Office of Audits
Office of Inspector General
U.S. General Services Administration

PBS's Pacific Rim Region Grossly Mismanaged the Battery Energy Storage Systems at the Glenn M. Anderson Federal Building and the Ronald Reagan Federal Building and U.S. Courthouse, Resulting in Health and Safety Issues

Report Number A230079/P/4/R25005
August 20, 2025

Executive Summary

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Why We Performed This Audit

We performed this audit based on our ongoing assessment of a hotline complaint. Among other things, the complaint expressed health and safety concerns related to battery energy storage systems (battery systems) installed at the Glenn M. Anderson Federal Building in Long Beach, California (Anderson Building), and the Ronald Reagan Federal Building and U.S. Courthouse in Santa Ana, California (Reagan Building). While we continue to assess other aspects of the complaint, the objective of this audit was to determine whether GSA's Public Buildings Service (PBS) Pacific Rim Region (PBS Region 9) manages the battery systems at the Anderson and Reagan Buildings in accordance with applicable regulations to ensure the health and safety of building occupants.

What We Found

In 2020, as part of a PBS energy savings performance contract (ESPC), an energy service company (ESCO) installed battery systems at the Anderson and Reagan Buildings. Combined, these battery systems consisted of 3,200 nickel-iron batteries. If not properly maintained, nickel-iron batteries can pose numerous health and safety risks, including the risk of electric shock, release of and exposure to hazardous materials, fire, and explosions.

PBS Region 9 grossly mismanaged the battery systems at the Anderson and Reagan Buildings, resulting in health and safety issues. We found that PBS Region 9 failed to ensure that the battery systems were properly maintained by the ESCO, resulting in a battery explosion, hazardous materials leaks, an injury, and a fire. Although the battery systems were disconnected after the battery system fire at the Anderson Building in April 2023, the battery systems and associated health and safety hazards remained in both buildings for years.

According to documents provided by PBS Region 9 management, the ESCO removed the batteries from the Reagan and Anderson Buildings in April 2025.

What We Recommend

We recommend that the PBS Commissioner institute policies and procedures to ensure:

1. Battery systems are designed, installed, operated, and maintained in accordance with federal regulations, PBS policy, and building code requirements.

2. Training requirements are designed and implemented for PBS and PBS contractor personnel working with battery systems and associated technologies.

3. Appropriate action is taken to address PBS personnel performance deficiencies identified in this report, including supervisory chains of command and individuals responsible for managing the battery systems.

We also recommend that the PBS Regional Commissioner of the Pacific Rim Region take immediate action to:

4. Safeguard the occupants and assets in the Anderson and Reagan Buildings by:
    a. Verifying that the ESCO removed the batteries and any other hazards from both the Anderson and Reagan Buildings using only qualified personnel.
    b. Obtaining the complete third-party investigation report into the cause of the battery system fire at the Anderson Building. Upon receipt, ensuring any remaining health and safety hazards listed in the report are addressed or mitigated.

5. Improve management oversight of the region's facilities to ensure that:
    a. Code violations and maintenance deficiencies brought to management's attention are immediately addressed.
    b. Local fire department personnel are involved in pre-fire planning activities for future battery system projects.
    c. Local fire department personnel are involved in post-fire assessments.
    d. Final certificates of occupancy are not issued until all outstanding fire and life safety deficiencies are corrected.

The PBS Commissioner agreed with the report's recommendations.

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Introduction

We performed an audit of the GSA Public Buildings Service (PBS) Pacific Rim Region's (PBS Region 9's) management of battery energy storage systems (battery systems) installed at the Glenn M. Anderson Federal Building in Long Beach, California (Anderson Building), and the Ronald Reagan Federal Building and U.S. Courthouse in Santa Ana, California (Reagan Building).

Purpose

In August 2023, the GSA Office of Inspector General received a hotline complaint expressing, among other things, health and safety concerns related to battery systems installed at the Anderson and Reagan Buildings. According to the complaint, PBS personnel ignored several code violations during the design and installation of the systems, resulting in hazardous and unsafe working conditions in the buildings. We concluded that there was merit to the complaint and initiated this audit accordingly.

Objective

Our objective was to determine whether PBS Region 9 manages the battery systems at the Anderson and Reagan Buildings in accordance with applicable regulations to ensure the health and safety of building occupants.

See ***Appendix A*** – Objective, Scope, and Methodology for additional details.

Background

Battery systems are electrochemical devices that charge (or collect energy) from the power grid or a power plant and then discharge that energy, typically for future use. The basic unit of a battery system is a battery cell, which converts stored chemical energy into electrical energy. Systems range in their size and capacity. Larger systems may contain thousands of individual cells, housed in racks. Several battery technologies are available for battery system applications, including flooded lead-acid batteries, valve-regulated lead-acid batteries, nickel-cadmium batteries, and lithium-ion batteries.[1] Battery technologies differ in their chemistry and technical characteristics, as well as their advantages and disadvantages.

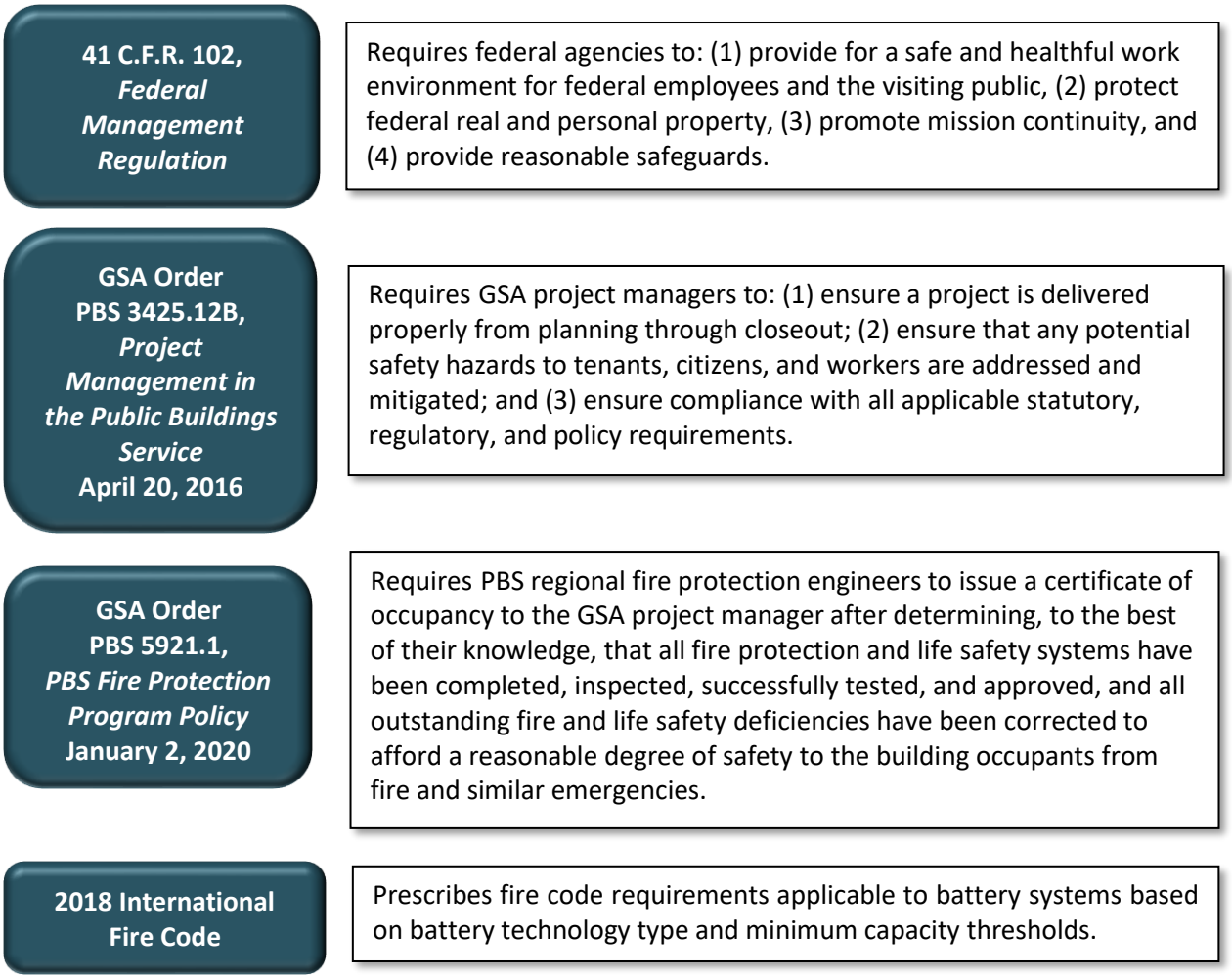
Battery systems provide several energy and cost-saving services. Most battery systems in the United States are designed to provide an on-site source of power in case of grid failure. The systems can also take advantage of lower time-of-use electricity rates or reduce electrical demand charges.[2] This can lead to reduced demand on the power grid and utility bill savings for individual buildings. While battery systems may produce energy and cost savings, they are not

[1] These battery technologies are defined in ***Appendix B***.

[2] Time-of-use electricity rates vary based on the time of day, with lower electricity prices during off-peak hours and higher prices during peak hours.

without risk. Specifically, they introduce chemical, electrical, fire, and toxic gas hazards. Accordingly, PBS must manage battery systems installed at locations under its jurisdiction in accordance with several regulatory, policy, and code requirements (see *Figure 1* below).

Figure 1. Criteria Relating to Battery System Management



Energy Savings Performance Contracts

Energy savings performance contracts (ESPCs) began in 1986 with amendments to the National Energy Conservation Policy Act of 1978 (42 U.S.C. 8287). The amendments stated in part that "The head of a Federal agency may enter into contracts … solely for the purpose of achieving energy savings and benefits ancillary to that purpose" for a term not to exceed 25 years. According to the U.S. Department of Energy's Federal Energy Management Program:

> ESPCs are a partnership between a federal agency and an energy service company (ESCO). After being selected for a potential award, the ESCO conducts a comprehensive facility energy audit and identifies improvements to save energy.

> In consultation with the agency, the ESCO designs and constructs a project that meets the agency's needs and arranges financing to pay for the project.
>
> The ESCO guarantees that the improvements will generate sufficient energy cost savings to pay for the project over the term of the contract. After the contract ends, all cost savings accrue to the agency. The agency is responsible for contract administration for the entire term of the contract.[3]

Essentially, ESPCs are designed to allow federal agencies to implement cost-saving facility energy improvements with no upfront capital costs, using energy savings to pay for the improvements.

Los Angeles-Area ESPC

In June 2018, PBS Region 9 modified a Los Angeles-area ESPC that was originally awarded in 2013.[4] The modification, referred to as "Phase 2B," extended the ESPC for 20 years and incorporated several additional energy conservation measures. Phase 2B included the design and installation of battery systems at the Anderson and Reagan Buildings. According to the ESCO's proposal, the purpose of the battery systems is to "store energy from the grid during off-peak hours and discharge during on-peak periods, shaving peak electrical demand charges and shifting consumption charges to lower rate periods."

The ESCO's proposal further provided that maintenance of the battery systems would be the responsibility of the battery manufacturer for 2 years; after that, the ESCO would assume maintenance responsibilities. The proposal added that the ESCO would own the batteries until the battery systems were accepted by PBS. Additional information related to the Los Angeles-area ESPC battery systems is shown in *Figure 2* below.

Figure 2. Los Angeles-Area ESPC Battery Systems Information

Building	Implementation Price ($ in millions)	Proposed Savings (Annual) ($)	Number of Battery Cells	Power Capacity Maximum (kW)	Energy Capacity Maximum (MWh)
Anderson	2.94	183,656	1,280	500	1.9
Reagan	3.61	319,465	1,920	750	2.9
Total	**6.55**	**503,121**	**3,200**	**1,250**	**4.8**

[3] U.S. Department of Energy website. https://www.energy.gov/femp/about-federal-energy-savings-performance-contracts. Accessed January 21, 2025.

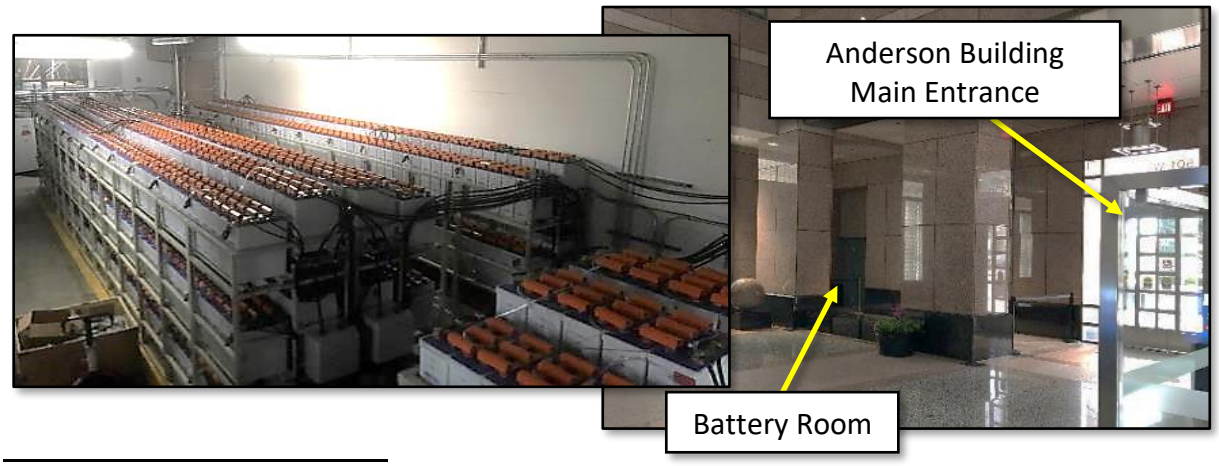
[4] Contract Number GS-09P-14-KS-C-0003, Modification PS52 (Phase 2B).

Glenn M. Anderson Federal Building. Constructed in 1989, the Anderson Building (see *Figure 3* below) is an 8-story building with a 4-story atrium and one below-grade basement located in downtown Long Beach, California. Tenants include the U.S. Department of Homeland Security, Internal Revenue Service, National Oceanic and Atmospheric Administration, and Social Security Administration. The building is the sole federal building in the city of Long Beach and is primarily used as standard office space to support the missions of the tenants housed within. The building is accessed by federal employees, contractors, and the public.

Figure 3. Exterior of the Anderson Building[5]

In 2020, the ESCO installed a battery system in a ground-level room of the Anderson Building, directly next to the building's main entrance and lobby, a public sidewalk, and a city bus stop (see *Figure 4* below). The system was made up of 1,280 battery cells, each weighing more than 154 pounds. In total, more than 105 tons of battery cells and battery racks were installed in the Anderson Building's battery room.

Figure 4. Anderson Building's Battery Room[6]



[5] Source: General Services Administration website. https://www.gsa.gov/about-us/gsa-regions/region-9-pacific-rim/buildings-and-facilities/california/glenn-m-anderson-federal-building. Accessed August 7, 2024.

[6] Photograph on the left taken by a PBS contractor employee, August 5, 2020. Photograph on the right taken by the audit team, September 7, 2023.

According to ESCO personnel, the battery system at the Anderson Building was plagued with problems while in operation. In mid-April 2023, PBS officials initiated a 30-day performance period to review whether the system performed as intended. According to the PBS officials, a battery system fire occurred on April 24, 2023, prior to the end of the performance period. As a result, PBS did not contractually accept the battery system, and the system was disconnected.

Ronald Reagan Federal Building and U.S. Courthouse. Constructed in 1999, the Reagan Building (see *Figure 5* below) is a 10-story building with a 2-story atrium lobby and one below-grade basement located in downtown Santa Ana, California. Tenants include the U.S. District Court, U.S. Bankruptcy Court, U.S. Attorney's Office, U.S. Marshals Service, U.S. Trustees, Office of the Federal Public Defenders, and U.S. Marine Corps. The building provides office space and courtrooms and supports the missions of the tenants housed within.

Figure 5. Exterior of the Reagan Building[7]

In 2020, the ESCO installed a battery system in a basement room of the Reagan Building, next to the building's switchgear room and below a parking garage.[8] The system was made up of 1,920 battery cells, each cell weighing more than 154 pounds. In total, more than 158 tons of battery cells and battery racks were installed in the Reagan Building's battery room (see *Figure 6* on the next page).

[7] Source: General Services Administration website. https://www.gsa.gov/about-us/gsa-regions/region-9-pacific-rim/buildings-and-facilities/california/ronald-reagan-federal-buildingus-courthouse. Accessed August 7, 2024.

[8] A switchgear room houses electrical disconnect switches, fuses, or circuit breakers used to control, protect, and isolate electrical equipment.

Figure 6. Reagan Building's Battery Room[9]

PBS officials and ESCO personnel told us that the battery system at the Reagan Building was never fully operational because the system did not meet local utility requirements. According to PBS officials, the battery system was disconnected following the April 24, 2023, fire in the Anderson Building's battery room and was not contractually accepted by PBS.

Battery Technology Installed at the Anderson and Reagan Buildings

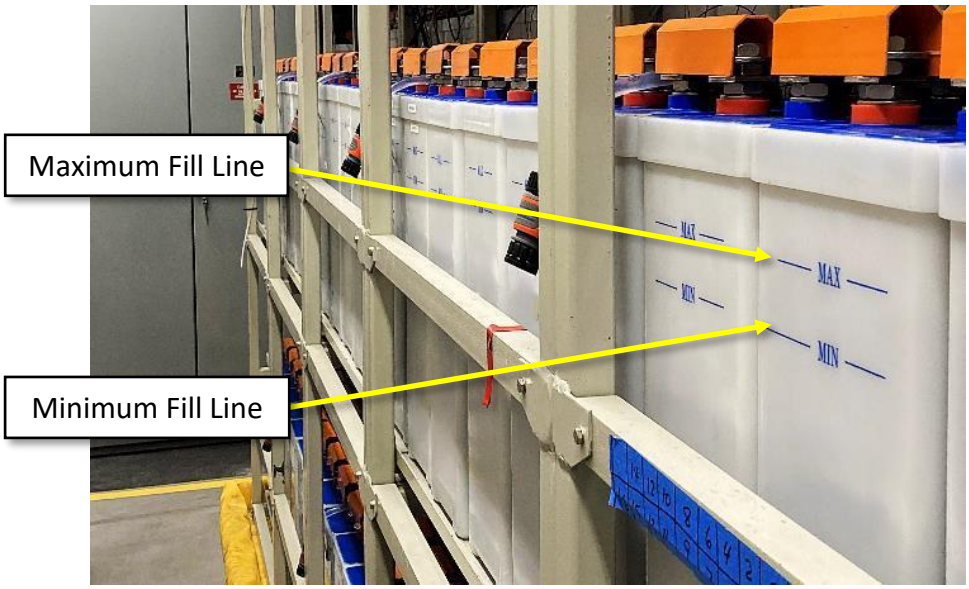
Although the battery systems were designed to meet International Fire Code (IFC) requirements for nickel-cadmium batteries, all other terms of the Los Angeles-area ESPC called for the installation of nickel-iron batteries at the Anderson and Reagan Buildings. According to the ESCO's proposal, several battery technologies were explored, and the nickel-iron battery technology was selected because it was "the best fit for the daily demand curve." The ESCO's proposal added that "only one vendor was solicited because they have the only battery technology that will address the demand curve of the building[s]."

Nickel-iron battery history. Nickel-iron battery technology was introduced in the United States by Thomas Edison in the early 1900s. Early nickel-iron batteries were robust, had long shelf and cycle lives, and were often used in energy storage systems and vehicles. The batteries also had disadvantages, including low power and energy density, high self-discharge, poor low-temperature performance, and high cost. In the 1970s, nickel-iron batteries were displaced in most applications by technologies with smaller, lighter battery cells. However, in the early 2000s, nickel-iron batteries received renewed interest in the United States for grid applications where weight and space were less important factors.

[9] Photographs taken by the audit team, September 6, 2023. The battery supplier's name has been removed from the battery cells in the photograph on the left.

The active materials of the nickel-iron battery are metallic iron for the negative electrode, nickel oxide for the positive electrode, and a potassium hydroxide solution with lithium hydroxide. As a nickel-iron battery charges, hydrogen gas is created and water in the electrolyte is depleted. For this reason, nickel-iron batteries require regular watering to "top up" the electrolyte. Watering is required when the electrolyte level falls below the minimum fill line. If the electrolyte level rises above the maximum fill line, maintenance is required (see *Figure 7* below).

Figure 7. Nickel-Iron Battery Cells Showing Maximum and Minimum Fill Lines at the Reagan Building[10]



Nickel-iron battery hazards and precautions. The ESCO provided PBS with the battery supplier's *Installation and Operation Manual* and *Safety Data Sheet* for the nickel-iron batteries installed at the Anderson and Reagan Buildings. These documents highlight several health and safety hazards associated with the batteries, including electric shock, release of and exposure to hazardous materials, fire, and explosions. The documents also highlight precautionary measures required to safely manage the batteries. A detailed listing of these hazards and precautionary measures is included in ***Appendix C***.

Hotline Complaint

In August 2023, we received a hotline complaint expressing several concerns related to Phase 2B of the Los Angeles-area ESPC. Among other things, the complaint expressed health and safety concerns associated with the battery systems installed at the Anderson and Reagan Buildings. According to one portion of the complaint, PBS personnel ignored several code violations during the design and installation of the battery systems, resulting in hazardous and

[10] Photograph taken by the audit team, October 26, 2023. The battery supplier's name has been removed from the battery cells in the photograph.

unsafe working conditions in the buildings. We conducted site visits and interviews at both sites and determined that the health and safety elements of the complaint had merit. We are notifying management of the results of our assessment through this report. We continue to assess other aspects of the hotline complaint.

Results

Finding – PBS Region 9 grossly mismanaged the battery systems at the Anderson and Reagan Buildings, resulting in health and safety issues.

In 2020, as part of a PBS ESPC, an ESCO installed battery systems at the Anderson and Reagan Buildings. Combined, these battery systems consisted of 3,200 nickel-iron batteries. If not properly maintained, nickel-iron batteries can pose numerous health and safety risks, including the risk of electric shock, release of and exposure to hazardous materials, fire, and explosions.

PBS Region 9 grossly mismanaged the battery systems at the Anderson and Reagan Buildings, resulting in health and safety issues. We found that PBS Region 9 failed to ensure that the battery systems were properly maintained by the ESCO, resulting in a battery explosion, hazardous materials leaks, an injury, and a fire. Although the battery systems were disconnected after the battery system fire at the Anderson Building in April 2023, the battery systems and associated health and safety hazards remained in both buildings for years.

According to documents provided by PBS Region 9 management, the ESCO removed the batteries from the Anderson and Reagan Buildings in April 2025.

Failure to Ensure Battery Systems Were Properly Maintained

Nickel-iron batteries must be properly maintained to promote the safe and effective operation of the battery systems. Accordingly, the ESPC prescribes that the battery systems should be maintained in accordance with manufacturer specifications. However, we found that PBS Region 9 failed to ensure that the ESCO assigned qualified personnel to maintain the battery systems. As a result, a series of fire and life safety incidents occurred, including a battery explosion and release of hazardous materials that led to an ESCO employee sustaining chemical burns.

The ESCO's battery supplier's *Installation and Operation Manual* describes several maintenance requirements for the nickel-iron batteries. However, as described below, the ESCO did not comply with these requirements.

- **Failure to Assign Qualified Personnel to Perform Battery Maintenance –** According to the battery supplier's guidance, "battery installation, maintenance, service, and replacement must be performed only by authorized personnel." The ESCO did not assign qualified personnel to maintain the nickel-iron batteries. Instead, it assigned maintenance responsibilities to four of its heating, ventilation, and air conditioning (HVAC) technicians. The ESCO's HVAC technicians told us they had no previous experience working with battery systems or nickel-iron batteries. They also said they received no specialized training in battery system maintenance or related health and safety concerns.

- **Failure to Properly Supervise Battery System Maintenance –** The battery supplier's guidance provides that servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and required safety precautions. However, the ESCO designated one of the four HVAC technicians as site supervisor (foreman) for the battery system projects. The foreman told us he was "dragged into the project" because he worked near the two federal buildings. He added that battery system maintenance was conducted at the direction of the ESCO's battery supplier by phone because the supplier was in Florida.

As prescribed in PBS's project management policy, PBS project managers are responsible for ensuring quality and safety management.[11] Specifically, project managers must ensure that a project satisfies the needs for which it was undertaken and work in partnership with contractors to ensure the safety of all workers. However, the PBS project manager for the Los Angeles-area ESPC told us that she was unaware of the contract requirements for quality control and was unsure whether the ESCO was meeting contractual maintenance obligations.

The PBS ESPC project manager's lack of awareness and inadequate project oversight created an environment where the ESCO allowed unqualified individuals to maintain the battery systems. In this environment, the ESCO's foreman led battery system training sessions despite having no experience with, or training on, battery systems or nickel-iron batteries. The purpose of the ESCO-foreman-led training sessions was to provide battery system health and safety instruction for PBS operations and maintenance (O&M) contractor employees working at the Anderson and Reagan Buildings.[12] As a result, the PBS O&M contractor employees did not receive adequate health and safety training, placing them at increased risk of personal harm when working near the battery systems.

The use of unqualified personnel was worsened by problems with the batteries themselves that prevented the required maintenance. For example, as described in the *Background* section of this report, manufacturer specifications require that electrolyte levels for each battery remain within the maximum and minimum fill lines marked on the exterior of each cell.[13] However, the ESCO's foreman said it was not possible to determine the electrolyte fluid levels because the battery casings were fully opaque. According to the foreman, "Even with flashlights, sunlight, bright light, we could not see through basically any of the 1,280 batteries at [the Anderson Building]."

The defective battery casings were also documented in inspection reports completed by a PBS Region 9 fire protection engineer in 2023. The engineer's March 22, 2023, inspection report

[11] GSA Order PBS 3425.12B, *Project Management in the Public Buildings Service.*

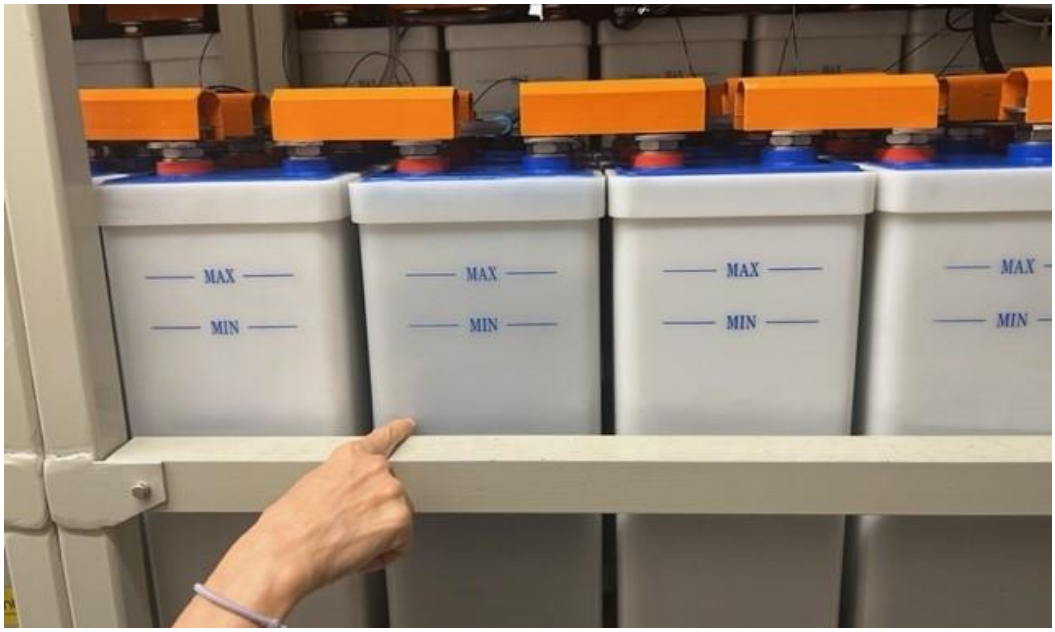
[12] PBS awards O&M contracts to contractors that perform the day-to-day activities necessary for the buildings and their systems to perform consistently, safely, and for their intended purposes. Systems may include electrical, HVAC, elevators, escalators, fire safety, plumbing, and roofs.

[13] See page 7.

noted that "the battery cases are no longer [transparent] … this makes determining electrolyte levels in the batteries exceedingly difficult. This could lead to under / over filling." However, we found that the engineer did not share this concern with PBS Region 9 management until April 25, 2023, 1 day after the battery system fire at the Anderson Building.

After the fire, PBS Region 9 management asked the fire protection engineer to inspect the two battery systems again. His inspection reports noted that several issues identified during his March 2023 inspection remained unaddressed, including the opaque battery casings. Specifically, his report on the Reagan Building battery system noted that "as can be seen in the picture … [see *Figure 8* below], it is completely unclear whether the electrolyte is between the minimum and maximum fill marks on the case."

Figure 8. Defective Nickel-Iron Battery Casings at the Reagan Building[14]



Taken together, these problems prevented the proper maintenance of the batteries and likely contributed to the following safety incidents at the Anderson Building:

- **Battery Explosion and Release of Hazardous Materials –** In March 2022, there was a battery explosion at the Anderson Building. According to a PBS O&M contractor employee who observed the room after the explosion:

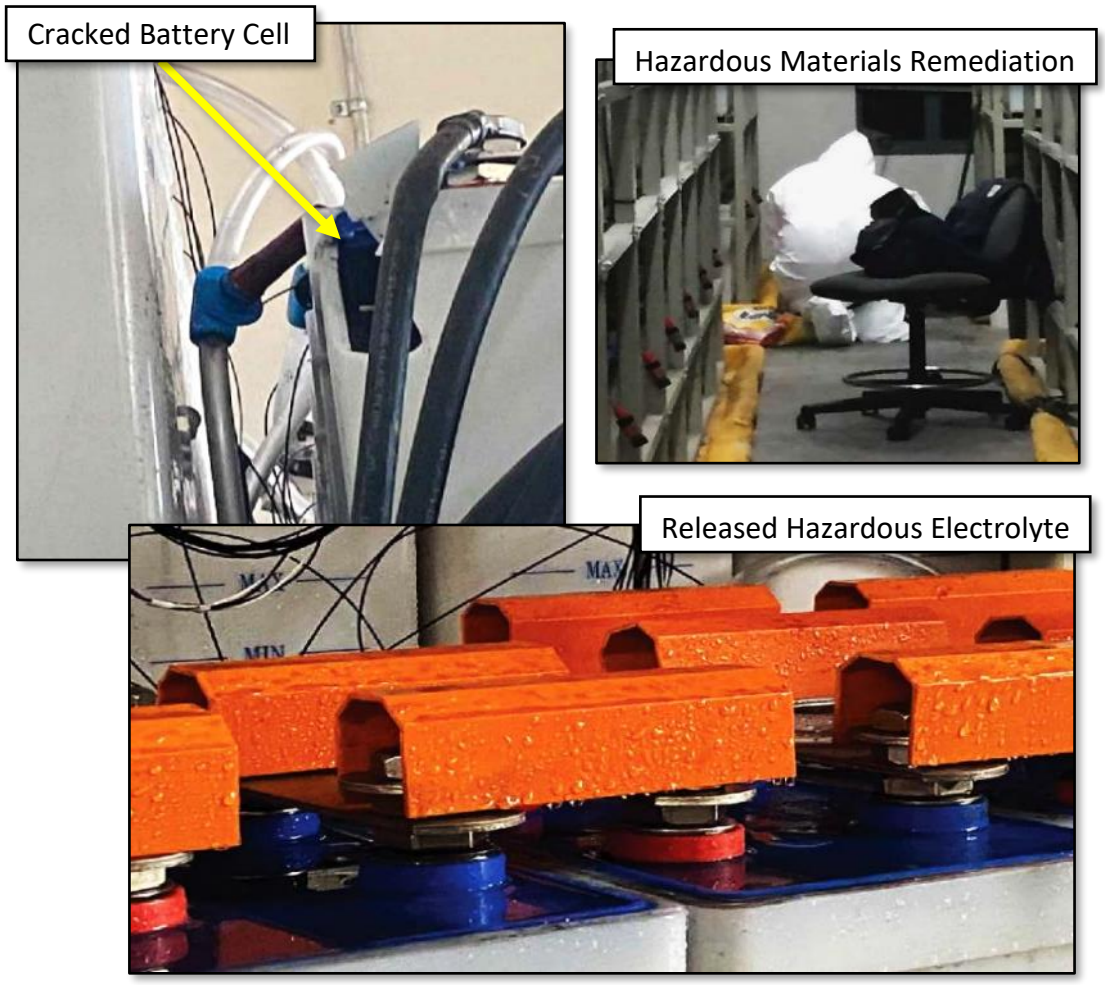
  > It was discovered that a battery had, for the lack of a better term, exploded. There may be more than one damaged battery in the rack:

[14] Photograph taken by a PBS Region 9 fire protection engineer, October 19, 2023. The battery supplier's name has been removed from the battery cells in the photograph.

unknown at this time. There was battery electrolyte up the wall about 15 or 20 feet. The entire rack was dripping with electrolyte.

In response to the incident, the ESCO hired a hazardous materials remediation company to clean the affected area. Additionally, PBS requested that the ESCO provide a report identifying the cause of the incident. On July 8, 2022, the ESCO's battery supplier completed a *Final Incident and Recommendation* report. According to the report, nine battery cells in the Anderson Building's battery room were permanently damaged; each of the battery cells had severe cracks in the cell jars and were leaking electrolyte. The report also identified improper maintenance as a significant contributing factor. *Figure 9* below shows the battery incident photos and remediation work.

Figure 9. Photos Taken After the March 2022 Battery Explosion at the Anderson Building[15]



[15] Photographs taken by a PBS O&M contractor employee at the Anderson Building, March 31, 2022.

- **HVAC Technician Sustained Chemical Burns –** In April 2022, one of the ESCO's four HVAC technicians sustained chemical burns while replacing a damaged battery. The technician who sustained the burns told us another ESCO HVAC technician was on a ladder removing the damaged battery while he waited below to receive the battery. The battery tilted, allowing electrolyte to spill from a crack in the damaged battery and onto his shoulder.

  The battery manufacturer's guidance provides that immediate medical aid is required if electrolyte contacts the skin. The guidance further provides that affected individuals should immediately apply vinegar to neutralize the electrolyte and then wash thoroughly with water for at least 15 minutes. However, the burned ESCO HVAC technician was not trained on these safety procedures and did not follow them after the electrolyte spilled onto his shoulder. He told us that he did not wash the affected skin until it started to burn approximately 10 to 15 minutes after contact. According to the technician, there were "physical chemical burn marks on [his] skin" after washing.

  The battery manufacturer's guidance also requires workers to wear appropriate gloves and protective clothing to prevent skin exposure. However, the burned ESCO HVAC technician told us that he was not instructed to use personal protective equipment prior to the incident. He added that he took it upon himself to purchase a face shield, apron, and gloves following the incident. According to the burned HVAC technician, the ESCO made no procedural or policy changes in response to the incident.

  The terms of the ESPC require that all accidents resulting in injury or property damage must be reported to the PBS contracting officer within 24 hours; however, both the ESCO's foreman and the burned HVAC technician acknowledged that they did not do so. When we interviewed the PBS ESPC project manager in October 2023, she told us she was unaware of the incident. However, we noted that the project manager was present during a February 2023 video training session when a PBS O&M contractor employee raised concerns about the incident. Several other PBS Region 9 personnel, including a PBS deputy property manager and the Anderson Building's building manager, also attended this training. Nonetheless, we found that PBS took no action following the training session to ensure the ESCO addressed battery-system-related health and safety hazards.

PBS Repeatedly Failed to Address Health and Safety Issues

As previously established, the nickel-iron battery systems installed in the Anderson and Reagan Buildings posed health and safety risks, some of which materialized. However, from the design of the battery systems through installation, operation, and post-operation, PBS Region 9 repeatedly failed to address the health and safety issues—even after a battery system fire in the Anderson Building in April 2023. As described on the following pages, we found that:

- Health and safety concerns identified during the design phase of the project were not addressed;
- A PBS Region 9 fire protection engineer disregarded fire safety issues by: (1) making improper exceptions to requirements to avoid fire code violations and (2) issuing final certificates of occupancy before fire safety issues were resolved;
- The PBS ESPC project manager routinely downplayed or dismissed health and safety concerns;
- A PBS Region 9 field office did not coordinate pre-fire planning activities with the local fire departments; and
- PBS Region 9 senior management failed to oversee the battery system project or address known health and safety deficiencies.

Health and safety concerns identified during the design phase of the project were not addressed. From late 2018 to May 2019, PBS ESPC project team members reviewed the 50 percent and 100 percent design documents for the battery systems at the Anderson and Reagan Buildings. The reviewers reported several battery-system-related health and safety concerns. Among other things, they questioned design document exclusions of:

- Eye wash and shower stations;
- Secondary hazardous materials spill containment;
- Warning signage and emergency alert (alarm) systems; and
- An analysis required under the IFC designed to identify potential fire risks and measures to address those risks.

PBS Region 9 did not address these concerns. Instead, it proceeded with the installation of the battery systems.

A PBS Region 9 fire protection engineer disregarded fire safety issues by: (1) making improper exceptions to requirements to avoid fire code violations and (2) issuing final certificates of occupancy before fire safety issues were resolved. PBS fire protection engineers play a key role in PBS's fire protection program. These PBS employees are subject-matter experts who, in accordance with *PBS Fire Protection Program Policy*, must have at least 4 years of experience and "special competence in the understanding of the principles of physics and chemistry governing fire growth, spread, and suppression."[16]

The *PBS Fire Protection Program Policy* provides that regional fire protection engineers serve as the Authority Having Jurisdiction (AHJ) for PBS.[17] According to the National Fire Protection Association, an AHJ is "an organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a

[16] GSA Order 5921.1, *Public Buildings Service (PBS) Fire Protection Program Policy*, Chapter 2, Paragraph 2.1.6.

[17] Outside of the federal government, AHJs are typically local fire department personnel.

procedure."[18] However, we found that the PBS Region 9 fire protection engineer assigned to the battery systems at the Anderson and Reagan Buildings mishandled health and safety concerns. As described below, the fire protection engineer made improper exceptions to avoid fire code violations and issued final certificates of occupancy before code violations were resolved.

Improper exceptions were made to avoid fire code violations. In August 2020, a PBS Region 9 fire protection engineer completed acceptance testing and a fire protection inspection of the battery systems and identified several instances of IFC noncompliance. The engineer also questioned whether the installed batteries met Underwriters Laboratory (UL) test requirements designed to determine whether the batteries would operate safely.

In response, the ESCO hired a subcontractor to conduct a fire safety assessment for both battery systems. The ESCO subcontractor's October 2020 assessment report identified 22 areas of IFC noncompliance for the nickel-iron battery systems, including deficiencies in signage, spacing between the batteries, and spill control.[19]

To address the most significant violations identified by its subcontractor, the ESCO would have been required to make costly, large-scale changes to both battery systems. According to the PBS Region 9 fire protection engineer, the ESCO would have had to reduce the battery rooms to a size that would not be financially feasible. To avoid this, the ESCO's subcontractor recommended that the ESCO request several "exceptions" from PBS to consider the nickel-iron batteries installed at both buildings as nickel-cadmium batteries, which are subject to less-stringent IFC requirements. Although PBS policy does not allow for such "exceptions," the ESCO submitted its subcontractor's assessment and a request for "exceptions" to PBS for review on October 20, 2020.

PBS project review documentation indicates that the PBS Region 9 fire protection engineer approved the "exceptions" on October 28, 2020. However, when we interviewed the engineer, he would not acknowledge approving the exceptions, stating that he was "not supposed to grant code exceptions." According to the engineer, the ESCO designed the battery rooms to meet code requirements for nickel-cadmium battery chemistry, but a different technology (nickel-iron) was installed. The engineer told us that he agreed with the code violations identified in the ESCO subcontractor's assessment report, but the changes needed to address many of the violations would have rendered the projects financially unfeasible.

Notwithstanding these assertions, the PBS Region 9 fire protection engineer, in his capacity as the AHJ, had the final authority to approve or deny the "exceptions." Instead of ensuring that

[18] National Fire Protection Association 70E, *Standard for Electrical Safety in the Workplace*.

[19] See ***Appendix D*** for instances of IFC noncompliance identified by the PBS Region 9 fire protection engineer and the ESCO's subcontractor.

the IFC violations were fully corrected, he allowed the project to continue with numerous fire hazards.

Issuance of final certificates of occupancy before code violations were resolved. The PBS Region 9 fire protection engineer later violated the *PBS Fire Protection Program Policy* by issuing final certificates of occupancy for the battery rooms in the Anderson and Reagan Buildings even though fire and life safety deficiencies remained outstanding. The *PBS Fire Protection Program Policy* requires fire protection engineers to issue a certificate of occupancy to the project manager once the engineer has determined that:

> To the best of their knowledge, all fire protection and life safety systems have been completed, inspected, successfully tested, and approved, and all outstanding fire and life safety deficiencies have been corrected to afford a reasonable degree of safety to the building occupants from fire and similar emergencies.[20]

In February 2022, the PBS Region 9 fire protection engineer issued final certificates of occupancy for the battery rooms in the Anderson and Reagan Buildings. However, both battery rooms had outstanding fire and life safety deficiencies. Specifically, the ESCO still needed to confirm that fire alarm systems would provide an alert signal in the event of an exhaust fan malfunction. This alert signal is critical because nickel-iron batteries release hydrogen gas that can be explosive and cause catastrophic damage if not exhausted from the battery rooms. Instead of waiting for this deficiency to be corrected, the PBS Region 9 fire protection engineer issued final certificates of occupancy with the following contingency:

> THIS CERTIFICATE IS CONTINGENT ON THE FAN'S OPERATIONAL STATUS MONITORED BY THE FIRE ALARM SYSTEM ON OR BEFORE 4/23/22.[21]

While the *PBS Fire Protection Program Policy* allows for contingencies when issuing temporary certificates of occupancy, it does not do so for final certificates of occupancy. Furthermore, the contingency was not addressed for either system by the April 23, 2022, due date.

The PBS ESPC project manager routinely downplayed or dismissed health and safety concerns. PBS project management policy requires that project managers work with project teams to ensure that any potential safety hazards to tenants, citizens, and workers are addressed and mitigated.[22] On several occasions during design and installation, PBS regional

[20] GSA Order, PBS 5921.1, *Public Buildings Service (PBS) Fire Protection Program Policy*, January 2, 2020.

[21] 2018 International Fire Code 1206.2.11.3.2, *Supervision*, states that "Required mechanical ventilation systems for rooms and cabinets containing storage batteries shall be supervised by an *approved* central station, proprietary or remote station service or shall initiate an audible and visual signal at an *approved* constantly attended on-site location." (italics in the original)

[22] GSA Order PBS 3425.12B, *Project Management in the Public Buildings Service*.

subject-matter experts, PBS O&M contractor employees, PBS Region 9 fire protection engineers, and an ESCO subcontractor reported health and safety concerns related to the battery systems. However, the PBS ESPC project manager failed to take action to ensure that potential safety hazards were addressed and mitigated. Instead, she dismissed or downplayed these concerns. For example:

- On September 1, 2020, the PBS building manager at the Anderson Building emailed the PBS ESPC project manager, asking if the Anderson Building O&M contractor's December 2018 health and safety concerns were addressed. On the same day, the project manager responded that the concerns were addressed. However, we found no indication that the battery rooms were assessed for health and safety concerns until April 2023.

- In February 2023, the ESCO and PBS personnel held training sessions for PBS O&M contractor employees. As noted on page 10 of this report, the ESCO's unqualified foreman led the health and safety portion of the training, during which the O&M contractor employees reiterated several of their previously reported concerns dating back to December 2018. However, the PBS ESPC project manager downplayed these concerns, stating that "I'm aware that the facilities [personnel] have some sort of level of fear associated with these battery systems … the severity of these battery systems are not what they think they are."

The PBS ESPC project manager also downplayed the health and safety concerns during our audit interviews. According to the project manager, the O&M contractor employees "have misconceptions thinking the batteries are unsafe or a hazard," but their concerns are "overstated" and "overblown." However, the project manager also acknowledged that she was not knowledgeable enough about the batteries to make this determination. For example, when we asked if she believed a technical expert opinion and review of the potential hazards associated with the battery systems was necessary, she responded that she was unsure, adding, "I'm not a subject-matter expert."

A PBS Region 9 field office did not coordinate pre-fire planning activities with the local fire departments. The *PBS Fire Protection Program Policy* requires PBS field offices to consult and coordinate pre-fire planning activities with the local fire department. The purpose of the pre-fire planning activities is to ensure that the local fire department has sufficient knowledge of the facility to improve its response to fire emergencies. Although the battery systems posed unique fire safety risks, we found that PBS Region 9 did not coordinate pre-fire planning activities with the local fire departments at the Anderson and Reagan Buildings.

On two occasions, in September 2020 and May 2021, a PBS O&M contractor employee at the Reagan Building emailed both the PBS building manager at the Reagan Building and the PBS ESPC project manager to let them know that the local fire department wanted to schedule a meeting to discuss the battery systems. The PBS O&M contractor employee attached the local fire station captain's business card to both emails.

Nonetheless, on February 24, 2023, when the PBS O&M contractor employee asked if anyone from PBS contacted the fire department, the PBS ESPC project manager responded that "somebody needs to share with me the point of contact for the fire department … and I will take it upon myself to coordinate a meeting." When the PBS building manager at the Reagan Building stated that she already shared the point of contact information, the project manager responded that she needed a reminder because she was managing "three different roles." Later that day, the building manager provided the contact information to the project manager.

On March 15, 2023, the PBS project manager emailed a meeting invitation to the Long Beach Fire Department and Orange County Fire Authority, requesting a virtual call to be held on April 6, 2023. On April 4, 2023, the project manager emailed the ESCO, notifying it that she had cancelled the meeting because "unfortunately there was no response from either Fire Department." Following the cancellation, no further attempt was made by the project manager or the PBS field office to coordinate a meeting with the fire departments, and the pre-fire planning activities did not take place.

As described in the following section, the Long Beach Fire Department responded to a fire in the Anderson Building's battery room on April 24, 2023. The responding deputy told us that he was unaware of the battery system in the building until the fire occurred.

PBS Region 9 senior management failed to oversee the battery system project or address known health and safety deficiencies. As mentioned throughout this report, project team members raised significant health and safety concerns related to the battery systems as early as December 2018. However, we found that PBS Region 9 senior management did not take steps to assess the health and safety conditions until more than 4 years later.

In February 2023, PBS Region 9 senior management initiated an assessment of the battery rooms; however, as described below, senior management mishandled the assessment. Further, after a major fire occurred in the Anderson Building's battery room in April 2023, senior management did not take timely action to identify the cause of the fire and address the hazards posed by the battery systems.

On February 2, 2023, a PBS O&M contractor employee emailed the PBS building manager for the Reagan Building and the PBS Region 9 field office deputy property manager and expressed significant reservations about entering the Reagan Building's battery room, writing "that area is unsafe." On February 24, 2023, PBS Region 9 senior management directed the PBS Region 9 safety and occupational health manager to conduct inspections of the battery rooms in the Anderson and Reagan Buildings.

In preparation for these inspections, PBS personnel asked O&M contractor employees to provide their concerns about the battery systems. On March 7, 2023, the president of the O&M contractor for the Anderson Building emailed the PBS Region 9 Laguna Field Office senior property manager, stating that:

> An independent third-party safety inspector should evaluate the room or perhaps OSHA [the Occupational Safety and Health Administration] or both. Engineers mentioned that the safety elements of the [February 23, 2023] meeting were light. You mentioned a safety inspector has reviewed the space (or will review the space). An approval from the safety inspector of the safety of the space and associated safety/alarm systems and PPE [personal protective equipment] would be very helpful.

On April 17, 2023, the PBS Region 9 safety and occupational health manager completed his inspections, identifying similar health and safety concerns and code violations as those previously reported to PBS Region 9 personnel. For example, he noted that shower systems should be installed to meet code requirements. However, this concern was previously reported to PBS by O&M contractor employees in December 2018, March 2019, March 2022, February 2023, and March 2023.

Nonetheless, a PBS Region 9 senior property manager asked the safety and occupational health manager if there was "any way we can get something in writing that you toured the space and see no concerns from an OSH [occupational safety and health] perspective (assuming that is the case)?" On April 18, 2023, the safety and occupational health manager responded:

> The O&M contractor has identified concerns they have with allowing their workers to do work in the battery rooms … it is up to the contractor if they are going to allow their workers in the space to conduct work.

The Anderson Building battery system fire occurred 6 days later, on April 24, 2023, resulting in the disconnection and discontinued use of both systems. As shown in *Figure 10* on the next page, the fire caused significant damage to the battery room and the batteries themselves.

Figure 10. Post-Fire Photos of the Anderson Building Battery System[23]

That same day, a PBS Region 9 fire protection engineer recommended that:

> Both of the energy storage systems be disconnected and de-energized until such time as a full investigation into the ongoing issues has been completed and safeguards put in place to insure [*sic*] safe operation.

Subsequently, the ESCO initiated an investigation to determine the origin and cause of the fire. However, the results of the ESCO's investigation were slow to materialize. In June 2023, the PBS ESPC contracting officer sent a *Concern Letter Regarding Lack of Progress* to the ESCO, stating that "we are over the one-month mark of when the BESS [battery energy storage system] incident took place, GSA requests a written status update with factual details." The ESCO responded that its investigation was still ongoing.

We initiated our audit on September 28, 2023. On October 3, 2023, 5 months after the fire and with the results of the ESCO's investigation still unavailable, the PBS ESPC project manager emailed the PBS Region 9 supervisory fire protection engineer to coordinate an inspection of

[23] Photographs attached to the PBS ESPC project manager's email, April 25, 2023. The battery supplier's name has been removed from the battery cells in the photographs.

the battery system at the Anderson Building. Records show that this inspection was performed on the advice of counsel and due to concern over our audit, rather than out of concern for the health and safety conditions of the buildings in the wake of the April 2023 fire.

For example, the PBS ESPC project manager's October 3, 2023, email stated that an inspection of the Anderson Building's battery system was needed because GSA counsel "strongly advises us to complete a GSA [Fire Protection Engineer] Inspection/Site Visit to document findings and confirm a GSA fire protection engineer has viewed the current conditions." In preparation for his inspection, the PBS Region 9 supervisory fire protection engineer stated the following in an email to the PBS Region 9 Laguna Field Office senior property manager and PBS building manager for the Anderson Building:

> As you may have heard the IG [Inspector General] has started a formal investigation into the fire incident at Glenn Anderson. Because of this, I have been asked to perform an investigation also, and take a look at things as they are.

On October 11, 2023, we held the audit entrance conference. During the meeting, we asked if PBS intended to conduct a similar inspection at the Reagan Building. The PBS ESPC project manager responded "no," at which point the PBS Regional Commissioner stated, "have them go to both sites." On October 16, 2023, the PBS Region 9 supervisory fire protection engineer informed the PBS building manager at the Reagan Building that the PBS Regional Commissioner asked him to inspect the Reagan Building's battery room, adding that the inspection was "related to the current IG [Inspector General] audit of the battery rooms."

The PBS Region 9 supervisory fire protection engineer completed inspections of both battery systems in October 2023. In his report, the engineer concluded that:

> It is believed that the fire happened due to inadequate amount of electrolyte covering the battery's internal plates, exposing the iron and nickel plates and allowing the plates to arc electricity. As an electric arc is incredibly hot, it melted the plastic of the battery's case, and caused the subsequent fire.

The PBS Region 9 supervisory fire protection engineer further concluded that "a hydrogen leak and subsequent rapid fire is deemed unlikely."

In December 2023, the PBS ESPC contracting officer sent a *Second Concern Letter Regarding Lack of Progress* to the ESCO, stating the following:

> It has been eight months since the BESS [battery energy storage system] fire took place and GSA is still waiting for the factual details on how it occurred. GSA is still waiting for the analysis report that explains the root cause of the BESS [battery energy storage system] failing.

The ESCO again responded that its investigation was ongoing.

On May 9, 2024—over 1 year after the fire—an attorney for the ESCO provided the following notification to PBS officials via email:

> Late Tuesday, [ESCO] received a draft report from the battery expert engaged to investigate the origin and cause of last year's fire at the Anderson building. Based on the expert's findings, [ESCO] believes that it is in the parties' best interest to proceed with removal of the remaining batteries at both the Anderson and Reagan buildings. While the full report is privileged and confidential, and [ESCO] must maintain that privilege due to its ongoing dispute and potential for litigation with [ESCO's battery supplier], we wanted to provide you with the expert's Executive Summary which is attached.

On May 22, 2024, the ESCO's attorney emailed the final report's executive summary. According to the one-page executive summary, "the fire in the Anderson Federal Building battery room was likely caused by electrical arcing activity that ignited hydrogen present external to the batteries at the location of arcing." This summary conclusion contradicted the PBS Region 9 supervisory fire protection engineer's conclusion that the fire did not involve hydrogen ignition.

Notwithstanding the limited information provided in the executive summary and the fact that it contradicted the conclusions of the PBS Region 9 supervisory fire protection engineer, PBS has refused to obtain the ESCO's full investigation report. As a result, PBS Region 9 does not have complete information on the cause of the fire. On June 20, 2024, a GSA Region 9 attorney told us that they did not plan to request the full report because the matter was between [ESCO] and [ESCO's battery supplier], and GSA did not want to get drawn into litigation.

Post-Fire Status of the Battery Systems

In accordance with the contract, ownership of the battery systems remains with the ESCO because PBS did not accept either system. Although the battery systems were disconnected after the battery system fire at the Anderson Building in April 2023, the systems and associated health and safety hazards remained in both buildings for approximately 2 years. According to PBS Region 9 management, the ESCO did not remove the batteries until April 2025. Documents provided by PBS Region 9 indicate that other battery system components remain on-site.

Further, as stated above, PBS lacks complete information on the cause of the April 2023 fire at the Anderson Building. This raises the risk of additional fire and life safety events. PBS should take comprehensive steps to address these risks by, among other things, taking measures to promote a more effective safety culture in PBS Region 9.

Subsequent PBS Policy Changes

In May 2024, PBS revised its P100, *Facilities Standards for the Public Buildings Service* (P100), to address some of the more significant problems raised in the battery system installations at the Anderson and Reagan Buildings. Specifically, the revised standards provided that fixed energy storage systems, including battery systems, must be located either in a structure dedicated to the system, or outside of the building. The revised standards also provided that battery systems must only use maintenance-free batteries.

However, on February 24, 2025, PBS issued a memorandum rescinding the P100 and replaced it with *PBS Interim Core Building Standards*.[24] Although the interim core standards incorporate National Fire Protection Association 855, *Standard for the Installation of Stationary Energy Storage Systems*, the standard does not require maintenance-free batteries or that battery systems are located outside or in a dedicated structure.

[24] *Rescission of PBS P100 Facilities Standards, and Issuance of PBS Interim Core Building Standards*. The memorandum applies to GSA-owned or lease-construction facilities that have less than 50 percent of construction activity completed as of January 21, 2025, as measured in dollar value.

Conclusion

PBS Region 9 grossly mismanaged the battery systems at the Anderson and Reagan Buildings, resulting in health and safety issues. We found that PBS Region 9 failed to ensure that the battery systems were properly maintained by the ESCO, resulting in a battery explosion, hazardous materials leaks, an injury, and a fire. Although the battery systems were disconnected after the battery system fire at the Anderson Building in April 2023, the battery systems and associated health and safety hazards remained in both buildings for years.

According to documents provided by PBS Region 9 management, the ESCO removed the batteries from the Anderson and Reagan Buildings in April 2025.

PBS should institute policies and procedures to ensure that battery systems are designed, installed, operated, and maintained in accordance with federal regulations, PBS policy, and building code requirements. Additionally, PBS should ensure that its personnel and contractors with battery-system-related responsibilities are appropriately trained and qualified.

Recommendations

We recommend that the PBS Commissioner institute policies and procedures to ensure:

1. Battery systems are designed, installed, operated, and maintained in accordance with federal regulations, PBS policy, and building code requirements.

2. Training requirements are designed and implemented for PBS and PBS contractor personnel working with battery systems and associated technologies.

3. Appropriate action is taken to address PBS personnel performance deficiencies identified in this report, including supervisory chains of command and individuals responsible for managing the battery systems.

We also recommend that the PBS Regional Commissioner of the Pacific Rim Region take immediate action to:

4. Safeguard the occupants and assets in the Anderson and Reagan Buildings by:
    a. Verifying that the ESCO removed the batteries and any other hazards from both the Anderson and Reagan Buildings using only qualified personnel.
    b. Obtaining the complete third-party investigation report into the cause of the battery system fire at the Anderson Building. Upon receipt, ensuring any remaining health and safety hazards listed in the report are addressed or mitigated.

5. Improve management oversight of the region's facilities to ensure that:
    a. Code violations and maintenance deficiencies brought to management's attention are immediately addressed.
    b. Local fire department personnel are involved in pre-fire planning activities for future battery system projects.
    c. Local fire department personnel are involved in post-fire assessments.
    d. Final certificates of occupancy are not issued until all outstanding fire and life safety deficiencies are corrected.

GSA Comments

The PBS Commissioner agreed with the report's recommendations. PBS's response can be found in its entirety in ***Appendix E***.

Appendix A – Objective, Scope, and Methodology

Objective

We performed this audit after confirming the merits of a hotline complaint. Among other things, the complaint expressed health and safety concerns related to battery systems installed at the Anderson and Reagan Buildings. Our objective was to determine whether PBS Region 9 manages the battery systems at the Anderson and Reagan Buildings in accordance with applicable regulations to ensure the health and safety of building occupants.

Scope and Methodology

Our audit scope consisted of the battery systems installed at the Anderson and Reagan Buildings. We conducted two site visits at each building to tour the rooms housing the battery systems and interview personnel with responsibilities associated with the battery systems. The purpose of our visits was to gain a better understanding of the battery system technology and document the current state of the battery systems in both buildings.

To accomplish our objective, we:

- Reviewed relevant regulations and PBS policy governing the management of federal real property;
- Reviewed relevant PBS policies, building codes, and fire codes governing the management of battery systems;
- Interviewed PBS and PBS contractor personnel to understand their roles and responsibilities related to the Anderson and Reagan Buildings, the Los Angeles-area ESPC, and the two battery systems;
- Interviewed a battery expert from the U.S. Department of Energy to gain a better understanding of nickel-iron battery technology and associated risks;
- Interviewed Long Beach Fire Department personnel to gain insight into the April 24, 2023, battery system fire at the Anderson Building; health and safety hazards associated with nickel-iron battery systems; requirements for managing nickel-iron battery systems; and appropriate actions to address reported hazards and system deficiencies;
- Conducted two site visits at both the Anderson and Reagan Buildings to gain insight into the battery systems' components, layouts, and conditions; and
- Reviewed preaward and postaward documentation for the Los Angeles-area ESPC, including proposal, award, modification, correspondence, and project design documentation.

Internal Controls

We assessed internal controls significant within the context of our audit objective against GAO-14-704G, *Standards for Internal Control in the Federal Government*. The methodology above describes the scope of our assessment, and the report finding includes any internal control deficiencies we identified. Our assessment is not intended to provide assurance on GSA's internal control structure as a whole. GSA management is responsible for establishing and maintaining internal controls.

Compliance Statement

We conducted the audit between September 2023 and July 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our finding and conclusion based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our finding and conclusion based on our audit objective.

Appendix B – Battery Technology Definitions

Battery Technology	Definition[25]
Flooded Lead-Acid	A lead-acid battery consisting of cells that have electrodes immersed in liquid electrolyte. Flooded lead-acid batteries have a provision for the user to add water to the cell and are equipped with a flame-arresting vent, which permits the escape of hydrogen and oxygen gas from the cell in a diffused manner such that a spark or other ignition source outside the cell will not ignite the gases inside the cell. In a flooded battery, these gases are allowed to escape to the atmosphere. Because the gases created during battery charging are vented to the atmosphere, distilled water must be added periodically to bring the electrolyte level back to that required by the battery specifications. One of the most common types of flooded lead-acid batteries is the automobile battery.
Valve-Regulated Lead-Acid	A lead-acid battery consisting of sealed cells furnished with a valve that opens to vent the battery whenever the internal pressure of the battery exceeds the ambient pressure by a set amount. Valve-regulated lead-acid batteries differ substantially from flooded lead-acid batteries in design, operation, and potential hazard. They are also uniquely different from traditional liquid electrolyte lead-acid batteries in that they have no liquid electrolyte to flow from the container if it were to break. Also, they do not vent gases to the atmosphere; rather, they implement an oxygen recombination cycle that minimizes the emissions of gas from the batteries during overcharging. These batteries are sometimes mistakenly called “maintenance free”; however, they should be maintained in accordance with the manufacturer’s instructions.
Nickel-Cadmium (Ni-Cd)	An alkaline storage battery in which the positive active material is nickel oxide, the negative contains cadmium, and the electrolyte is potassium hydroxide. Ni-Cd batteries are durable and may be recharged many times. One of the hazards of storage batteries is overcharging. In the case of Ni-Cd batteries, overcharging can produce either hydrogen gas or oxygen that could result in a rupture of the cell casing. Ni-Cd cells are, therefore, provided with safety venting caps to allow the generated gas to escape from inside the cell.
Lithium-Ion (Li-ion)	Li-ion batteries are typically lighter than other comparably sized types of rechargeable batteries, which makes them a popular choice for portable devices and automotive applications. They hold their charge well, are generally durable, may be recharged many times, have the advantage of not requiring spill control safeguards, and pose a reduced gas hazard. Li-ion batteries, when exposed to prolonged hot conditions with inadequate ventilation, can rupture, ignite, or explode. Li-ion batteries were the subject of a massive battery recall initiative by several computer and cell phone manufacturers due to the Li-ion batteries used in their products overheating from internal contamination defects and causing fires or burn injuries.

[25] *2018 International Fire Code (IFC) and Commentary – Volume 1.*

Appendix C – Nickel-Iron Battery Hazards and Precautionary Measures

Health and Safety Hazards	Precautionary Measures[26]
Electrical Shock Batteries contain dangerous voltages and currents.	• Avoid combined contact between positive and negative terminals with metal objects. • Wear rubber-soled shoes, electrical gloves, and eye protection when connecting and disconnecting battery terminals. • Remove all jewelry (e.g., bracelets, rings, and watches).
Hazardous Materials Batteries contain a caustic and corrosive electrolyte consisting of potassium hydroxide and lithium hydroxide. Contact with the electrolyte causes eye and skin burns. If ingested, the electrolyte causes digestive and respiratory tract burns. The electrolyte may affect the central nervous system and may cause kidney damage.	• Facilities storing or utilizing this material should be equipped with an eyewash and a safety shower. • Wear safety glasses and chemical goggles or face shield if handling liquids. If electrolyte contacts the eyes, get medical aid immediately. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. • Wear appropriate gloves and protective clothing to prevent skin exposure. If electrolyte contacts the skin, get medical aid immediately. Neutralize with vinegar immediately and then wash thoroughly with water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner that limits exposure. • If electrolyte is ingested, do not induce vomiting. If victim is conscious and alert, give 2–4 cups of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. • If electrolyte is inhaled, get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. If breathing has ceased, apply artificial respiration using oxygen and a suitable mechanical device such as a bag or a mask.
Hydrogen Gas Batteries produce hydrogen gas with the potential for explosion if ignited.	• Keep all open flames and sparks away from batteries. • Provide adequate ventilation to remove gas, and safeguard exposure to an ignition source. • Use adequate general and local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Spills and Leaks Breaching of the battery cell jar may release hazardous materials.	• Neutralize any spilled battery emission with plenty of water. If necessary, use sand to soak up the spill before diluting with water. • Wear protective clothing that is impervious to caustic materials, and absorb or pack spill residues in inert material.

[26] Battery supplier's *Installation and Operation Manual.*

Appendix D – PBS Region 9 Fire Protection Engineer and ESCO Subcontractor Assessment Findings

Reported IFC Standard Noncompliance	Fire Protection Engineer Assessment	ESCO Subcontractor Assessment
	Date Reported	
***1206.2.3, Hazard mitigation analysis.** A failure modes and effects analysis or another approved hazard mitigation analysis shall be provided.		10/19/2020
***1206.2.3.1, Fault condition.** The hazard mitigation analysis shall evaluate the consequences of the following failure modes, and others deemed necessary by the *fire code official*.		10/19/2020
***1206.2.3.2, Analysis approval.** The *fire code official* is authorized to approve the hazardous mitigation analysis provided that the hazard mitigation analysis demonstrates the five safeguards provided in the IFC.		10/19/2020
***1206.2.3.3, Additional protection measures.** Construction, equipment and systems that are required for the stationary storage battery system to comply with the hazardous mitigation analysis.		10/19/2020
***1206.2.8.3, Stationary battery arrays.** Stationary storage battery systems shall be segregated into stationary arrays not exceeding 50 kWh each. Each stationary battery array shall be spaced not less than 3 feet from other stationary battery arrays and from walls in the storage room or area.	8/3/2020, 2/17/2021	10/19/2020
1206.2.8.6, Signage. Approved signs shall be provided on doors or in locations near entrances to stationary storage battery system rooms.	8/3/2020, 2/17/2021	10/19/2020
***1206.2.9, Maximum allowable quantities.** *Fire areas* within buildings containing stationary storage battery systems exceeding the maximum allowable quantities in Table 1206.2.9 shall comply with all applicable Group H occupancy requirements in this code and the *International Building Code*.		10/19/2020

*The ESPC subcontractor recommended that the ESPC contractor pursue an exception to treat the batteries as nickel-cadmium rather than nickel-iron. Nickel-cadmium batteries are not subject to this IFC standard

1206.2.10.1, Listings. Storage batteries and battery storage systems shall be listed in accordance with UL 1973.[27]	8/3/2020, 2/17/2021	10/19/2020
1206.2.10.3, Energy Management System. An approved energy management system shall be provided for battery technologies other than lead-acid and nickel-cadmium for monitoring and balancing cell voltages, currents and temperatures within the manufacturer's specifications.	8/3/2020, 2/17/2021	
1206.2.11.3.2, Supervision. Required mechanical ventilation systems for rooms and cabinets containing storage batteries shall be supervised by an *approved* central station, proprietary or remote station service or shall initiate an audible and visual signal at an *approved* constantly attended on-site location.	8/3/2020, 2/17/2021	
1206.2.11.5, Spill control and neutralization. Approved methods and materials shall be provided for the control and neutralization of spills of electrolyte.	2/17/2021	10/19/2020

[27] UL Standard 1973, *ANSI/CAN/UL Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications*, 2018. UL is a not-for-profit organization whose goods are to establish, maintain, and operate laboratories for the investigation of materials, devices, products, equipment, constructions, methods, and systems with respect to hazards affecting life and property.

Appendix E – GSA Comments

Docusign Envelope ID: 181524F1-A4BA-441A-A94E-AFEB15033366

GSA

Public Buildings Service

July 14, 2025

MEMORANDUM FOR: NICHOLAS PAINTER
REGIONAL INSPECTOR GENERAL FOR AUDITING
SOUTHEAST SUNBELT REGION AUDIT OFFICE (JA-4)

FROM: MICHAEL P. PETERS
COMMISSIONER (P)
PUBLIC BUILDINGS SERVICE

SUBJECT: Response to the GSA Office of Inspector General's Draft Report, *PBS's Pacific Rim Region Grossly Mismanaged the Battery Energy Storage Systems at the Glenn M. Anderson Federal Building and the Ronald Reagan Federal Building and U.S. Courthouse, Resulting in Health and Safety Issues* (A230079-1 (June 18, 2025))

Thank you for the opportunity to comment on the Office of Inspector General's (OIG) draft report, *PBS's Pacific Rim Region Grossly Mismanaged the Battery Energy Storage Systems at the Glenn M. Anderson Federal Building and the Ronald Reagan Federal Building and U.S. Courthouse, Resulting in Health and Safety Issues*. The Public Buildings Service (PBS) is committed to providing space free of health and safety issues so that federally owned facilities under the jurisdiction, custody and control of the U.S. General Services Administration (GSA) are maintained in good condition for customer agencies, employees, service providers and visitors at the best value for taxpayers.

Responses to the specific recommendations included in the draft report are set forth below.

OIG Recommends, the PBS Commissioner institute policies to ensure:

1. **Battery systems are designed, installed, operated, and maintained in accordance with federal regulations, PBS policy, and building code requirements.**

   PBS agrees with this recommendation and will work to ensure compliance with OSHA 1926.441 Batteries and Battery Charging and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.

U.S. General Services Administration
1800 F Street NW
Washington, DC 20405
www.gsa.gov

2. **Training requirements are designed and implemented for PBS and PBS contractor personnel working with battery systems and associated technologies.**

   PBS agrees with this recommendation and will develop and implement training for PBS personnel working with battery systems and associated technologies as well as include similar training requirements for PBS contractor personnel.

3. **Appropriate action is taken to address PBS personnel performance deficiencies identified in this report, including supervisory chains of command and individuals responsible for managing the battery systems.**

   PBS agrees with this recommendation and will take appropriate action regarding PBS personnel performance deficiencies identified in this report for managing the battery systems. Many of the deficiencies identified in the report are associated with personnel who were subject to a Reduction in Force or opted into the Deferred Resignation Program.

OIG Recommends the PBS Regional Commissioner of the Pacific Rim Region take immediate action to:

4. **Safeguard the occupants and assets in the Anderson and Reagan Buildings by:**
   a. **Verifying that the ESCO removed the batteries and any other hazards from both the Anderson and Reagan Buildings using only qualified personnel.**
   b. **Obtaining the complete third-party investigation report into the cause of the battery system fire at the Anderson Building. Upon receipt, ensuring any remaining health and safety hazards listed in the report are addressed or mitigated.**

   PBS agrees with this recommendation and has verified that the batteries were removed from the Anderson Building in Long Beach by the ESCO on April 8, 2025. The batteries were removed from the Reagan Building in Santa Ana on April 22, 2025. PBS has received the complete third-party investigation report into the cause of the battery system fire and forwarded it to the OIG on July 10, 2025. PBS will ensure any remaining health and safety hazards listed in the report are addressed.

5. **Improve management oversight of the region's facilities to ensure that:**
   a. **Code violations and maintenance deficiencies brought to management's attention are immediately addressed.**
   b. **Local fire department personnel are involved in pre-fire planning activities for future battery system projects.**

c. **Local fire department personnel are involved in post-fire assessments.**
d. **Final certificates of occupancy are not issued until all outstanding fire and life safety deficiencies are corrected.**

PBS agrees with this recommendation and will issue guidance regarding management and oversight of the region's facilities, including:

1. Code violations and maintenance deficiencies
2. Pre-fire planning activities
3. Post-fire assessment activities, and
4. Criteria for issuing certificates of occupancy.

Please contact Pat Fee, Director, Facilities Operations Division, Office of Facilities Management, Public Buildings Service, at 202-501-0038, if you have any questions.

Appendix F – Report Distribution

Acting GSA Administrator (A)

GSA Deputy Administrator (AD)

Acting Commissioner (P)

Deputy Commissioner (P1)

Acting Chief of Staff (P2)

Deputy Commissioner of Enterprise Strategy (P2)

Acting Chief of Staff (PB)

Acting Deputy Chief of Staff (PB)

Acting Regional Commissioner (9P)

Chief Financial Officer (B)

Acting Deputy Chief Financial Officer (B)

Office of Audit Management and Accountability (BA)

Assistant Inspector General for Auditing (JA)

Deputy Assistant Inspector General for Acquisition Audits (JA)

Deputy Assistant Inspector General for Real Property Audits (JA)

Director (JAO)

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