



U.S. DEPARTMENT OF
ENERGY

NNSASM
National Nuclear Security Administration

Risks for Sustainment of the Plutonium Facility-4 at Los Alamos National Laboratory

Report to Congress
November 2020

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**National Nuclear Security Administration
United States Department of Energy
Washington, DC 20585**

Message from the Acting Administrator

The Los Alamos National Laboratory's Plutonium Facility (PF)-4, at present, houses the sole U.S. pit production capability. As such, it is the only operating facility capable of meeting stockpile requirements for plutonium surveillance, manufacturing, and research. PF-4 is also nearing 50 years old and requires maintenance and recapitalization to address risks to have the capability to meet the Nation's critical plutonium missions. As requested by Congress, this report provides an assessment of these risks and the plan to sustain PF-4.

Pursuant to statutory requirements, this report is being provided to:

- **The Honorable James M. Inhofe**
Chairman, Senate Committee on Armed Services
- **The Honorable Jack Reed**
Ranking Member, Senate Committee on Armed Services
- **The Honorable Deb Fischer**
Chairman, Subcommittee on Strategic Forces
Senate Committee on Armed Services
- **The Honorable Martin Heinrich**
Ranking Member, Subcommittee on Strategic Forces
Senate Committee on Armed Services
- **The Honorable Adam Smith**
Chairman, House Committee on Armed Services
- **The Honorable William "Mac" Thornberry**
Ranking Member, House Committee on Armed Services
- **The Honorable Jim Cooper**
Chairman, Subcommittee on Strategic Forces
House Committee on Armed Services
- **The Honorable Michael Turner**
Ranking Member, Subcommittee on Strategic Forces
House Committee on Armed Services
- **The Honorable Richard Shelby**
Chairman, Senate Committee on Appropriations
- **The Honorable Patrick Leahy**
Vice Chairman, Senate Committee on Appropriations
- **The Honorable Lamar Alexander**
Chairman, Subcommittee on Energy and Water Development
Senate Committee on Appropriations

- **The Honorable Dianne Feinstein**
Ranking Member, Subcommittee on Energy and Water Development
Senate Committee on Appropriations
- **The Honorable Nita M. Lowey**
Chairwoman, House Committee on Appropriations
- **The Honorable Kay Granger**
Ranking Member, House Committee on Appropriations
- **The Honorable Marcy Kaptur**
Chairwoman, Subcommittee on Energy and Water Development
House Committee on Appropriations
- **The Honorable Mike Simpson**
Ranking Member, Subcommittee on Energy and Water Development
House Committee on Appropriations

If you have any questions or need additional information, please contact Dr. Howard Dickenson, NNSA's Acting Associate Administrator for External Affairs, at (b)(6) or Ms. Katie Donley, Deputy Director for External Coordination, Office of the Chief Financial Officer, at (b)(6) (b)(6)

Sincerely,

(b)(6)

William A. Bookless
Acting Under Secretary for Nuclear Security
and Administrator, NNSA

Executive Summary

Located at the Department of Energy's National Nuclear Security Administration (DOE/NNSA) Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico, Plutonium Facility (PF)-4, at present, is the Nation's only operational plutonium facility capable of producing certain strategic components required to sustain and modernize the U.S. nuclear stockpile. PF-4 will be over 50 years old by 2030 and currently poses a single point risk of failure for the majority of defense-related and non-defense plutonium missions within the United States.

Current pit production policy and efforts include a two-site solution using both PF-4 and the to-be repurposed former Mixed Oxide Fuel Fabrication Facility at the Savannah River Site (SRS), near Aiken, South Carolina. The new facility under construction at SRS will focus solely on manufacturing new War Reserve quality pits to be used in ongoing and planned warhead acquisition programs, and will not be suitable to serve as a redundant capability for the vast majority of the non-pit production missions at the PF-4 Complex. PF-4 will remain necessary for research and development of plutonium capabilities and essential to maintaining a reliable manufacturing capability for the Nation. This report focuses on the risks to PF-4's plutonium pit production mission, and more broadly on facility-level risks that could influence any of the missions in PF-4.

DOE/NNSA and LANL are using a multi-faceted approach to maintain PF-4, upgrade safety and security features to address the modern regulatory environment, and expand capability to meet DOE/NNSA's mission. DOE/NNSA has incorporated projected mission profiles for PF-4 as part of the long-term planning process and is working with LANL to build in flexibility for future risk mitigation. DOE/NNSA is committed to maintaining LANL as the Nation's consolidated Center of Excellence for plutonium research, development, and manufacturing activities and PF-4 as the primary plutonium facility within LANL. Rigorous application of the maintenance and upgrade programs described in this report are projected to sustain the viability of PF-4 through 2045.



Risks for Sustainment of the Plutonium Facility-4 at Los Alamos National Laboratory

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I. Legislative Language

This report responds to legislative language set forth in the House Report (H. Rept.) 116-120 to accompany the House version of the *National Defense Authorization Act for Fiscal Year 2020* (H.R. 2500), wherein it is stated:

The Department of Energy's Plutonium Facility (PF-4) at the Los Alamos National Laboratory is the Nation's enduring Plutonium Research and Development and production capability. The facility has been operational since 1978, and is currently undergoing major upgrades to ensure a pit production capability of 30 pits per year by 2026. Given the age and use of the facility, which includes additional plutonium activities, the committee is concerned about the continued viability of the site in the long-term.

To better understand the risk to PF-4 and plans to continue its mission, the committee directs the Administrator for Nuclear Security to provide a report to the congressional defense committees not later than December 31, 2019, assessing the risks to the continued viability of PF-4 through 2045 and plans for either sustaining the facility or replacing it, including timelines and estimated costs.

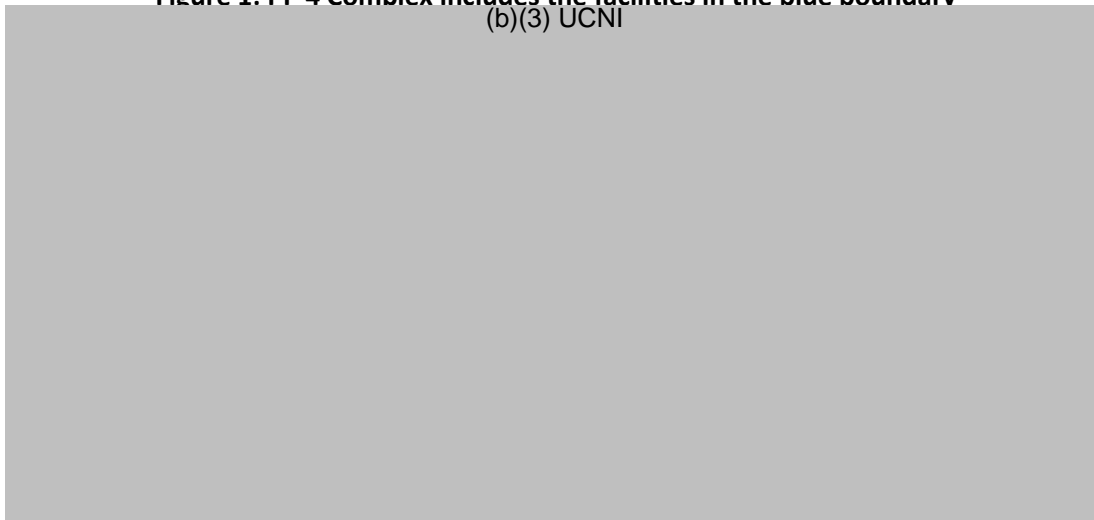
II. Introduction

Located at the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico, Plutonium Facility (PF)-4 was originally designed in the 1970s with an expected full-time staff of roughly 100 personnel to serve as a secondary production and research facility to support the Rocky Flats Plant located near Denver, Colorado. Today, PF-4 is currently the only large-scale, maximum security plutonium production and research facility in the Nation with a daily staff of over 1,000 engineers, scientists, and technicians performing multiple missions that include maintaining the current stockpile, nonproliferation, non-defense research, other Department of Energy (DOE) missions, and work for other government agencies.

DOE's National Nuclear Security Administration (DOE/NNSA) current pit production approach employs a two-site solution using both PF-4 and the to-be repurposed former Mixed Oxide Fuel Fabrication Facility at the Savannah River Site (SRS), near Aiken, South Carolina. Even after proposed pit production activities reach a sustained rate at SRS in 2030, PF-4 will be necessary for research and development of plutonium capabilities and essential to maintaining a reliable manufacturing capability for the Nation.

PF-4 is the primary laboratory and production building within LANL's Technical Area-55 (TA-55). PF-4 and the supporting infrastructure buildings are depicted within the blue boundary in Figure 1. This area is referred to as the PF-4 Complex throughout the remainder of this report.

Figure 1: PF-4 Complex includes the facilities in the blue boundary
(b)(3) UCNI



LANL continues to assemble a highly qualified team of engineers, scientists, and technicians on staff in PF-4 to meet current and evolving needs. Any long-term disruption to PF-4 could compromise DOE/NNSA's ability to meet mission requirements, as at present there is no alternate facility with these capabilities. Initial estimates to replace PF-4 indicate such an effort could take decades to re-establish capabilities elsewhere.

This report organizes the major risks to continuing operations within the PF-4 Complex, as well as the strategies to address these risks, into three categories: aging infrastructure, expanded mission requirements, and regulatory and environmental influences.

III. PF-4 Risks

PF-4 currently poses a single point of failure for the majority of defense-related and non-defense plutonium missions within the United States. The new facility under construction at SRS will focus solely on manufacturing new War Reserve quality pits to be used in ongoing and planned warhead acquisition programs in support of Department of Defense requirements. The SRS facility is not being designed or built to serve as a redundant capability for the vast majority of current non-pit production missions the PF-4 Complex. While the pit production mission in PF-4 remains one of DOE/NNSA's highest priorities, this report focuses broadly on facility-level risks that could influence the missions in PF-4.

As of 2020, DOE/NNSA is not planning to replace PF-4. In the 2017 Analysis of Alternatives (AoA) for pit production, DOE/NNSA examined the cost of constructing a new facility at three different DOE sites to conduct only the pit production mission, a major subset of the current PF-4 mission. In all cases the AoA determined that new construction would be more expensive than renovating PF-4. The AoA analysis resulted in the finding that maintaining the building for the next 25 years is the appropriate option for the Nation to reduce the risk of a gap in the pit production mission.

3.1 Aging Infrastructure

PF-4 has been in operation since 1978. DOE/NNSA conducted a risk analysis in March 2020 of sustaining the PF-4 Complex's physical infrastructure over the next 25 years. The analysis highlights current and future infrastructure risks due to age, condition, and remaining service life. The analysis also identifies general timeframes for reinvestment in key systems for continuing to meet mission requirements. Currently, the PF-4 Complex continues to support mission requirements despite carrying known risks identified in the analysis. The analysis does not suggest or identify an immediate threat to mission delivery.

The PF-4 Complex, consisting of approximately 386,000 square feet of physical infrastructure, is currently in "Fair" condition with a Building Condition Index (BCI) score of 78 out of a potential 100.¹ BCI scores inform DOE/NNSA of the current status of a building's maintenance needs, as BCI scores gradually decrease over time with normal facility use and as systems reach end of life and need replacement. As of the end of fiscal year (FY) 2019, the PF-4 Complex had \$32 million of deferred maintenance.

Over the next 25 years, there will be major systems and components in the PF-4 Complex that will require repair or replacement due to age and condition. Known reinvestment needs over the next 25 years are the heating, ventilation, and air conditioning (HVAC), electrical, and roofing systems.

3.2 PF-4 Expanded Mission Requirements

LANL serves as the Nation's Center of Excellence for plutonium research, development, and manufacturing activities. Since the closure of the Rocky Flats Plant in 1992 and the 2014 security category downgrade of the Superblock facility located at Lawrence Livermore National Laboratory, in Livermore, California, PF-4 is the Nation's only operating facility capable of meeting stockpile requirements for plutonium surveillance, manufacturing, and research. Based on DoD requirements and congressional statutes, PF-4 is required to provide an enduring production capability of at least 30 pits per year starting in 2026.

Meeting those requirements and responding to potentially evolving Department of Defense mission needs requires DOE/NNSA to maintain flexibility in year-to-year programmatic missions. Both DOE/NNSA and LANL managers recognize that PF-4's status as a mixed-use facility necessitates changes to the management approach to meet the expanded scope. LANL is still developing the requisite knowledge necessary to balance the demands of operating a new, parallel production mission with the demands of accomplishing the existing traditional missions of PF-4.

¹ BCI is a condition rating for an overall asset (applies to buildings, trailers, or other structures and facilities). For each asset, the BCI is computed by taking the average of its systems' condition indices, weighted by each system's replacement cost. DOE/NNSA defines BCI scores above 86 as in good condition, requiring only normal maintenance; BCI scores from 70 to 85 require corrective action from DOE/NNSA to repair or replace older or potentially degraded equipment; and BCI scores below 70 implies a facility requires immediate work and is likely currently operating with facility systems that must be replaced.

3.3 Regulatory and Environmental Requirements

Maintaining compliance with seismic requirements is a principle risk to PF-4's operational longevity. As a high-hazard plutonium facility, PF-4 is required to withstand severe earthquake ground motion. When the facility was designed in the 1970s, engineers included a considerable safety margin in PF-4's structure, and this excess structural capacity has supported PF-4 to remain within regulatory compliance, even as nuclear industry codes and standards increased requirements over time. In 2009, new geotechnical analysis indicated an increased probability that a severe earthquake could affect PF-4. Based on this updated understanding of the earthquake hazard, postulated seismic loads exceeded PF-4's structural capacity, prompting a series of upgrades to reinforce the building. Today, while PF-4's structural capacity exceeds anticipated seismic demands, there is a risk that future changes to seismic performance requirements or new discoveries that increase the seismic hazard at LANL could compel additional structural upgrades or challenge PF-4's enduring operational viability. To mitigate these risks, DOE/NNSA has developed a portfolio of physical testing and advanced modeling to assess and affirm PF-4's satisfactory performance under today's seismic demands and to facilitate expeditious response to any future changes to LANL's seismic hazard profile.

Another risk to PF-4's long-term sustainability involves the potential for major regulatory changes that challenge the facility's enduring safety or security posture. The security-related Design Basis Threat is an example of potential security requirements that are subject to change over time. If there is a significant revision to the Design Basis Threat, DOE/NNSA may have to undertake expensive upgrades to PF-4 to meet heightened security requirements. Similarly, in the nuclear safety arena, changes to standards of protection for members of the public or onsite workers during postulated accident scenarios could necessitate costly safety system upgrades or require operational restrictions that constrain mission execution. To mitigate these types of regulatory risks, as detailed in Section 4.1, DOE/NNSA has invested in a suite of safety and security upgrades that reduce PF-4's long-term vulnerability and provide flexibility to changing requirements.

The ability to dispose of radioactive waste also poses a potential risk to enduring PF-4 operations. As a nuclear facility that processes plutonium, programmatic activities in PF-4 generate solid and liquid radioactive waste forms that must be safely managed under several overlapping regulatory regimes. Transuranic waste produced at PF-4 is required to be interred in the Nation's sole geologic repository, DOE's Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. Other PF-4 waste forms that include hazardous non-radioactive constituents are regulated by the New Mexico Environment Department under the *Resource Conservation and Recovery Act (P.L. 94-580)*. Unforeseen issues at WIPP or changes in the state's regulatory posture could impair PF-4's ability to dispose of waste. Over time, if the quantity of accumulated waste approaches the facility's storage capacity, plutonium processing operations would have to be curtailed. To mitigate these risks, DOE/NNSA is making significant capital investments to modernize solid and liquid radioactive waste facilities at LANL and to maximize the waste storage capacity of existing infrastructure.

IV. Risk Mitigation

DOE/NNSA is committed to maintaining LANL as the Nation’s consolidated Center of Excellence for plutonium research, development, and manufacturing activities, and PF-4 as the primary plutonium facility within LANL. A rigorous application of the maintenance and upgrade programs described has the potential to sustain the viability of PF-4 through 2045.

4.1 Aging Infrastructure

4.1a Overview

DOE/NNSA has developed rigorous standards and processes to identify and measure risk and corporately determine the best options and value for risk reduction. DOE/NNSA’s Enterprise Risk Management system uses a methodology for highlighting the risk and risk reduction trending across the nuclear security enterprise using a Mission Dependency Index and the BUILDER program’s condition scores to assess facility and system conditions and effects on the mission to improve investment prioritization. BUILDER is a software program that DOE/NNSA uses to proactively identify and respond to emerging infrastructure needs by identifying asset components that need repairs and replacements at the most appropriate time.² Decisions to mitigate risk are determined at both the program and combined program level through an Enterprise Risk Management system. The Master Asset Plan and annual Deep Dives,³ which are long-term planning processes consisting of biennial site events, links infrastructure planning to mission deliverables and are reflected in DOE/NNSA’s annual enterprise-wide infrastructure strategic plan.

DOE/NNSA’s Maintenance program funds the recurring day-to-day activities that are required to sustain and preserve PF-4’s facilities, property, assets, systems, and equipment in a condition suitable to perform designated purposes. DOE/NNSA’s Recapitalization program funds critical infrastructure projects to improve condition. Recapitalization program investments are evaluated and prioritized using an enterprise-wide, risk-based assessment that focuses on program delivery, safety, sustainability, return on investment, and deferred maintenance reduction to obtain optimal benefit within available budget. These planning and prioritization processes support methods to respond to emerging issues and changes. Portfolios of activities such as PF-4 Ventilation and Confinement Systems Upgrades are an example of a risk mitigation approach that can realign schedules when technical issues arise and costs and schedule may increase and decrease.

Together, the Maintenance and Recapitalization programs identify, track, and manage risk—including the integrated risk associated with internal programs. Performance and risk is

² BUILDER was developed by the U.S. Army Corp of Engineers and has been recognized by the National Academies of Science as a best-in-class practice for infrastructure management. The software is also recommended as an approved means for projecting future needs and estimating capital costs in the Office of Management and Budget memo M-20-03, Implementation of Agency-Wide Real Property Capital Planning, dated November 6, 2019.

³ Deep Dives are yearly meetings DOE/NNSA holds for each site where infrastructure requirements and needs are assessed for entry into the program of record.

assessed at recurring LANL site meetings and monthly cost, schedule, and scope contingency reviews.

Table 1 summarizes the historic and planned maintenance and recapitalization investments at PF-4.

Table 1. Maintenance and Recapitalization Funding at the PF-4 Complex for Fiscal Years (FY) 2016 through 2025 in Millions (\$M)

Program	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
						FY 2021 Future Years Nuclear Security Program				
Maintenance	\$9.4	\$9.9	\$13.7	\$22.2	\$26.0	\$48.8	\$54.2	\$52.4	\$61.5	\$66.3
Recapitalization ¹	\$12.7	\$29.2	\$13.3	\$1.4	\$26.4	\$16.6	TBD	TBD	TBD	TBD
Total	\$ 22.1	\$39.1	\$27.0	\$23.6	\$52.4	\$65.4	TBD	TBD	TBD	TBD

(1) The Recapitalization Program Integrated Project List (IPL) is annually formulated and approved.

4.1b Major Construction Projects

Recognizing that PF-4 would soon be reaching its golden anniversary and that the life of PF-4 would likely extend well into the future, DOE/NNSA undertook comprehensive reviews to identify requirements for sustaining PF-4’s plutonium missions. The reviews, conducted under an Integrated Nuclear Planning program, were managed jointly by laboratory and federal officials. Investments resulting from this effort include the suite of PF-4 enhancements included in the TA-55 reinvestment project (TRP); the construction, equipment outfitting, and operations of the Radiological Laboratory Utility Office Building (RLUOB); and the PF-4 Equipment Installation phases under the Chemistry and Metallurgy Research Replacement (CMRR) project. Currently, there are three major capital asset construction projects underway that support PF-4:

- **TA-55 Reinvestment Project, Phase 3 (TRP-III):** provides upgrades to the fire alarm control system in PF-4 and balance-of-plant support facilities at TA-55 to modernize this life-safety hardware. This is the last Phase of TRP, which began more than a decade ago.
- **CMRR Project:** provides infrastructure improvements to the TA-55 complex and replaces the 1950s-era Chemistry and Metallurgy Research building with modern analytical chemistry and material characterization capabilities needed to support multiple missions in PF-4.
- **Los Alamos Pit Production Project (LAP4):** provides a major equipment installation and infrastructure upgrade to support LANL’s expanded mission to provide at least 30 pits per year.

4.1c Upgrades

Accomplishments

Table 2 lists several completed projects that serve as examples of addressing specific criteria identified in the risk-based assessments.

Table 2. Completed Recapitalization Projects at the PF-4 Complex

First Year of Funding	Recapitalization Projects	Funding or Estimated Budget (\$k)	Completion Date
2016	TA-55 Structural Upgrade for Seismic Response	5,250	Dec. 2016
2016	TA-55 Facility Control System Modifications	500	Jun. 2017
2016	PF-4 Physical Barriers and Signage Upgrades	1,689	Apr. 2019
2016	PF-4 SNM Vault Storage Upgrades	214	Jan. 2019
2016	PF-4 Real Time Criticality Monitoring Systems Replacements	522	Jun. 2019
2016	PF-4 Internal SNM Transportation System Upgrades	1,065	Apr. 2019
2016	PF-4 Criticality Safety Determinations Computer System Upgrade	3,450	May 2020
2017	PF-4 Disconnect and Removal of Two Inoperable Fans	1,165	Sep. 2019
2017	PF-4 Fire-Rated Assemblies Upgrade	598	Sep. 2018
2018	PF-4 Fire Water Loop Wet Pipe Tank and Power Replacement	6,340	Feb. 2020

Table 3 delineates several ongoing projects at the PF-4 Complex.

Table 3. Ongoing Recapitalization Projects at the PF-4 Complex

First Year of Funding	Recapitalization Projects	Estimated Costs (\$k)	Targeted Completion Date
2017	PF-4 fire water loop pumps and boilers Replacement	8,820	Jun. 2021
2017	PF-4 Zone 1 Damper Controls and Actuator Safety Upgrades	7,217	Jan. 2022
2017	PF-4 Public Address System Upgrade	3,361	Sep. 2021
2017	PF-4 High-Risk Variable Frequency Drive Fan Safety Upgrade	6,090	Jun. 2021
2017	PF-4 Medium-risk Variable Frequency Drive Fan Safety Upgrade	1,915	Jun. 2021
2018	PF-4 Fire Wall Upgrades	7,000	Oct. 2021
2019	PF-4 Secondary Lift Installation	1,425	Aug. 2021
2020	PF-4 Power and Communications Systems Upgrade	16,000	Jul. 2022
2020	PF-4 Fire Suppression System 2 over 1 Seismic Issues Upgrade	10,400	Oct. 2021

Planned Improvements

Table 4 includes improvements to the PF-4 Complex planned over the next seven years to reduce infrastructure risks to operations and modernize the physical infrastructure for continued operations. Projects in Table 4 with a first year of funding after 2021 will be analyzed for consideration in future budget requests.

Table 4. Proposed Recapitalization Improvements at the PF-4 Complex

First Year of Funding	Recapitalization Projects	Estimated Cost (\$k)	Proposed Completion Date
2021	PF-4 Area 200 Facility Wet Vacuum Replacement	6,384	2023
2021	PF-4 New High Pressure Water Feed Line	10,227	2023
2022	PF-4 Facility Controls Systems Upgrades	17,445	2024
2023	TA-55 New Fire Suppression Water Supply	13,895	2024
2022	PF-4 North and South Fire Suppression Cast Iron Fittings Replacement	10,984	2024
2022	PF-4 Health Physics Vacuum Upgrade	11,940	2024
2023	PF-4 Zone 1 Exhaust Fan Replacement	4,000	2025
2023	Zone 2 Exhaust Fans Safety Class Upgrade	2,900	2025
2023	PF-4 Instrument Air System Upgrade	10,000	2025
2024	Area 400 Facility Wet Vacuum Replacement	10,000	2026
2024	PF-4 UPS Revitalization	10,000	2026
2024	PF-4 13.2kv Switchgear Revitalization	10,000	2026
2024	PF-4 Motor Control Center 611 & 612 Revitalization	10,000	2026
2024	PF-4 3009-2014 DSA Implementation Upgrades	10,000	2026
2025	PF-4 Generator and Power Supply Upgrades	2,400	2027
2025	Facility Wet Vacuum Replacement (balance of plant)	10,000	2027

Due to end of life, DOE/NNSA has also identified several major systems that will require replacement over the next 25 years. These major systems have multiple components that have dropped the System Condition Index (SCI) into the poor range as those components approach end of life and need replacement.⁴

- PF-4 Complex HVAC systems are currently in poor condition, with an SCI of 59.**
 Over the next 25 years, it is projected that DOE/NNSA will need to invest an estimated \$185 million for HVAC system replacements and repairs at the PF-4 Complex, including significant investment in replacing air distribution heating and cooling units as well as air

⁴ The SCI is a condition rating for each system within a building (such as roofing, HVAC, plumbing, etc.). For each system, the SCI is computed by taking the average of its components' condition indices, weighted by each component's replacement cost. SCI scores (good condition, corrective action needed, etc.) are interpreted in the same manner as BCI scores described in Section 3.1. As aforementioned, DOE/NNSA defines scores above 86 as in good condition, requiring only normal maintenance; scores from 70 to 85 require corrective action to repair or replace older or potentially degraded equipment; and scores below 70 implies a facility requires immediate work and is likely currently operating with facility systems that must be replaced.

handling units at end of life. Chilled water systems will also reach end of life and require replacement.

- **PF-4 Complex electrical systems are currently in poor condition, with an SCI of 67.** Over the next 25 years, it is projected that DOE/NNSA will need to invest an estimated \$85M on electrical system replacements and repairs at the PF-4 Complex, including significant investments in replacing PF-4's process controls system, lightning protection system, and emergency lighting and power systems.
- **PF-4 Complex roofing systems are currently in poor condition, with an SCI of 75.** Over the next 25 years, it is projected that DOE/NNSA will need to invest an estimated \$27M on roofing system repairs and replacements, including approximately \$12M to replace the PF-4 roof covering.

Due to the complexity of each of these systems, DOE/NNSA has developed a 25-year maintenance strategy to resolve current and predicted issues through 2045. Site inspection and assessment of system health will determine the timing, scope, and associated project costs. As each repair is completed, SCI will be updated to reflect the current maintenance needs of that system.

The most recent 3-year average investment into facility maintenance, repairs, and recapitalization for the PF-4 Complex is \$37 million. This level of investment has maintained the condition of PF-4 relatively constant. When this nominal sustainment cost to maintain condition is extrapolated, plus the additional one-time major systems replacements outlined above, the average 25-year annual sustainment cost for the complex is estimated at \$52 million in 2020 dollars, rising to \$75 million by 2045 when adjusted for 2 percent inflation.⁵

To help plan and manage this complex set of infrastructure investment needs, DOE/NNSA is deploying a new, science-based infrastructure stewardship approach that focuses on data-driven, risk-informed decision making using innovative infrastructure tools and metrics to better assess conditions, improve data quality, and prioritize investments. Part of this approach includes the deployment of BUILDER. This approach provides DOE/NNSA with a single, risk-informed, rules-based approach to assess component-level building system inventory and to inform infrastructure renewal decisions based on current and predicted system conditions, functionality, mission priorities, and acceptable risk tolerance levels.

4.2 Expanded Mission Requirements

DOE/NNSA is working with LANL to prioritize mission work in PF-4 to prioritize and improve coordination of activities in PF-4 to reduce risk as missions evolve in coming years. The combination of consistent requirements from the manufacturing mission, and the year-to-year requirements for research missions requires more coordination between all the different laboratory and Federal programs using PF-4. LANL and DOE/NNSA will need to correctly assign priority to personnel and missions within PF-4 should the need arise. DOE/NNSA is working

⁵This investment discussion focuses on the current, physical infrastructure and does not include programmatic equipment or any programmatic or mission changes or additions to the existing infrastructure.

closely with LANL to address changes to mission requirements and effects to other missions for effective management as pit production rates increase.

4.3 Regulatory and Environmental Requirements

Both DOE/NNSA and LANL are committed to PF-4 operating in full compliance of Federal, state, and local regulations. DOE/NNSA and LANL work together with Federal regulators, the state of New Mexico, local leaders, and other outside entities to keep DOE/NNSA and LANL staff informed of local concerns and changes in regulations. The strategy also assists in keeping local entities informed of past and future DOE/NNSA investments to improve the safety of the PF-4 facility and to protect the public. Many of the improvements to PF-4 described in Section 4.1 are also focused on strengthening PF-4’s capabilities to maintain regulatory compliance in the face of evolving safety, security, and environmental requirements.

DOE/NNSA realizes that additional risks have the potential to be identified beyond those discussed in this report. To mitigate unidentified risks, DOE/NNSA coordinates with LANL to clarify mission priorities and adjust program funding for sufficient resiliency to adapt to unexpected changes and events.

V. Summary

The science, production, analytical chemistry, and material characterization activities in the PF-4 complex are both dependent and complementary with other activities at TA-55. Figure 2 depicts a timeline of key activities and upgrades related to the PF-4 Complex and relevant scope supporting PF-4 missions through 2045.

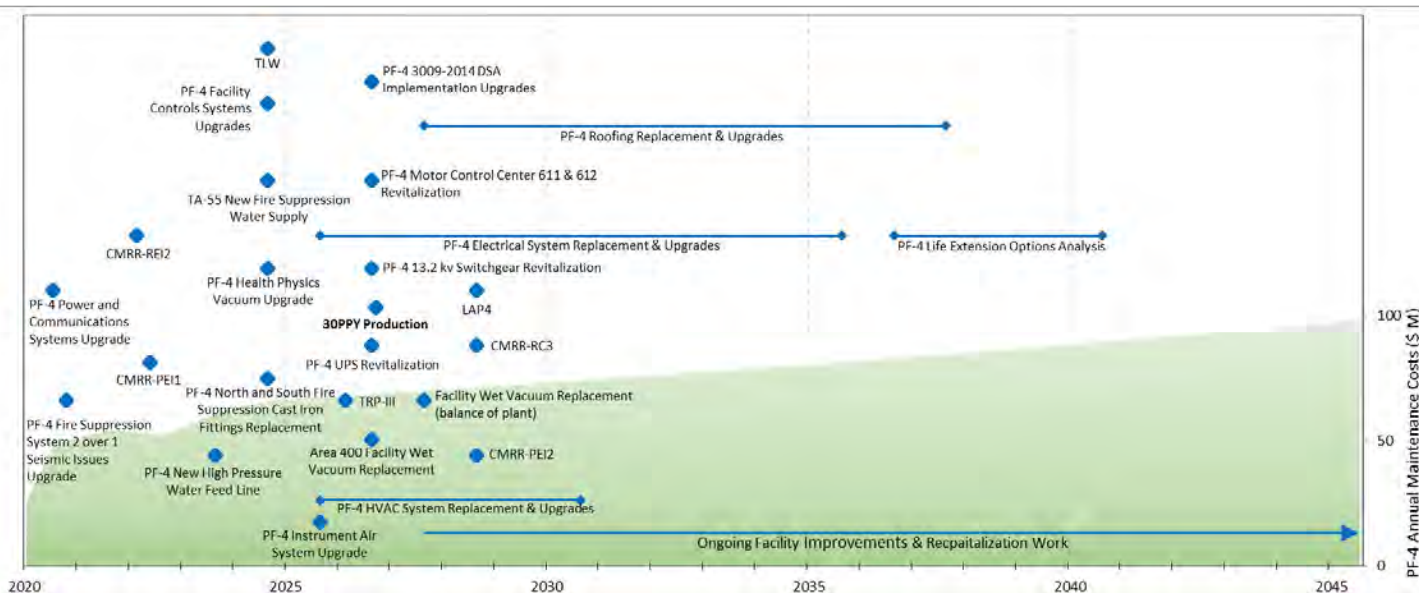


Figure 1. Major Infrastructure Activities through 2045

At present, PF-4 is the Nation's only operating facility capable of meeting stockpile requirements for plutonium surveillance, manufacturing, and research. DoD requirements and congressional statutes require PF-4 to provide an enduring production capability of at least 30 pit per year production capability starting in 2026. Although the pit production mission in PF-4 remains one of DOE/NNSA's highest priorities, this report focused broadly on facility-level risks that could impact any of the missions in PF-4.

DOE/NNSA conducted a risk analysis of sustaining the PF-4 Complex's physical infrastructure over the next 25 years. The analysis identifies general timeframes for reinvestment in key systems to continue to meet mission requirements. Analysis results do not indicate an immediate threat to mission delivery. Currently, the PF-4 Complex continues to accomplish mission requirements despite carrying known risks identified in the analysis.

DOE/NNSA supports and is working with LANL leadership to support the laboratory in meeting the expanded mission requirements, which includes focusing on keeping PF-4 capable of meeting the current, expected, and potential future mission needs for the next 25 years. DOE/NNSA is committed to maintaining LANL as the Nation's consolidated Center of Excellence for plutonium research, development, and manufacturing activities. Rigorous application of the maintenance and upgrade programs described has the potential to sustain the viability of PF-4 through 2045.