential Inadequacy of the Safety Analysis and established restrictions on heat source plutonium material-at-risk in the facility. The staff review of the Plutonium Facility safety basis continues into 2019.

During 2018, the Board's staff monitored LANL's ongoing efforts to improve the seismic performance of the Plutonium Facility in follow-up to DOE's response to Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*. These efforts include the development of a nonlinear dynamic analysis of the facility and experimental testing of representative column capitals. After a lengthy planning period, column capital testing and development of the new analysis are both set to commence in 2019. These efforts will enable NNSA to resolve longstanding questions about the performance of the structure under seismic loads.

Paleoseismic Trenching

In September 2018, the Board’s staff observed paleoseismic trenches excavated in Santa Fe National Forest across the Pajarito Fault System, a 50-km long fault that dominates the seismic hazard at LANL. LANL will integrate information from the paleoseismic investigation into its planned 10-year update to the LANL probabilistic seismic hazard analysis (PSHA). The Board’s staff evaluation of new seismic information generated from this PSHA update effort continues into 2019.



Paleoseismic Trenches Near LANL

Savannah River Tritium Enterprise

Combined Tritium Facilities Safety Basis

In a March 5, 2018, letter to the Tritium Facilities contractor, the NNSA Savannah River Field Office (SRFO) noted that the safety basis documents the contractor submitted in July 2017 contained multiple credible events that result in high co-located worker dose consequences after taking all available controls into account. SRFO requested the contractor to develop a strategy to reduce the co-located worker consequences. The safety basis documents that the contractor submitted in July 2017 combined several tritium facilities (and their material-at-risk) into one safety basis, calculated accident consequences using new atmospheric dispersion parameters, no longer credited the Emergency Preparedness Program to mitigate accident scenarios, and proposed reducing the allowable material-at-risk by approximately 50 percent at the tritium facilities.

In a June 4, 2018, letter to the Secretary of Energy, the Board noted that although DOE had delayed discussion of lines of inquiry developed by the Board’s staff on the revised safety basis for the combined tritium facilities, the Board thought it prudent to communicate the concerns identified thus far. The Board stated that it was concerned that there is a need to

evaluate and implement additional safety controls for events that result in high radiological dose consequences to co-located workers or dose consequences to the offsite public that approach the evaluation guideline. The Board also noted potential concerns with how the facility worker is relied on to self-protect during events, application of administrative controls, and various analytical assumptions.

In August 2018, SRFO requested that the Tritium Facilities contractor resubmit the revised tritium facility safety basis. The contractor submitted the revision in November 2018. The Board's staff plans to review the revised safety basis in early 2019.

Nevada National Security Site (NNSS)

U1a Complex Safety Basis

During 2018, the Board's staff reviewed the U1a Complex safety basis and its supporting documents. Based on its review, the Board issued a December 18, 2018, letter to the Secretary of Energy identifying safety items related to the heavy reliance in the U1a Complex safety basis on specific administrative controls, rather than engineering controls, to protect the experimental package and the lack of proper software quality assurance for the credited U1h hoist control system. The Board's letter acknowledged that the safety basis includes a commitment to evaluate the feasibility of using an alternative container that may be credited as an engineering control for material movement activities, but noted that the U1a Complex will continue to rely on specific administrative controls until NNSS completes the evaluation.

Device Assembly Facility Seismic Hazard Assessment

During 2018, the Board's staff evaluated the 10-year seismic hazard assessment for the Device Assembly Facility. The Board's staff focused on the seismic hazard assessment report and its associated sensitivity studies. The NNSS contractor identified an error in the seismic hazard assessment during its preparations for the Board's staff review. As a result, the contractor obtained an independent peer review of the seismic hazard assessment to check for other errors. The Board's staff will continue its review into 2019 focusing on the impact of the seismic hazard on the safety analysis for the Device Assembly Facility.

Sandia National Laboratories (SNL)

Annular Core Research Reactor Reactivity Control System Upgrade

SNL completed installation of a reactivity control system upgrade (RCSU) in the Annular Core Research Reactor (ACRR) in 2018. SNL undertook this upgrade to enhance ACRR's performance and improve its reliability by simplifying the interface between the instrumentation and control system and the reactivity control system, and to improve the human-machine interface display. The Board's staff reviewed the preparations to restart ACRR following this upgrade and observed the evolutions, drills, and interviews performed during the NNSA Readiness Assessment conducted to verify readiness to safely resume ACRR operations.

The Board's staff also evaluated the quality assurance, software quality assurance, and instrumentation and control aspects of the ACRR RCSU, as well as the portions of the instrumentation and control hardware and software that provide shutdown margin, safety interlocks, display feedback, and control safety functions.



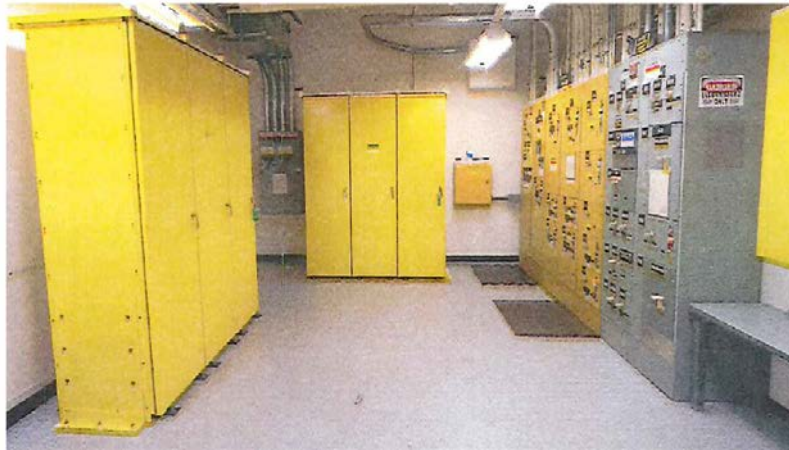
Annular Core Research Reactor at SNL

Lawrence Livermore National Laboratory (LLNL)

Plutonium Facility (Building 332) Motor Control Center Installation

The Board sent letters to DOE in 1999 and 2003 expressing concerns related to the operability of vital safety systems and delineating deficiencies in the Building 332 emergency power system (EPS), including the potential for single-point failures. In 2003, DOE defined a plan of action to address these deficiencies but noted that it would take years to address them all. The replacement of the Building 332 motor control center (MCC) in Increment 3 was the final item in DOE's plan. LLNL completed the installation of the new MCC in 2018.

The Board's staff reviewed incorporation of all of the modifications to the Building 332 EPS identified in DOE's 2003 plan of action, including the new MCC. The Board's staff also reviewed the one-line electrical drawings of the EPS in the current safety basis for Building 332 addressing resolution of the single-point failure issues.



New Motor Control Center in Building 332

Y-12 National Security Complex (Y-12)

The Board continued to provide oversight for the new Uranium Processing Facility and the Electrorefining Project at Y-12. Details can be found in Section IV.

Nuclear Safety Research and Development

The Board's staff evaluated the experimental results of a nuclear safety research and development project at Y-12. The experimental project is designed to determine the uranium airborne release fraction (ARF) and respirable fraction (RF) to be used in safety analysis of fires at Y-12 defense nuclear facilities. The Board issued a September 7, 2018, letter to the Secretary of Energy noting that the Board's staff had identified technical concerns with this project and the use of its preliminary results in the Uranium Processing Facility safety analysis. The Board noted the concerns indicate that use of ARF and RF values derived from the Y-12 experiments would likely lead to underestimating the dose consequences of accidents involving uranium metal fires, which could result in the selection of inadequate safety controls.

III. Defense Nuclear Waste Operations

Idaho National Laboratory (INL)

Drum Over-Pressurization Event

In April 2018, four drums containing solid radioactive waste underwent over-pressurization at the Accelerated Retrieval Project (ARP)-V facility in the Radioactive Waste Management Complex at INL. The over-pressurization ejected the drum lids, and spread radiological material within ARP-V. The Board's staff conducted reviews at INL in the aftermath of the event. Review topics included the chemical compatibility of the wastes being processed at INL, the controls introduced by DOE after the event to prevent recurrence, and hazards posed by methane-generating wastes. The Board and its staff are continuing to gather information and evaluate the safety implications at INL and at other DOE sites. The Board plans to conduct a public hearing in May 2019 on the safety of solid waste storage and processing in the complex.



Ruptured Drum in ARP-V at Idaho National Laboratory

Integrated Waste Treatment Unit Safety Basis

The Integrated Waste Treatment Unit (IWTU) is designed to process approximately 900,000 gallons of liquid radioactive sodium-bearing waste, which is now stored at INL's Idaho Nuclear Technology and Engineering Center (INTEC) Tank Farm, as well as newly generated liquid waste from INTEC. The Board has continued to perform oversight of this facility since DOE began the conceptual design stage more than a decade ago. More recently, the Board reviewed the IWTU final design, along with the latest revision of its safety basis documents, to ensure hazard controls provide adequate protection of the public prior to startup. The Board shared safety items from the review with DOE in its March 27, 2018, letter. The Board identified lack of adequate safety basis controls for certain fire and dust explosion events and

issues with the technical validity of the analytical methodology used for evaluation of potential auto-ignition of coal dust particles in a vent line. With regard to auto-ignition, DOE's contractor committed to perform more sampling of coal dust particles in order to demonstrate that such fires in the vent line are prevented.

Savannah River Site (SRS)

The Board continued to provide oversight of the Salt Waste Processing Facility design and construction project. Details can be found in Section IV.

Conduct of Operations

In a January 4, 2018, letter, the Board identified four safety items regarding the Conduct of Operations program and technical safety requirement (TSR) implementation at SRS: (1) less than adequate rigor of TSR control implementation; (2) less than adequate operations training on TSR controls and their bases; (3) less than adequate work authorization processes in implementing TSR controls, and (4) an ineffective corrective action program. In April 2018, DOE and NNSA provided responses that included an extensive set of actions taken or planned to address the issues identified by the Board and ensure rigorous TSR implementation. In May 2018, DOE and NNSA personnel, including the DOE and NNSA site managers for SRS, briefed the Board on these actions.

Following review of the SRS actions identified by DOE and NNSA, the Board noted in its August 14, 2018, letter that sharing the SRS operating experience for ensuring rigorous TSR implementation with the defense nuclear complex would be beneficial and help identify challenges in this area at other sites. The Board encouraged DOE to evaluate and disseminate this SRS operating experience complex-wide.

H-Canyon Facility

As a result of the issues that the Board raised in its December 16, 2015, letter to DOE concerning the structural integrity of the H-Canyon Exhaust (HCAEX) Tunnel, DOE directed its contractor to perform an additional examination of concrete representative of the tunnel. This examination led DOE to conclude in June 2017 that the ability of the HCAEX Tunnel to perform its intended safety class safety function during and following a design basis earthquake is indeterminate. Since that time, the contractor has been conducting a non-linear fragility analysis of the HCAEX Tunnel to determine the adequacy of the tunnel given its degraded state. The Board reviewed the input, assumptions, methodology, and acceptance criteria for the non-linear fragility analysis. In letters to DOE dated May 17, 2018, and December 7, 2018, the Board identified safety items about inappropriate assumptions and input parameters regarding concrete compressive strength and concrete loss.



HCAEX Tunnel Wall Showing Concrete Loss and Exposed Rebar

In a September 7, 2018, letter to DOE, the Board expressed concern with the H-Canyon Facility Justification for Continued Operation (JCO) approved by DOE in November 2017. SRS established the JCO due to the indeterminate ability of the HCAEX Tunnel to perform its safety class function during and after a design basis earthquake. A prominent feature of the JCO is the reliance on operator actions to stop an ongoing radiological material transfer within five minutes of an earthquake to protect the public and co-located worker. The Board's letter identified several issues with the implementation of this compensatory measure that should be resolved to ensure the continued safe operation of H-Canyon while evaluations of the HCAEX Tunnel's ability to perform its safety class function continue.

Atmospheric Dispersion Modeling

In December 2017, the Board sent a draft recommendation to the Secretary of Energy on atmospheric dispersion modeling at SRS. The draft recommendation identified several facility safety bases at SRS that had yet to update their atmospheric dispersion parameters per DOE guidance, the first of which was recognized back in 2011. Some of the safety bases could have increased calculated dose consequences from postulated accidents once these parameters are updated, which could drive the need for additional safety controls or upgrades to existing controls. The draft recommendation noted that while actions were taken to reduce hazards at the K-Area Complex, some facilities remain a concern, including the Tritium Facilities and the Concentration, Storage, and Transfer Facilities. The Board did not issue a final recommendation, but in its letter of April 27, 2018, the Board provided the proposed final recommendation as amended, the notational votes, and vote comments to DOE for information.

Solid Waste Management Facility (SWMF)

In January 2018, the Board's staff reviewed the safety basis for the SWMF, which provides permanent disposal, interim storage, characterization, and shipment of radioactive, mixed, and hazardous wastes generated by and received at SRS. SWMF includes waste storage pads used to store transuranic (TRU) waste drums awaiting characterization or shipment. The SWMF safety basis credits the response of the SRS fire department to limit the potential duration of fires on TRU waste storage pads to two hours. The waste storage pads do not have fire detection or automatic fire suppression systems, and the facility is not continuously staffed. The lack of these features can lead to a delay in fire department notification, resulting in a fire that lasts longer than the postulated two hours and results in radiological consequences greater than those considered in the safety basis. The Board's April 24, 2018, letter advised DOE of this deficiency in the SWMF safety basis.



Solid Waste Management Facility at the Savannah River Site

Los Alamos National Laboratory (LANL)

In November 2017, the Board sent a letter to NNSA identifying issues associated with a calculation that LANL used to determine thermal separation distances between combustibles and material at risk at the Transuranic Waste Facility. This calculation is used for other facilities at LANL, including the Area G facility. The Board tasked its staff with determining if similar potential safety items exist at Area G due to use of this calculation.

The basis for interim operation for Area G credits a specific administrative control (SAC) to mitigate the consequences of fires that are initiated by wildland fires or seismic activity. This SAC addresses transient combustible materials, with the safety functions of preventing fire spread between fuel packages and preventing significant thermal insults to material at risk. The

Board's staff assessment of the calculation identified that a spread of fire between combustible fuel packages could occur, preventing the SAC's safety function from being achieved. However, the current general lack of combustibles around Area G, limited current operations, and development of a new documented safety analysis (DSA) for Area G alleviated the Board's immediate concern with this calculation. The Board's May 24, 2018, letter to DOE communicated this conclusion.



Waste Drum Storage at LANL Area G Dome

In 2018, the Board's staff began reviewing the new draft DSA for Area G. The review focused on development of the hazard and accident analyses and the adequacy of the selected controls. The Board's staff also began reviewing the current Area G basis for interim operation that covers mobile loading operations, which make up the bulk of current Area G operations. These reviews continue into 2019.



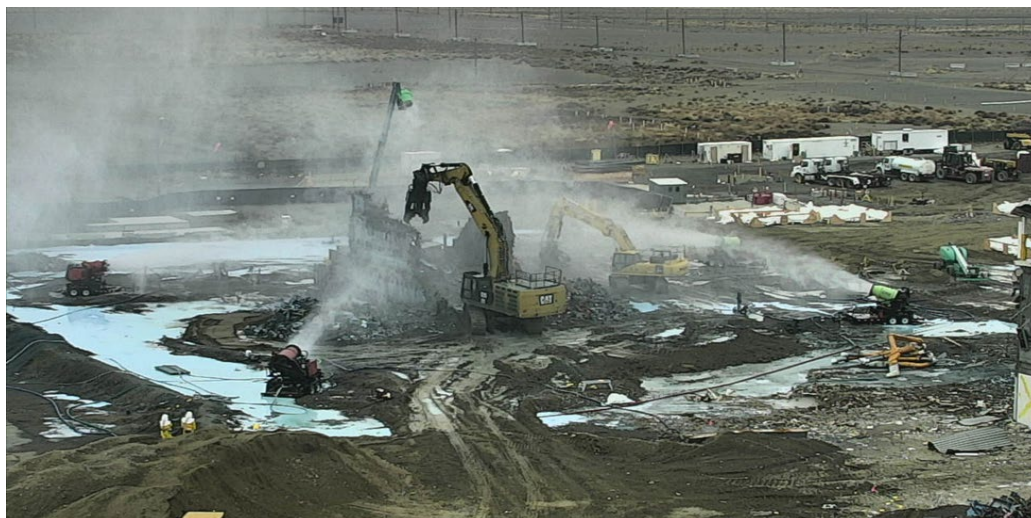
LANL Area G Mobile Loading Activities

Hanford Site

The Board continued to provide oversight of several projects intended to disposition radioactive waste stored in 177 underground tanks, including the Waste Treatment and Immobilization Plant, the Low Activity Waste Pretreatment System, and the Tank Side Cesium Removal System. Details can be found in Section IV.

Deactivation and Decommissioning of the Plutonium Finishing Plant (PFP)

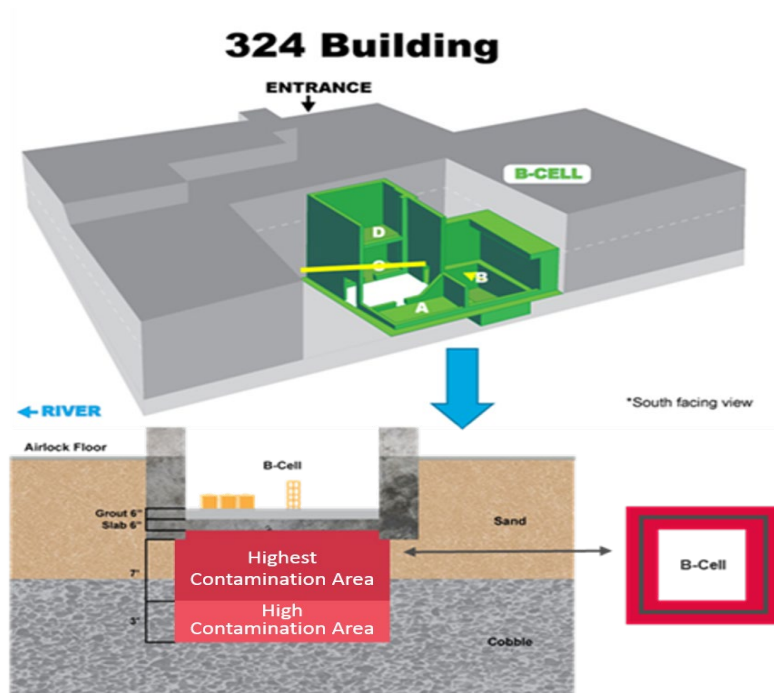
In December 2017, DOE suspended demolition activities at PFP following a spread of contamination beyond radiologically controlled areas that had occurred between December 15 and December 18, 2017. In 2018, the Board's staff's oversight of the demolition activities focused on DOE's investigation of the contamination spread event and the corrective actions DOE established to avoid recurrence of the conditions resulting in the event. In conjunction with the State of Washington and the Environmental Protection Agency (both of which have jurisdiction over aspects of the activity), DOE lifted the work suspension in September 2018 after completing the corrective actions and resumed lower-risk PFP demolition work. The Board and its staff continue to monitor ongoing demolition and debris removal activities.



Demolition Operations at the Hanford Plutonium Finishing Plant

Hanford 324 Building Decontamination

The Waste Technology Engineering Laboratory (324 Building) at the Hanford site operated from 1965 to 1996 in support of radioactive materials and chemical process research and development. During its operational period, an undiscovered breach in the protective metal barrier associated with the laboratory floor allowed spills of liquid radioactive materials to leak into the soil beneath the B-cell in the facility. DOE has designed a project to remediate the highly contaminated soil underneath the B-cell to mitigate the radiological hazard.



Contaminated Areas Under B-Cell in the 324 Building at Hanford

The Board's staff reviewed the contaminated soil remediation project and safety basis, including analyses and controls for credible accidents. The Board's staff team determined that DOE's estimated dose consequences for a bounding fire event in the 324 Building B-cell used a non-conservative airborne release fraction and respirable fraction that could result in an underestimate of the dose consequences to the onsite worker and the public. Using appropriate bounding values could increase the estimated dose consequence to the public above the DOE evaluation guideline to require safety class controls. The Board provided results of the staff's review to the Secretary of Energy in its September 7, 2018, letter. The Board's staff is continuing to review the structural implications of soil removal and changes to the safety basis in 2019.

Sludge Treatment Project

DOE completed preparations for startup of the engineered container retrieval and transfer system (ECRTS) at the 105-K West Basin/Annex. The purpose of ECRTS operations is to retrieve sludge from the 105-KW Basin engineered containers and transfer the sludge to specialized containers for subsequent transport to Hanford's T Plant for storage. In April 2018, the Board's staff reviewed DOE's conduct of its Operational Readiness Review (ORR) performed to confirm readiness for safe start-up of ECRTS operations. Following resolution of DOE ORR findings, DOE subsequently approved startup of ECRTS operations.



Transfer of Sludge Container from the 105 K-West Basin/Annex

The Board's staff independently reviewed and evaluated post-startup ECRTS operations, to ensure that DOE's contractor had adequately implemented applicable safety and conduct of operations requirements. In September 2018, the Board's staff observed sludge retrieval and transfer operations from the 105-KW Basin to the sludge transport and storage container (STSC) staged in the 105-KW Annex. In October and November 2018, the Board's staff observed STSC preparations for transport to T Plant at 105-KW Area as well as T Plant receipt and processing activities for storage. The primary objective was to verify that facility personnel demonstrated

adequate formality and discipline in the 105-KW Area and T Plant to safely conduct sludge transfer and transport operations. DOE's schedule calls for the ERCTS operations to be completed in late 2019 after an estimated 25 STSCs are transported and stored at T Plant.

Oak Ridge National Laboratory (ORNL)

Transuranic Waste Processing Center Safety Basis Review

The Transuranic Waste Processing Center at ORNL is responsible for management, treatment, packaging, and shipment of DOE transuranic waste legacy inventory, and low level waste generated at ORNL. During 2018, the Board's staff continued its review of the safety basis for the Transuranic Waste Processing Center. The Board's staff review covered the following topics: hazard identification, accident analysis, control selection, and adherence to relevant DOE directives. The Board staff's review will continue in 2019.



Transuranic Waste Processing Center at ORNL

Waste Isolation Pilot Plant (WIPP)

The Board provided oversight of the design for the new Safety Significant Confinement Ventilation System. Details can be found in Section IV.

In March 2018, the Board conducted a review of the WIPP maintenance program to assess the status of program implementation since restart of waste handling operations in January 2017 following the February 2014 underground fire and radiological release events. The review focused on establishing whether WIPP is managing and maintaining safety-related structures, systems, and components in such a way that they will operate when needed and as designed.

The Board's September 24, 2018, letter to the Secretary of Energy identified safety items with maintenance and inspection processes and procedures for WIPP structures, systems,

and components. These maintenance issues can degrade structures, systems, and components and result in hazards (e.g., fires) affecting onsite personnel. These issues are similar to those that DOE identified in its accident investigation report as contributing to the 2014 fire event. The Board's letter was provided for DOE's information and use as DOE considers additional focused oversight and sustainable corrective actions in these areas. The Board's staff will continue to follow maintenance implementation at WIPP in 2019.

IV. Design and Construction

The Board’s Policy Statement-6, *Policy Statement on Oversight of Design and Construction of Defense Nuclear Facilities*, established in July 2017, provides the approach the Board takes to review the design and construction of DOE defense nuclear facilities. The Board evaluates staff analyses, along with other sources of data such as input from resident inspectors, Board Member field visits, DOE project status briefings, and Board hearings, to form the basis for identifying any nuclear safety deficiencies to DOE. Commensurate with the degree a deficiency challenges adequate protection of public health and safety, the Board uses its statutory tools to inform DOE and the public. Design and construction projects under review in 2018 by the Board and its staff are listed in the following table.

Design and Construction Projects Under Review in 2018

Project Name	Location	Status of Project	Status of Board Review
Waste Treatment and Immobilization Plant	Hanford Site, Richland, WA	Concurrent design and construction	Ongoing - project letter dated 10/12/2017
K-Basin Closure Sludge Treatment Project	Hanford Site, Richland, WA	Completed	Completed
Low Activity Waste Pretreatment System	Hanford Site, Richland, WA	Preliminary design	Project on hold - project letter dated 5/14/2015
Tank Side Cesium Removal System	Hanford Site, Richland, WA	Preliminary design	Ongoing – no current issues
Tank Waste Characterization and Staging Capability	Hanford Site, Richland, WA	Conceptual design	Ongoing - no current issues
Idaho Calcine Disposition Project	Idaho National Laboratory, Idaho Falls, ID	Conceptual design	Project on hold - no current issues
Plutonium Equipment Installation Subproject Phase 1	Los Alamos National Laboratory, Los Alamos, NM	Construction	Ongoing - project letter dated 11/18/2016

Project Name	Location	Status of Project	Status of Board Review
Transuranic Waste Processing Center Sludge Processing Facility Buildouts Project	Oak Ridge National Laboratory, Oak Ridge, TN	Preliminary design	Ongoing - no current issues
Material Staging Facility	Pantex Plant, Amarillo, TX	Conceptual design	Ongoing - no current issues
Salt Waste Processing Facility	Savannah River Site, Aiken, SC	Construction complete	Ongoing - no current issues
Safety Significant Confinement Ventilation System	Waste Isolation Pilot Plant, Carlsbad, NM	Final design	Ongoing - project letter dated 3/26/18
Uranium Processing Facility	Y-12 National Security Complex, Oak Ridge, TN	Construction	Ongoing - no current issues, project letter dated 6/26/2017
Electrorefining Project	Y-12 National Security Complex, Oak Ridge, TN	Final design	Ongoing - no current issues

Hanford Site, Waste Treatment and Immobilization Plant/Low Activity Waste Pretreatment System

The tank farms at the Hanford Site near Richland, Washington, contain 56 million gallons of radioactive and toxic waste stored in 177 underground tanks. In the late 1990s, DOE began work on the Waste Treatment and Immobilization Plant (WTP) intended to immobilize the Hanford tank waste. WTP is a radiochemical processing plant consisting of four primary facilities: Pretreatment, Low-Activity Waste (LAW), High-Level Waste (HLW), and the Analytical Laboratory facilities. As initially designed, all waste first would be processed through the Pretreatment facility, where it would be separated into two streams: low-activity waste and high-level waste. These two waste streams then would be solidified into glass in stainless steel containers at the LAW and HLW facilities, respectively. DOE will dispose of the low-activity waste glass onsite and will ship the high-level waste glass offsite for permanent disposal once a national repository is available.

In subsequent years, numerous technical issues have arisen at WTP, primarily related to the Pretreatment and HLW facilities. These issues have significantly impacted the timeline for waste treatment. Consequently, DOE developed a strategy to feed the low-activity waste to the LAW facility without first processing it in the Pretreatment facility. This approach included

a new project—the Low-Activity Waste Pretreatment System (LAWPS)—that would pretreat and deliver waste to the LAW facility. This approach would enable the LAW facility to vitrify waste prior to completion of the Pretreatment facility; however, high-level waste would still be pretreated and delivered via the Pretreatment facility.

In May 2018, DOE approved the documented safety analysis for the LAW facility. In June 2018, the contractor designing and building WTP, declared completion of LAW facility construction activities. DOE is beginning commissioning activities, with the intent to begin LAW facility operation ahead of a legally mandated 2023 deadline. Due to the complexity and hazards of the LAW facility as well as the precedent such commissioning activities will set for HLW and Pretreatment facilities, the Board will maintain significant oversight of the LAW facility safety analysis and startup preparations.

DOE has since further modified its strategy for treating low-activity waste. After updating and approving the LAWPS Safety Design Strategy (SDS), DOE suspended work on this facility and introduced a new system, Tank Side Cesium Removal (TSCR), to perform the same function of pretreating waste feed for the LAW facility on a shorter timeline. DOE has not yet determined whether TSCR will replace LAWPS entirely, or whether it will deploy LAWPS at a later date in addition to TSCR. DOE approved the SDS for TSCR in late 2018, and the Board is currently reviewing this and other design documentation.



Waste Treatment and Immobilization Plant at Hanford

In 2018, the Board and its staff focused on evaluating DOE work to resolve open Board technical issues. In a January 29, 2018, letter to the Board, DOE declared resolution of three technical issues related to spray leak accidents at WTP: orifice configuration; droplet size distribution; and agglomerate structure. The Board evaluated the technical analysis contained in this communication. The Board does not agree with DOE’s analytical approach in all cases, but concludes that spray leak accidents are nevertheless adequately controlled under the current strategy.

In its October 24, 2018, letter, DOE declared resolution of three technical issues related to the design of the HLW facility: unanalyzed melter accidents; seismic categorization of safety controls; and hydrogen control strategy. The Board's review of DOE's technical analysis supporting resolution of these issues continues into 2019.

The Board in its October 23, 2014, letter, requested that DOE address increased volcanic ashfall hazards identified in updated assessments by the United States Geological Survey and provide plans to incorporate that information into the WTP design and safety basis. In late 2018, reports of a multi-agency effort sponsored by DOE were completed in support of an updated volcanic ashfall characterization for the Hanford site. DOE will use the updated volcanic ashfall characterization to incorporate modern ashfall hazard information into the WTP design and safety basis. The Board's review of these reports continues into 2019.

Savannah River Site, Salt Waste Processing Facility (SWPF)

SWPF will separate SRS tank farm waste into high-level and low-activity waste streams. The high-level waste stream will be vitrified at the Defense Waste Processing Facility and the low-activity waste stream will be immobilized into a grout mixture at the Saltstone Production Facility. DOE completed SWPF construction in April 2016 and began system and facility testing with water. In December 2018, DOE introduced non-radioactive waste simulant into the facility to support continued testing and cold commissioning.



Salt Waste Processing Facility at the Savannah River Site

In 2018, the Board's staff observed functional testing of SWPF safety systems. The Board's staff also conducted reviews of draft safety basis documents. DOE subsequently revised the draft safety basis documents and the contractor conducted additional testing on air pulse agitator mixing systems. In October 2018, DOE approved the safety basis, which includes the documented safety analysis and technical safety requirements. The Board's staff initiated

evaluation of the changes incorporated into the approved safety basis and the review of results from testing of air pulse agitators. These reviews continue into 2019.

WIPP, Safety Significant Confinement Ventilation System (SSCVS)

In a March 26, 2018, letter, the Board identified a safety item with the final design of the WIPP SSCVS. The final design documentation did not adequately address requirements for integration of an underground safety significant continuous air monitoring (CAM) system necessary to actuate the safety function of the SSCVS. In a March 29, 2018, letter, DOE responded that the scope of the SSCVS project did not include any portions of the WIPP underground, including any potential upgrades to the CAM system. DOE's response stated that the design of the CAM system will be handled separately.

DOE's Carlsbad Field Office, in an April 26, 2018, letter, approved the WIPP SSCVS final design documentation with a condition of approval to ensure that all flow from the waste disposal areas is filtered prior to being released to the environment unless manually bypassed for life safety. This change required that the CAM system meet a higher level of instrumentation reliability in accordance with industry requirements. The Board's staff has begun evaluation of the SSCVS instrumentation and controls design and plans to evaluate the CAM system design in 2019.

Y-12 National Security Complex, Uranium Processing Facility (UPF)

UPF is critical to maintaining the nation's nuclear weapons stockpile and the Navy's nuclear propulsion program. UPF will update and replace key uranium processes and fabrication capabilities currently used in the 9212 Complex at Y-12. The UPF project will comprise three separate (but adjacent) nuclear building structures and one non-nuclear maintenance support building.

In March 2018, the UPF project achieved several crucial milestones by receiving NNSA's approval for Critical Decision 2 and 3 for all major sub-projects under the larger UPF project portfolio. This authorized and initiated the official start of construction for all three nuclear building structures and the non-nuclear support building.



UPF Building Foundation Construction at the Y-12 National Security Complex

Prior to the Critical Decision 2 and 3 approvals, the Board's staff reviewed the 90-percent design package that the UPF project submitted for the Critical Decision authorization. The Board's staff also reviewed the construction quality assurance program to verify that the required codes and standards are included in project implementing procedures and specifications. The Board's staff plans future reviews of the UPF project to focus on application of quality assurance in construction and procurement of safety-related structures, systems, and components.

Y-12 National Security Complex, Electrorefining Project

Installation and operation of the Electrorefining project in the 9215 Complex at Y-12 will enable NNSA to decommission certain aged and hazardous process systems in the 9212 Complex. The Board's staff reviewed the safety controls described in the preliminary documented safety analysis for the Electrorefining project to ensure the controls are sufficient and consistent with DOE Standard 1189-2008, *Integration of Safety into the Design Process*.

V. Safety Standards and Programs

The Board evaluates the content and implementation of DOE directives relating to the design, construction, operation, and decommissioning of DOE's defense nuclear facilities. The Board is required to review these directives, termed as "standards" in the Atomic Energy Act, which include DOE orders, guides, regulations, standards, and handbooks.

Department of Energy Directives

New DOE Directive on Interface with the Board, DOE Order 140.1

In May 2018, DOE issued DOE Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*, to replace the prior directive on interface with the Board, DOE Manual 140.1-1B. DOE did not formally request input and feedback from the Board and stakeholders. DOE Order 140.1 incorporated major changes from DOE Manual 140.1-1B, including new restrictions and protocols regarding access to information, facilities, and personnel that the Board believed could diminish the Board's ability to effectively perform its statutory mandate under the Atomic Energy Act of 1954, as amended.

To address the Board's concerns with DOE Order 140.1, the Board decided to hold a set of public hearings with DOE leadership to discuss the Board's interface with DOE and the new restrictions and protocols included in DOE Order 140.1. The Board also intended that the public hearings would provide an opportunity for the public and stakeholders to provide feedback on the Order to the Board and DOE leadership.

In August 2018, the Board held its first public hearing on DOE Order 140.1. This public hearing included testimony from the Deputy Secretary of Energy. DOE senior leadership from NNSA and DOE's Office of Health, Safety and Security responded to Board members' questions on the development, content, impacts, and implementation of the new Order. The Board also received comments from several public stakeholders, who expressed concern with the Order. The Board's questioning focused on language in the Order compared to the Atomic Energy Act and how the Order would be interpreted and implemented across the complex. Information gathered during the first public hearing confirmed the Board's apprehension that DOE Order 140.1 attempts to diminish the Board's ability to perform its statutory mandate under the Atomic Energy Act of 1954, as amended.

On September 17, 2018, the Board sent a letter to the Secretary of Energy that detailed the Board's concerns with inconsistencies between the Order and the Atomic Energy Act of 1954, as amended, including: (1) a new definition of "public health and safety" that only includes individuals located beyond the site boundaries of DOE sites, thereby excluding onsite individuals and workers from the Board's oversight; (2) exemptions allowing DOE and contractors to not cooperate on and provide access to Hazard Category 3 nuclear facilities or other facilities or activities that DOE determines do not have the potential to adversely affect public health and safety; (3) lack of a clear provision to provide the Board with ready access to such information, facilities, and personnel as the Board considers necessary to carry out its

responsibilities; and (4) allowance for DOE to deny Board requests related to deliberative documents, pre-decisional documents, or deliberative meetings. The Board noted that it would work with DOE on appropriate revisions to the Order to address the Board's concerns.

In November 2018, the Board held its second public hearing on DOE Order 140.1. The goal of the second hearing was to gather information on access to information, facilities, and personnel for facilities managed by the DOE Office of Environmental Management (EM) and to receive additional input from the public. Senior leadership from DOE-EM testified and responded to Board member questions on implementation of the Order for DOE-EM defense nuclear facilities. As with the first public hearing, the Board received comments from public stakeholders, who expressed concern with the Order.

The testimony and responses of DOE senior leadership during these two public hearings in 2018 indicated that inconsistencies exist between the specific language in the Order and its planned implementation in the field and that the Board would have greater access to information and facilities than provided in the Order. However, DOE senior leadership at the two hearings and the Secretary of Energy in his December 13, 2018, letter indicated that DOE did not intend to revise DOE Order 140.1 to address the inconsistencies with the Atomic Energy Act of 1954, as amended.

The Board responded to the Secretary in its December 21, 2018, letter stating that the Board remains concerned with the provisions in DOE Order 140.1 that are inconsistent with the Atomic Energy Act, as amended. The Board believes that DOE implementation of the Order as written could impact the long-standing, strong, and productive relationship between the Board and DOE. The Board again noted its commitment to collaborate with DOE to resolve these concerns. Moving forward in 2019, the Board intends to hold an additional public hearing on these matters, endeavor to ensure that the Board's ability to perform its statutory mandate is not impacted, and continue its focus with DOE on ensuring adequate protection of public health and safety.

DOE Rule on Nuclear Safety Management

DOE has begun the process to revise 10 CFR Part 830, *Nuclear Safety Management*, which has served as the cornerstone of its regulatory framework to ensure adequate protection of public health and safety. The Board's April 27, 2018, letter noted its plans to review and provide comments to the proposed rule. The Board communicated its concerns and comments on DOE's notice of proposed rulemaking to DOE in its October 5, 2018, letter. Overall, the Board is concerned that the proposed revision to 10 CFR Part 830 will make it more difficult for the Department to exercise consistent oversight across the complex and loosens requirements upon which DOE and the public rely to ensure adequate protection of public health and safety. The Board identified concerns with DOE's proposal to remove the requirement for DOE to annually review and approve changes to documented safety analyses. The Board found that DOE's proposed change, if implemented, created a potential for the safety basis and facility operations to drift outside the envelope approved by DOE. The Board also identified concerns with DOE's proposal to remove the definitions of facility hazard categories from the rule. The

hazard categorization of a facility is important because it determines what safety basis requirements in 10 CFR Part 830 are applicable and informs the use of a graded approach when implementing those requirements. In 2019, the Board will evaluate DOE's responses to these and other concerns as described in the Board's October 5, 2018, letter.

DOE Standard 5506-2007, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities

In a March 15, 2018, letter, the Board provided Technical Report, DNFSB/TECH-43, *Deficiencies in DOE Standard 5506-2007, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, to DOE for information. DNFSB/TECH-43 contains independent analysis and advice related to specific deficiencies and weaknesses in DOE Standard 5506. The weaknesses associated with DOE Standard 5506 could lead to non-conservative decisions when developing the safety basis for TRU waste facilities. The specific deficiencies are related to the (1) statistical material at risk methodology; (2) source term determination; and (3) vehicle and aircraft crash accident analysis.

With regard to source term determination, DNFSB/TECH-43 identified ongoing DOE and NNSA sponsored experimental testing to establish an appropriate damage ratio and radioactive material release fraction for pipe overpack containers in fuel pool fire accident scenarios. In 2015, NNSA had identified that the DOE Standard 5506-prescribed damage ratio of zero for these scenarios was not justified. Since 2015, the Board's staff has provided oversight of the experimental testing suite. In 2018, experimental testing validated the efficacy of a prototype filter to act as a pressure relief device in fuel pool fire accidents. The prototype filter prevented pipe overpack container lid loss in stacked and non-stacked configurations during testing. Finally, DNFSB/TECH-43 noted two areas (plume buoyancy and a Waste Isolation Pilot Plant-like radiological release event) for DOE's consideration in the next revision of DOE Standard 5506. In particular, DNFSB/TECH-43 notes the need for guidance on when and how DOE facilities should analyze WIPP-like events. Subsequent to issuance of DNFSB/TECH-43, another event involving solid radioactive waste occurred at INL in April 2018 (discussed in Section III), which further highlighted the importance of this topic.

Other DOE Directives

The Board selected three DOE directives for review during 2018. These selected directives have not been revised or reaffirmed since relevant industry safety standards have changed.

DOE Standard 3014, Accident Analysis for Aircraft Crash into Hazardous Facilities—DOE issued DOE Standard 3014 in 1996 so there would be consistent and comprehensive analyses of external hazards of aircraft crash accidents that impact nuclear facilities. The Board's staff began a review of this directive to ensure it contains adequate and up-to-date technical guidance on aircraft crash accident analyses and dose consequence estimates for protection of the public and the workers. This review continues into 2019.

DOE Standard 1158, Self-Assessment Standard for DOE Contractor Criticality Safety Program—DOE issued Standard 1158 in 2010 to ensure consistent implementation with applicable industry standards for criticality safety programs issued by the American National Standards Institute (ANSI) and the American Nuclear Society (ANS). The Board’s staff began a review to ensure the technical guidance was consistent with the latest industry guidance. The Board staff found that DOE Standard 1158 was not aligned with current revisions of relevant ANSI/ANS guidance. In November 2018, DOE independently decided to cancel DOE Standard 1158 rather than revise it to be consistent with industry codes and standards. In 2019, the Board’s staff intends to review DOE plans to address the lack of updated self-assessment guidance for DOE contractor criticality safety programs.

DOE Standard 1195, Design of Safety Significant Safety Instrumented System Used at DOE Nonreactor Nuclear Facilities—DOE last revised DOE Standard 1195 in 2011. In 2018, the Board’s staff reviewed the standard and identified opportunities for improvement, which included revising it to be consistent with updates in fundamental industry consensus standard for safety instrumented systems. DOE has independently decided to revise this standard to incorporate lessons learned from implementation and use of this standard and to be consistent with industry codes and standards.

Planned Reviews in 2019

The Board is examining those DOE directives having complex-wide effects and/or those that establish controls for high-hazard activities in fiscal year 2019. The Board’s December 19, 2018, letter to DOE provided the directives it has selected to review. In addition to 10 CFR Part 830 and DOE Standard 1158-2010, the Board plans to review the recent changes to DOE Order 420.1C, *Facility Safety*. The Board may elect to add reviews of DOE directives as it deems appropriate.

Nuclear Criticality Safety

The Board’s staff conducted criticality safety reviews in 2018 to ascertain the health of DOE weapons complex contractor criticality safety programs. Specifically, the staff reviewed contractor criticality safety program compliance with ANSI/ANS criticality safety standards as well as DOE field office oversight. The Board’s staff reviews included the Y-12 National Security Complex, LANL, and certain activities at the Nevada National Security Site. As discussed in Section II, based on results of the review at LANL, the Board communicated safety items to DOE in its November 28, 2018, letter. The work on the Y-12 program is ongoing.

Emergency Preparedness, Response, and Recovery

The Board’s December 13, 2017, letter to DOE documented closure of Board Recommendation 2014-1, *Emergency Preparedness and Response*. The letter identified certain issues and included a reporting requirement for DOE to brief the Board on its assessment of progress made on addressing Board Recommendation 2014-1. In response to this reporting requirement, DOE briefed the Board on March 23, 2018, regarding the issues raised in the

Board's letter and discussed areas for future improvements in emergency preparedness and response.

In 2018, members of the Board's staff conducted a review of the emergency preparedness and response program at the Y-12 National Security Complex, with a focus on complex-wide issues previously identified in Board Recommendation 2014-1. The Board's staff noted multiple examples of improvements resulting from Recommendation 2014-1, including establishment of a second fire station at the west end of the site. However, certain efforts, including replacement of the plant shift superintendent building and primary fire station, have been delayed from the original schedule. Additionally, the Board's staff noted that Y-12 has not made substantial progress in establishing formal agreements for coordinating response resources between Y-12, Oak Ridge National Laboratory, and the East Tennessee Technology Park. The Board previously identified concerns about this sharing of resources in its December 2013 public hearing.

Throughout 2018, the Board and its staff reviewed emergency response drills and exercises at Y-12, Pantex, SRS, WIPP, Hanford, LANL, and LLNL to evaluate the current competencies and capabilities for emergency response at those sites.

Appendix A: Board Recommendations

Recommendations Open in 2018

Recommendation 2015-1, *Emergency Preparedness and Response at the Pantex Plant*

The Board issued Recommendation 2015-1 in November 2015 to address significant weaknesses in specific elements of emergency preparedness and response at Pantex. The Secretary of Energy accepted the recommendation in January 2016 and transmitted DOE's implementation plan to the Board in June 2016. DOE submitted all deliverables in accordance with its implementation plan in 2017. In 2018, the Board and its staff reviewed implementation of the actions in the implementation plan to determine whether the actions have been effective in addressing the Board's original concerns. Members of the Board's staff observed multiple exercises and drills at Pantex that demonstrated various improvements to emergency preparedness and response following the Board's Recommendation. (The Board subsequently closed Recommendation 2015-1 in its February 6, 2019, letter to the Secretary of Energy.)

Recommendation 2012-2, *Hanford Tank Farms Flammable Gas Safety Strategy*

Recommendation 2012-2 identified the need for safety-related ventilation systems to aid in preventing flammable gas events in the double-shell tanks at the Hanford Tank Farms. The recommendation also identified the need to upgrade a number of other systems necessary to provide accurate and reliable indications of abnormal conditions associated with flammable gas events.

DOE is now treating the double-shell tank primary ventilation system as a safety significant control in the safety basis for the Hanford Tank Farms. Per DOE's implementation plan, DOE installed safety significant flow detection equipment in the ventilation exhaust ducts. These monitors will allow DOE to ensure that airflow is sufficient to prevent hydrogen gas accumulation. The Board expects that this system will be fully deployed and implemented in 2019. Further, DOE installed and deployed safety significant level detectors in the annuli for the double-shell tanks, completing an action in the DOE implementation plan.

Recommendation 2012-1, *Savannah River Site Building 235-F Safety*

Recommendation 2012-1 identified the need for DOE to take actions to reduce the risk to collocated workers at Building 235-F. These actions include removing or immobilizing the residual contamination within Building 235-F, taking near-term actions to improve the safety posture of the facility, and ensuring that the emergency response to a radiological release from Building 235-F is adequate. The Secretary of Energy provided an implementation plan in response to Recommendation 2012-1 in December 2012 and an updated schedule to the implementation plan in March 2015. DOE's projected overall completion date for mitigating the residual contamination hazard at Building 235-F is May 2021.

In an August 14, 2018, letter to DOE, the Board noted that executing the remaining implementation plan deliverables needs to remain a priority due to the high radiological dose

consequences of a postulated fire, on-going loss of institutional knowledge of Building 235-F and on-going degradation of safety systems. DOE approved a safety basis revision to allow intrusive work in the highest contaminated cells and began intrusive work and removal of material from the cells and attached wing cabinets in October 2018.

Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant*

The Board issued Recommendation 2011-1 following an investigation into whistleblower-identified safety concerns at the Waste Treatment and Immobilization Plant Project at the Hanford Site. DOE has completed all commitments identified in its implementation plan. However, DOE continues to implement safety culture sustainment plans and continues the operation of the DOE-wide Safety Culture Improvement Panel, established in 2015. During 2018, the Board's staff monitored efforts by DOE and its contractors to implement the safety culture sustainment plans and the activities of the Safety Culture Improvement Panel. The Board's staff also reviewed efforts that DOE implemented to improve safety culture at the Waste Treatment and Immobilization Plant. This review continues into 2019.

Appendix B: Summary of All Safety Items Identified by the Board in 2018

On May 22, 2018, the Board published Policy Statement-7, *Communication and Disposition of Safety Items*. This policy establishes certain aspects of the Board's communication and disposition of safety items to better enable the execution of the Board's functions consistent with its mission. The Board determines the identification of safety items for formal communication to DOE. The Board determines the disposition of each safety item as follows: a safety observation that is provided for DOE's information and use; a safety issue for which the Board requires additional information from DOE; or, an issue of adequate protection where the Board recommends corrective action to DOE. Policy Statement-7 calls for a summary of all safety items identified during the reporting period, the Board disposition and their status to be included in the Board's annual report to Congress. The table starting on the following page provides the summary of safety items identified by the Board in 2018, organized by site or complex-wide as applicable.

Summary of All Safety Items Identified by the Board in 2018

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
Hanford	Board Letter – 9/7/18 Safety Observation	Hanford Site 324 Building Radiological Safety	DOE’s estimated dose consequences for a bounding fire event in the 324 Building B-cell used a non-conservative airborne release fraction and respirable fraction that could result in an underestimate of the dose consequences to the on-site worker and the public.
INL	Board Letter – 3/27/18 Safety Observation	Integrated Waste Treatment Unit (IWTU) – Inadequate Analysis of Events in the Safety Basis	Several hazards are designated as standard industrial hazards, and are screened from further analysis in IWTU’s safety basis. These events may require the identification of safety significant controls for protection of workers.
INL	Board Letter – 3/27/18 Safety Observation	IWTU – Fire Hazards Analysis	The fire hazards analysis relies on the implementation of site-wide safety management programs to screen out hazards, which is inconsistent with DOE requirements.
LANL	Board Letter – 5/24/18 Safety Observation	Los Alamos National Laboratory (LANL) Area G Fire Separation Distance Calculation	The Area G basis for interim operation credits a safety class specific administrative control (SAC) to mitigate the consequences of fires that are initiated by wildland fires or seismic activity. This SAC addresses transient combustible materials, with the safety functions of preventing fire spread between fuel packages and preventing significant thermal insults to material at risk (MAR). The Board’s assessment of the calculation identified that fire spread between combustible fuel packages could occur, preventing the SAC’s safety function from being achieved. However, the current general lack of combustibles around Area G, limited current operations, and development of a new documented safety analysis for Area G alleviated the Board’s immediate concern with this calculation.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
LANL	Board Letter – 11/28/18 Safety Observation	LANL Nuclear Criticality Safety Program – Lack of Concrete Milestones in Corrective Action Initiatives	The most recent version of LANL’s Program Improvement Plan does not contain any hard milestones past the current year.
LANL	Board Letter – 11/28/18 Safety Observation	LANL Nuclear Criticality Safety Program – Inadequate Nuclear Criticality Safety Division Staffing	LANL’s Nuclear Criticality Safety Division is still short of achieving its staffing target for full-time, qualified engineers.
LANL	Board Letter – 11/28/18 Safety Observation	LANL Nuclear Criticality Safety Program – Inadequate Plan of the Day	The Plan of the Day in the Plutonium Facility does not accurately reflect the activities that are actually performed on a given day.
LANL	Board Letter – 11/28/18 Safety Observation	LANL Nuclear Criticality Safety Program – Contrast in Operational Quality	The contrast between the high level of performance during formal assessments and the deficient performance exhibited in several subsequent events highlights a disparity between work that is observed by management and work that is not.
LANL	Board Letter – 11/28/18 Safety Observation	LANL Nuclear Criticality Safety Program – Repetitive Corrective Actions	LANL issued corrective action plans related to conduct of operations in 2014 and 2017. These plans share many of the same goals and recommended actions, indicating that previous corrective actions did not result in sustained improvements.
NNSS	Board Letter – 12/19/18 Safety Observation	U1a Safety Basis – Lack of Engineering Controls for Transportation Activities	The 2018 annual update to the U1a Complex safety basis credits only SACs, rather than engineering controls, to protect the experimental package from thermal and electrical insults during onsite transportation activities.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
NNSS	Board Letter – 12/19/18 Safety Observation	U1a Safety Basis – Lack of Engineering Controls for the Experimental Package in certain locations at the U1a Complex	The U1a Complex safety basis does not identify engineering controls to protect the experimental package from mechanical insults in certain locations.
NNSS	Board Letter – 12/19/18 Safety Observation	U1a Safety Basis – Lack of Software Quality Assurance (SQA) for the U1h Hoist Control System	SQA is lacking for firmware used to implement the safety significant U1a Hoist Control System.
Pantex	Board Letter – 9/7/18 Safety Issue Requested DOE briefing provided in October 2018	High Explosive Violent Reaction Redefinition	NNSA redefined the categories of accident consequences used to evaluate whether safety controls are required to perform nuclear explosive operations safely at the Pantex Plant.
Pantex	Board Letter – 10/17/18 Safety Observation	Pantex Special Tooling Program – Application of the Special Tooling Design Manual	Certain guidance and requirements in the Special Tooling Design Manual are inadequate given the safety functions provided by special tooling. Additionally, there are multiple instances of Pantex not meeting requirements and guidance within the manual.
Pantex	Board Letter – 10/17/18 Safety Observation	Pantex Special Tooling Program – Weld Quality and Non-Destructive Evaluation	Pantex does not implement non-destructive evaluation techniques beyond visual inspections performed by a qualified weld inspector, potentially missing subsurface features that could lead to poor weld performance. Furthermore, special tooling engineers do not implement joint efficiency factors or increased safety factors to account for weld defects that visual inspection would not detect.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
Pantex	Board Letter – 10/17/18 Safety Observation	Pantex Special Tooling Program – Preventive Maintenance and In-Service Inspection	Based on observed preventive maintenance activities and subsequent discussions, the special tooling preventive maintenance and in-service inspection programs lack the rigor expected for maintenance on and inspection of equipment with safety class and/or safety significant functions.
Pantex	Board Letter – 10/17/18 Safety Observation	Pantex Special Tooling Program – Performance Criteria Assurance	Although the requirements for the special tooling program are governed by the NNSA Production Office-approved Sitewide Safety Analysis Report, the performance criteria for program-specific special tooling are neither within Pantex safety basis documentation nor reviewed and approved by the NNSA Production Office.
Pantex	Board Letter – 10/17/18 Safety Observation	Pantex Special Tooling Program – Special Tooling Loading Conditions	Special tooling analyses employ non-conservative assumptions regarding placement and distribution of operational and accidental loads.
SRS	Board Letter – 1/4/18 Safety Issue Requested DOE report and briefing provided in April and May 2018, respectively	Technical Safety Requirement (TSR) Controls – Less than Adequate Rigor of Implementation	Administrative processes relied upon to ensure operations are conducted in compliance with the safety basis require improvement.
SRS	Board Letter – 1/4/18 Safety Issue Requested DOE report and briefing provided in April and May 2018, respectively	TSR Controls – Less than Adequate Operations Training on TSR Controls and their Bases	Operations personnel have exhibited less than adequate knowledge of TSR controls at multiple SRS facilities.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
SRS	Board Letter – 1/4/18 Safety Issue Requested DOE report and briefing provided in April and May 2018, respectively	TSR Controls – Less than Adequate Work Authorization Processes in Implementing TSR Controls	Many recent TSR implementation events occurred, in part, as a result of weaknesses in the identification and implementation of applicable TSR controls prior to conducting work.
SRS	Board Letter – 1/4/18 Safety Issue Requested DOE report and briefing provided in April and May 2018, respectively	TSR Controls – Ineffective Corrective Action Program	Weaknesses in the causal analysis and corrective action processes related to TSR implementation events.
SRS	Board Letter – 4/24/18 Safety Observation	Solid Waste Management Facility – Crediting Fire Department Response Time	It is possible for a fire to burn undetected and exceed the two-hour response time assumption in the safety basis, allowing more material to be released than is currently assumed and analyzed in supporting accident analyses.
SRS	Board Letter – 5/17/18 Safety Issue Requested DOE response and briefing provided in August and November 2018, respectively	H-Canyon Exhaust Tunnel Structural Integrity	The H-Canyon Exhaust Tunnel may not be able to perform its post-seismic safety function due to structural degradation.
SRS	Board Letter – 6/4/18 Safety Observation	SRS Revised Tritium Facilities Safety Basis – Dose Consequences	There are a number of events with high residual dose consequences to the co-located workers and dose consequences to the offsite public approaching the evaluation guideline. The Board is concerned that DOE needs to evaluate and implement additional safety controls.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
SRS	Board Letter – 6/4/18 Safety Observation	SRS Revised Tritium Facilities Safety Basis – Facility Worker Self-Protection	Several events have high unmitigated dose consequences to the facility worker that rely on prompt evacuation for mitigation. The staff does not have the site’s basis for crediting evacuation in situations such as rapidly developing events or ones requiring personnel to remain in place.
SRS	Board Letter – 6/4/18 Safety Observation	SRS Revised Tritium Facilities Safety Basis – Application of Administrative Controls	There are multiple instances where administrative controls are not clearly applied (e.g., the actions needed to ensure the safety significant water trap available volume is sufficient are not clearly laid out).
SRS	Board Letter – 6/4/18 Safety Observation	SRS Revised Tritium Facilities Safety Basis – Analytical Assumptions	Certain assumptions or conclusions in the hazard analysis are potentially non-conservative in nature or contrary to DOE standards or guidance (e.g., accumulation of flammable vapors, events determined to be Beyond Extremely Unlikely, stack collapse, impact ratio).
SRS	Board Letter – 8/14/18 Safety Observation	Use of the DOE Operating Experience Program by SRS	Sharing SRS operating experience in conduct of operations and training in ensuring rigorous TSR implementation with the rest of the defense nuclear complex would help identify challenges in this area at other sites. The Board encourages DOE to evaluate and disseminate the SRS operating experience complex-wide.
SRS	Board Letter – 9/7/18 Safety Observation	H-Canyon Justification for Continued Operation (JCO) – Incomplete Implementation and Demonstration of Transfer Protocol Compensatory Measure	The transfer protocol compensatory measure for H-Canyon has not been properly implemented, and has not been demonstrated to be reliable.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
SRS	Board Letter – 9/7/18 Safety Observation	H-Canyon JCO – Suspect Reliability of the Seismically Qualified Vessel Air Purge Response Compensatory Measure	The portable air compressor supporting the Seismically Qualified Vessel Air Purge Response is not qualified as a safety class component, despite the fact that it serves a safety class function.
SRS	Board Letter – 12/7/18 Safety Observation	H-Canyon Exhaust (HCAEX) Tunnel – Inappropriate Fragility Analysis Input	Specific assumptions and input parameters within the HCAEX Tunnel fragility analysis regarding concrete compressive strength and concrete loss are inappropriate.
WIPP	Board Letter – 3/26/18 Safety Observation	WIPP Safety Significant Confinement Ventilation System (SSCVS) – Continuous Air Monitor (CAM) Design Requirements	The final design documentation for the WIPP SSCVS does not adequately address design requirements for the full integration of the underground safety significant CAM system.
WIPP	Board Letter – 9/24/18 Safety Observation	Waste Isolation Pilot Plant (WIPP) Maintenance and Inspection Processes – Maintenance and Inspection of Liquid- Fueled Vehicles in the Underground	Vehicles with dripping leaks of hydraulic fluid, engine oil, or fuel that, by procedure, need to be removed from service until repaired, instead were operated in the underground; operator equipment inspections either failed to identify vehicle leaks or leaks were classified incorrectly; vehicle logbooks did not receive the required supervisory reviews; and unapproved or outdated implementing procedures were used for vehicle inspections.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
WIPP	Board Letter – 9/24/18 Safety Observation	WIPP Maintenance and Inspection Processes – Inaccuracies in Flowdown of TSRs into WIPP Preventive Maintenance Procedures	The Board identified numerous TSR-related non-compliances with the WIPP safety basis and/or WIPP Work Control Document Writer’s Guide. Examples of non-compliances found in various preventive maintenance procedures include: (1) TSR steps that are not [correctly] flowed down from the current revision of the documented safety analysis (DSA); (2) TSR steps that should be, but are not, identified as TSR steps in the procedure; (3) steps incorrectly identified as TSR steps; and (4) misidentified surveillance requirements.
WIPP	Board Letter – 9/24/18 Safety Observation	WIPP Maintenance and Inspection Processes – Deficiencies in WIPP’s Vendor-Recommended Maintenance Processes	WIPP has not formalized procedures and processes to ensure vendor-recommended maintenance is being incorporated into, or justifiably excluded from, preventive maintenance and preoperational procedures.
Y-12	Board Letter – 9/7/18 Safety Observation	Airborne Release Parameters for Uranium Alloys	There are technical weaknesses in the experimental program derived airborne release values for use in bounding safety analyses for the Uranium Processing Facility (UPF) design and other DOE defense nuclear facilities. The derived values for a design basis fire event in the UPF safety analysis do not meet the intent of DOE Standard 3009-94, which states that “calculations be based on reasonably conservative estimates of the various input parameters.”
Complex-wide	Board Letter – 3/15/18 Safety Observation	Standard 5506 – Statistical Material at Risk (MAR) Methodology	The guidance and requirements in DOE Standard 5506-2007, <i>Preparation of Safety Basis Documents for Transuranic Waste Facilities</i> , for the statistical MAR methodology lack sufficient detail and adequate technical basis.

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Complex-wide	Board Letter – 3/15/18 Safety Observation	Standard 5506 – Source Term Determination	The guidance and requirements in DOE Standard 5506-2007 for the source term determination lack sufficient detail and adequate technical basis.
Complex-wide	Board Letter – 3/15/18 Safety Observation	Standard 5506 – Vehicle and Aircraft Crash Accident	The guidance and requirements in DOE Standard 5506-2007 for vehicle and aircraft crash accidents lack sufficient detail and adequate technical basis.
Complex-wide	Board Letter – 10/5/18 Safety Observation	Title 10, Code of Federal Regulations, Part 830 (10 CFR Part 830) – Nuclear Safety Fundamental Concepts	The proposed rulemaking does not describe certain fundamental concepts of nuclear safety, such as the defense-in-depth philosophy or the hierarchy of controls. While these concepts are described in lower level documents, including DOE’s expectations in the rule itself would emphasize their importance and encourage more consistent implementation.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Hazard Categorization	By removing the definitions of the hazard categories from 10 CFR Part 830 and the rulemaking process, DOE’s proposed revisions fundamentally undermine the important nuclear safety requirements in the rule. DOE could redefine hazard categories such that many facilities are no longer covered by the safety basis requirements of Subpart B, without conducting a rulemaking to receive public feedback and comment.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Annual Updates to the Documented Safety Analyses	The removal of the requirement for DOE’s annual review and approval of documented safety analyses makes it more difficult for DOE to exercise its responsibility to protect the health and safety of workers and the public. There is a potential for the safety basis and facility operations to drift outside the envelope approved by DOE. Furthermore, DOE’s notice of proposed rulemaking does not fully analyze the problems that DOE is attempting to address, so it is not clear that DOE’s proposed change is an appropriate solution.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – JCOs, Evaluation of the Safety of the Situation (ESS), and the Annual Update Process	With DOE’s proposal to remove the requirement for Departmental review and approval of annual updates, there will be gaps in 10 CFR Part 830 where DOE is not required to approve significant changes in a facility’s safety basis.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Language Regarding DOE Approval	The proposed rulemaking creates uncertainty over when DOE will review and approve the DSA; clarity on the matter is important because DOE is ultimately responsible for safety at its facilities.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – DOE Requirements in the Appendix of the Rule	There is an internal inconsistency in the proposed rulemaking: The proposed rulemaking states that Appendix A contains no new requirements, though that Appendix includes “must” statements. Some of the “must” statements only appear in the Appendix, and not the body of the rule, and are important to safety.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Requirements on Unreviewed Safety Questions and TSRs	There is ambiguity on how contractors implement TSRs and evaluate unreviewed safety questions because the rule provides or cites only guidance for implementation in some key areas, and not requirements. This could lead to inconsistent implementation of the Rule throughout the DOE and has the unintended consequence of making it difficult for the DOE to regulate, oversee, and enforce the requirements governing these functions.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Aging Infrastructure	Aging infrastructure is a challenge to DOE in its efforts to operate facilities safely. 10 CFR Part 830 does not address this challenge.

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Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Invocation of DOE Standard 3009-2014	The proposed rulemaking does not specify the need to use the most current version of safe harbors (e.g., DOE Standard 3009-2014), allowing the continued use of older, less robust versions. While DOE has enacted some requirements for when the newer version of Standard 3009 should be used, DOE has not included those requirements in 10 CFR Part 830.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – DOE’s Nuclear Safety Policy	The proposed rulemaking no longer cites a reference explaining the key role that rules such as 10 CFR Part 830 provide in ensuring adequate protection of workers and the public.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – DOE Standard 3009-2014 Engineering Evaluations	Most existing facilities apply a safe harbor methodology that does not include clear requirements on how to evaluate the reliability of structures, systems, and components that are being upgraded to a higher safety classification.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Specific Administrative Controls (SACs)	DOE added SACs to the suite of safety controls, but the proposed rulemaking did not incorporate this concept. While administrative controls are less preferred on DOE’s hierarchy, there is sometimes a need to implement them for important safety functions. Having SACs defined in the Rule would clearly place this concept within nuclear safety requirements, and ensure better consistency between the Rule and lower level documents.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Changes to TSRs	10 CFR Part 830 is written in a way that could inadvertently lead to confusion, on the topic of when DOE approval is needed for changes to the safety basis.

Site	Board Disposition and Status	Title of Safety Item	Description of Safety Item
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Deletion of the “Margin of Safety” Criterion	DOE is proposing to eliminate one of the criteria for determining when a change proposed by the contractor represents an unreviewed safety question, which would require DOE approval. DOE stated that in implementation, this criterion was not providing a safety benefit. However, there potentially is a safety benefit to the concept, if the criterion were reformulated.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Refining the Definition of a Facility	The definition for a facility in the proposed rulemaking could have the unintended consequence of allowing contractors to subdivide or partition a facility to avoid implementing controls to prevent or mitigate accident scenarios.
Complex-wide	Board Letter – 10/5/18 Safety Observation	10 CFR Part 830 – Updates to Safe Harbors	10 CFR Part 830 includes “safe harbor” methods that DOE contractors may use to prepare a DSA. In some cases, some attention or updating of the safe harbors may be warranted to ensure that they provide useful guidance for complying with the requirements of 10 CFR Part 830.

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