Independent Assessment of Work Planning and Control at the Strategic Petroleum Reserve Bayou Choctaw Site

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U.S. DEPARTMENT of ENERGY | Office of Enterprise Assessments

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Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
API	American Petroleum Institute
APM	Accident Prevention Manual
BC	Bayou Choctaw
CFR	Code of Federal Regulations
CRAD	Criteria and Review Approach Document
DEAR	DOE Acquisition Regulation
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EBSP	Employee Behavioral Safety Process
FFPO	Fluor Federal Petroleum Operations, LLC
IH	Industrial Hygiene
ISM	Integrated Safety Management
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
JSHA	Job Safety Hazard Assessment
LE2	Life Extension 2
MAC	Multiple Arm Calibration
MIA	Management-in-action
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
OSHA	Occupational Safety and Health Administration
PHR	Preliminary Hazard Review
PM	Preventive Maintenance
PPE	Personal Protective Equipment
PSM	Process Safety Management
QA	Quality Assurance
QEW	Qualified Electrical Worker
RCI	Richard Construction, Inc.
S&H	Safety and Health
SMTR	Subcontract Management Technical Representative
SPR	Strategic Petroleum Reserve
SPR PMO	SPR Project Management Office
SSMC	Site Safety Monthly Council
STA	Safety Task Assessment
SWP	Safe Work Permit
UT	Ultrasonic Testing
VPP	Voluntary Protection Program
WP&C	Work Planning and Control

INDEPENDENT ASSESSMENT OF WORK PLANNING AND CONTROL AT THE STRATEGIC PETROLEUM RESERVE BAYOU CHOCTAW SITE

Executive Summary

The U.S. Department of Energy Office of Enterprise Assessments (EA) conducted an independent assessment of work planning and control (WP&C) at the Strategic Petroleum Reserve (SPR) Bayou Choctaw (BC) site from July to September 2025. This assessment evaluated Fluor Federal Petroleum Operations, LLC (FFPO) WP&C institutional safety and health (S&H) programs and their implementation within the framework of the five core functions of integrated safety management. The assessment also evaluated the flowdown of S&H requirements to subcontractors performing work at the BC site, and FFPO's process safety management (PSM) mechanical integrity program.

EA identified the following strengths, including one best practice:

- FFPO's practice of monitoring AccuWeather RealFeel® temperatures in the control room and using the public address system and radios to deliver sitewide announcements to notify workers of the appropriate heat stress controls enables timely implementation of controls for safe work execution. (Best Practice)
- Leadership and employee engagement are central to FFPO S&H programs, with employees actively participating through reviews, analyses, inspections, and peer observations. Leaders engage through participating in the management-in-action program, conducting site walks, holding S&H discussions, and documenting observations.
- FFPO has developed the Industrial Hygiene (IH) Academy, a comprehensive training program designed to equip FFPO SPR site safety specialists with the skills to perform as IH technicians. The IH Academy provides a consistent training approach, with each trainee's progress tracked to confirm successful completion.
- FFPO has a strong stop/pause work program. FFPO supervisors and subcontract management technical representatives were observed frequently reminding workers and subcontractors of their responsibility/authority to stop/pause work if they were unsure of a work step or encountered an unexpected hazard or off-normal condition. Further, employees feel they can report unsafe conditions without fear of retaliation.
- FFPO effectively flowed down S&H requirements to subcontractors using the FFPO procurement process, which applies a graded approach based on task complexity and risk.

EA also identified some significant concerns, including two findings related to PSM, and weaknesses in WP&C, as summarized below:

- FFPO has not maintained the Bayou Choctaw Meter Prover-1 (BCMP-1) inspection results from the 2020 ultrasonic testing scans. The loss of inspection records precludes FFPO's ability to ensure that important equipment will perform its intended function. (Finding)
- FFPO has not established an inspection frequency or performed additional inspections of the BCMP-1 meter prover since 2020 to monitor the rate and extent of corrosion, which could result in an inability to ensure the integrity of the meter prover and associated process equipment, increasing the risk of catastrophic system failure over time. (Finding)
- FFPO did not notify affected employees of personal air monitoring exposure results within the required timeframes established by the Occupational Safety and Health Administration. Although in the reviewed instances, exposure results were non-detectable, failing to adhere to regulatory

notification timeframes could preclude an employee from seeking additional medical consultation and receiving timely care.

- Deficiencies were identified in the planning and execution of work involving electrical hazards and the availability and maintenance of eyewash stations, posing a risk of serious injuries.
- Unsafe work practices with the potential to lead to serious injuries were observed during several work evolutions.

In summary, FFPO has developed and implemented a generally effective WP&C framework for the SPR BC site. The institutional S&H programs include several positive attributes, such as leadership and employee engagement, development of a comprehensive IH training academy, and a strong stop/pause work program. Additionally, FFPO effectively flows down safety requirements to subcontractors. However, significant weaknesses were identified in the PSM mechanical integrity program regarding corrosion control and maintenance of inspection and testing records that require immediate management attention. Additionally, deficiencies were noted in the planning and execution of work involving heat stress and electrical hazards and the availability and maintenance of eyewash stations. Until the concerns identified in this report are addressed, some workplace hazards may not be properly identified or controlled, resulting in reduced protection of worker S&H at the BC site.

INDEPENDENT ASSESSMENT OF WORK PLANNING AND CONTROL AT THE STRATEGIC PETROLEUM RESERVE BAYOU CHOCTAW SITE

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of work planning and control (WP&C) at the Strategic Petroleum Reserve (SPR) Bayou Choctaw (BC) site. The BC site is managed and operated by Fluor Federal Petroleum Operations, LLC (FFPO). This assessment was requested by the SPR Project Management Office (SPR PMO) Assistant Project Manager for Technical Assurance and was conducted from July to September 2025.

In accordance with the *Plan for the Independent Assessment of Work Planning and Control at the Strategic Petroleum Reserve Bayou Choctaw Site, July 2025*, this assessment evaluated the effectiveness of FFPO's established WP&C processes and implementation of the five core functions of integrated safety management (ISM) at the BC site. DOE's ISM policy defines the following core functions to ensure systematic and effective WP&C: define the scope of work, identify and analyze hazards, develop and implement hazard controls, perform work within controls, and provide feedback and improvement. The assessment also evaluated the flowdown of safety and health (S&H) requirements to subcontractors performing work at the BC site and FFPO's process safety management (PSM) mechanical integrity program.

The BC site is one of four SPR locations used to store crude oil. Each site consists of underground salt dome storage caverns and surface equipment used for transferring, storing, and recovering crude oil, including onsite piping, valve manifolds and accessories, crude oil injection/transfer pumps, meter stations, equipment used to recover oil from surges and local operations, and associated instrumentation. Typical work activities include, but are not limited to, the maintenance of piping systems, pumps and motors, valves, storage tanks and caverns, and storage cavern wellheads.

SPR was established in the 1970s, and after decades of operation, much of its infrastructure and equipment was at or past the 25-year design life. The Life Extension 2 (LE2) project was initiated after a 2016 strategic review highlighted the need for improvements. Three of the four SPR sites, including the BC site, were part of the LE2 project, a multi-year effort to modernize and upgrade SPR's aging infrastructure, including replacing a large percentage of process equipment, such as pumps, motors, and piping. These improvements are essentially complete except for final outstanding tasks/work to correct issues identified by DOE.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which EA implements through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms "best practices, deficiencies, findings, and opportunities for improvement (OFIs)" as defined in the order.

As identified in the assessment plan, this assessment considered objectives and criteria from DOE Guide 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities*, appendix D, *Activity Level Work Planning and Control Criterion Review and Approach Documents with Lines of Inquiry*. In addition, EA used selected objectives and criteria from the following EA CRADs:

- EA-32-03, Rev. 1, *Industrial Hygiene Program*
- EA-32-11, Rev. 0, *Control of Hazardous Energy (Lockout/Tagout)*
- EA-32-12, Rev. 0, *Material Handling Safety*
- EA-32-13, Rev. 1, *Electrical Safety*
- EA-32-16, Rev. 0, *Process Safety Management*.

EA examined key documents, such as policies, procedures, system descriptions, work instructions, safe work permits (SWPs), manuals, checklists, industrial hygiene (IH) exposure assessments, self-assessments, analyses of process equipment inspection and testing, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs. Over 30 jobs, tasks, and activities were observed, including subcontractor performance of fugitive emissions monitoring, LE2 repair work, wireline work (sonar scans and multiple arm calibration [MAC] surveys), and line break (controlled opening of a pipe carrying crude oil under pressure), as well as FFPO routine and ground maintenance. Finally, EA walked down significant portions of selected process equipment (e.g., valves, pumps, piping, heat exchangers), focusing on work activities and the mechanical integrity elements of PSM. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

There were no previous EA findings to follow up on during this assessment.

3.0 RESULTS

3.1 Work Planning and Control Institutional Programs

This portion of the assessment evaluated FFPO's WP&C institutional programs and processes that flow down worker S&H program requirements into work control procedures and enable the safe performance of work.

FFPO's SPR WP&C requirement documents appropriately implement the ISM guiding principles and core functions in accordance with DOE Policy 450.4A, *Integrated Safety Management Policy*; DOE Acquisition Regulation (DEAR) 970.5204-2, *Laws, regulations and DOE directives*; DEAR 970.5223-1, *Integration of environment, safety and health into work planning and execution*; and management and operating contract DE-FE0011020, attachment F, *List of Applicable DOE/SPRPMO Directives*, including the *Work Authorization Directive, Technical Support and Management (TSM)-Safety and Health, Revision 2*. ISM is adequately addressed in AAA7001.1, *Safety and Health Policy*, and AAA9020.1230, *Integrated Safety Management System (ISMS) Description*.

Document AAA9020.1230 effectively describes in detail how FFPO integrates ISM into work performed and includes a crosswalk that demonstrates how FFPO SPR documents, policies, procedures, and approved standard sets are used to comply with DOE ISM contract requirements. The document includes additional programs and requirements implemented at SPR, notably the DOE and Occupational Safety and Health Administration (OSHA) voluntary protection programs (VPPs) and 29 CFR 1910.119, *Process safety management of highly hazardous chemicals*, constituting a comprehensive S&H management system.

Document ASI5480.22, *Accident Prevention Manual* [APM], applies to all DOE and subcontractor personnel working onsite at any of the SPR locations. The APM is the authoritative document providing both S&H technical requirements as well as clear roles, responsibilities, and accountability for ISM integration throughout SPR activities using the line control safety program (APM, section 5). In the APM, processes are described in appropriate detail using a three-prong approach to WP&C to identify,

evaluate, and control hazards for each job task through (1) a pre-approved job hazard analysis (JHA) (APM, section 27) for pre-defined life critical work (potential for serious injury or fatality), (2) a safety task assessment (STA) (APM, section 27.4) for hazards and controls not identified in a JHA, and (3) an SWP (if needed) (APM, section 35) for activities that could impact operations and/or security systems. The stop work program (APM, section 2) has well-defined roles and responsibilities and detailed reporting steps. FFPO supervisors and subcontract management technical representatives (SMTRs) were observed frequently reminding workers and subcontractors of their responsibility to stop/pause work if they were unsure of a work step or encountered an unexpected hazard or off-normal condition (see section 3.3 for examples). Further, employees feel they can report unsafe conditions without fear of retaliation.

Employee and leadership engagement in S&H programs is emphasized throughout FFPO's SPR WP&C documents, including in a summary of attributes described in AAA9020.1230, section 4.3, *Supplemental Safety Culture Element*. Employees are expected to participate in all areas of safety management. Examples include assisting in the development of operational readiness reviews, process hazard analyses, and STAs; serving as safety monitors by conducting and documenting monthly inspections of their work areas; and participating in the employee behavioral safety process (EBSP), a peer-to-peer observation program. Leadership engagement includes participating in the management-in-action (MIA) program site walks, holding S&H discussions with field employees, and documenting their observations, which are appropriately tracked and trended.

FFPO has implemented effective S&H communications and employee participation programs using a variety of forums and mechanisms. For example, during Site Safety Monthly Council (SSMC) meetings, which are attended by SPR PMO personnel and FFPO managers and employees, S&H leading and lagging metrics, safety monitor inspections, EBSP, and MIA observations are appropriately reviewed and discussed, with any concerns tracked to resolution. SSMC meeting minutes are emailed to BC staff and are posted at several locations. The biannual Tripartite Safety Council provides an alternate mechanism for employees to speak directly with SPR PMO and FFPO managers to address safety concerns that have not been corrected through normal channels.

Further, an observed SSMC meeting and an observed end-of-day operations meeting appropriately began with a safety moment, as required for all Operations and Maintenance organization meetings with five or more attendees. Additional S&H communications tools include weekly toolbox safety meetings; the publication and communication of site safety goals; and an SPR crosstalk information exchange program used to share operating experience, near-miss information, and other lessons learned throughout SPR.

Industrial Hygiene Program

The FFPO contract appropriately requires FFPO to implement an integrated IH program. The FFPO IH program is appropriately based on the principles of workplace evaluation, risk assessment, sampling, and analysis methodologies of the American Industrial Hygiene Association (AIHA) publication, *A Strategy for Assessing and Managing Occupational Exposures, 4th edition*, and complies with DOE-STD-6005-2001, *Industrial Hygiene Practices.* The implementing document (APM, section 26) effectively describes an IH risk coding matrix used to develop an annual exposure monitoring plan, roles and responsibilities, sampling result notifications to employees, IH reports, and instrument calibration.

Notably, FFPO has developed the IH Academy, a comprehensive training program designed to equip FFPO SPR site safety specialists with skills needed to perform the functions of IH technicians. This program supports IH technician competency by covering regulatory and site-specific programmatic requirements; IH equipment calibration, maintenance, and operation; and documentation requirements for exposure assessment monitoring. The IH Academy provides a consistent training approach, with each trainee's progress tracked to confirm successful completion.

While FFPO's IH program is generally effective, contrary to the APM, section 26.5.1, and 29 CFR 1910.1028(e)(7)(i), FFPO did not notify affected employees of personal air monitoring exposure results within the required timeframe established by OSHA (within 15 working days of receipt of results), specifically for samples that detected benzene. (See **Deficiency D-FFPO-BC-1**.) Not providing workers with their exposure monitoring results in a timely manner could preclude an individual from seeking additional medical consultation and receiving timely care. Specifically, a review of an FFPO-provided sample of written employee exposure notifications (where mostly volatile organic compounds were measured with a focus on benzene) showed that the average time between when the samples were taken and when the employee signed the notification form was four months. Further discussion with the FFPO IH Manager and review of additional forms revealed that the duration between sample date and employee notification (as defined by employee signature) has been an ongoing issue at the BC site since at least 2021. None of the reviewed exposure samples exceeded the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values.

Heat Stress Management Program

FFPO's heat stress management program (APM, section 17.1) provides adequate direction for the recognition, evaluation, and control of conditions that could lead to heat-related illnesses. The program is well defined, and controls are appropriately based on ACGIH thermal stress guidance. FFPO allows the use of either wet-bulb globe temperature (WBGT) measurements or AccuWeather RealFeel® temperatures to define thresholds and implement more stringent controls (Level I controls are implemented when the RealFeel temperature is 88°F to 106°F, and Level II when the RealFeel temperature is greater than 106°F) as needed; the more common practice across the BC site is to use AccuWeather RealFeel temperatures, as this information is easily accessible via website or phone application. FFPO appropriately uses the STA checklist to identify a heat stress hazard when anticipated or forecasted. However, despite an increased health risk (especially during the summer months) and OSHA's focus on heat-related illness prevention, FFPO does not consistently include heat stress hazard (which has potential for serious injury or fatality) in JHAs (APM, section 27.2.1). (See **OFI-FFPO-BC-1**.) Further, while program implementation responsibilities (APM, section 17.4) assign the person-in-charge/supervisor as being responsible for implementing the program requirements (i.e., taking/recording WBGT measurements, ensuring affected workers log core body temperatures, submitting temperature logs and essential work authorization forms), during several field observations, these requirements were not always implemented when sitewide heat advisory announcements were made (see section 3.3 for further discussion).

Work Planning and Control Institutional Programs Conclusions

FFPO's SPR WP&C requirement documents appropriately implement the ISM guiding principles and core functions. Additionally, including the OSHA VPP and PSM requirements has resulted in a comprehensive S&H management system. FFPO has implemented effective S&H communications and employee participation programs using a variety of forums and mechanisms. The IH program is appropriately based on AIHA principles, and the heat stress management program is well defined. However, a weakness associated with notifying affected employees of personal air monitoring exposure results in a timely manner was identified.

3.2 Work Planning and Control Implementation

This portion of the assessment evaluated FFPO and subcontractor implementation of WP&C institutional programs at the BC site through the ISM core functions of defining the scope of work, identifying and analyzing hazards, developing and implementing hazard controls, performing work within controls, and providing feedback and making improvements.

Defining the Scope of Work

Reviewed scopes of work were adequate. FFPO work orders for observed maintenance work included adequate scopes of work to provide workers with a description of the planned activity and to initiate preparation of SWPs. Subcontracted work scopes for observed work performed by ComplyRite, Richard Construction, Inc. (RCI), SOCON, and Empire Wireline were effectively defined in detailed subcontract scope of work documents and were sufficient to support the development of required preliminary hazard reviews (PHRs) and identification of applicable hazards. These activities included fugitive emissions monitoring, cavern sonar surveying, and wireline logging services.

An observed Controlled Evacuation Committee planning meeting adequately addressed the removal and replacement of a faulty slop oil pump. Attendance was strong, and committee members thoroughly reviewed the scope of work, task steps, potential hazards, and applicable controls. The work package, including the SWP, STA, JHA, and controlled evacuation checklist, was properly authorized and well documented.

Identifying and Analyzing Hazards

Reviewed FFPO and subcontractor WP&C documents and associated work observations demonstrated that hazards were, in general, effectively identified and analyzed in FFPO JHAs/STAs, subcontractor job safety hazard assessments (JSHAs), job safety analyses (JSAs), and security subcontractor risk assessments. For example:

- The JHA associated with work order 1470966, *CAV017 Reposition Pipe Clamp*, was thorough and effectively identified the hazards associated with the observed field work. Potential hazards included pinch points, overhead risks from rigging hardware, elevated noise levels from impact tools, and crane-related incidents during transit or from its rotating superstructure, all of which were addressed in the JHA.
- The SOC subcontracted protective force developed a risk assessment document (similar to a JHA) that appropriately discusses risk activities, potential safety risks, and risk control measures. SOC's *Protective Force Risk Assessment* document, last approved on August 21, 2025, includes an appropriate description of tasks, hazards, and controls (with some exceptions noted below) for the protective force work at the BC site.
- The JSA prepared by SOCON Sonar Well Services, Inc. for performing a sonar scan of an abandoned cavern was comprehensive and appropriately defined the steps necessary to perform the work, associated hazards, and necessary controls. A lower-tier crane subcontractor (Becnel Rental Tools, LLC) appropriately used a checklist to identify crane-related hazards. An SWP was appropriately completed by the BC FFPO cavern engineer/SMTR.

While hazards were, in general, effectively identified and analyzed, contrary to DEAR 970.5223-1 and the APM, section 27.2, the identification and analysis of hazards for six reviewed work scopes were inadequate. (See **Deficiency D-FFPO-BC-2**.) Not properly identifying, analyzing, and documenting all hazards associated with work could expose workers to unnecessary risk of injury or illness. Specifically:

- The JHA associated with work order 1464453, *BCP 108 to Adjust or Replace Packing*, did not identify the hazards associated with heat stress and the use of cutting fluid.
- Work order 1470960, *Repair of a Compressor Air Leak and Replace Air-end oil*, included workers' preparation of an STA that did not identify hazards associated with heat stress and the use of cutting fluid chemicals and transmission fluid. Furthermore, the listed Personal Protective Equipment (PPE)

was "general duty gloves" instead of the appropriate chemical-resistant (nitrile) gloves, which were worn by the worker.

- The JHA, *JHA-BC-Forklifts*, for a maintenance activity to remove a tilt meter at the Cavern #4 wellhead (SWP 466894) did not address hazards associated with potential hot work. The JHA and STA also did not identify hazards from falling objects (the tilt meter fell off its stand during initial setup), insect bites (wasps were encountered), and chemical use (pesticides used for wasp control).
- The JHA associated with preventive maintenance (PM) work on security-related infrared equipment (SWP 468511), *Preventive Maintenance Infrared Perimeter Intrusion Detection System*, did not specify the task steps for the instrument and electrical technician, the hazards related to the voltage test procedure, or a shock risk assessment, as required by the APM, section 15, and National Fire Protection Association (NFPA) 70E, *Standard for Electrical Safety in the Workplace*, articles 110.1(H) and 110.5(H).
- The observed FFPO PM associated with weekly raw water pump testing work order 1484626, *BCP 604 Fire Water Pump Testing*, had no SWP, JHA, or STA. Hazards included noise, chemicals, and the potential for fumes, vapor, and splash. When workers re-entered the area after the pumps operated, a diesel fume odor was present.
- During grass trimming operations outside the perimeter fence of Brine Disposal Well Pad #1, the potential for fire was not identified as a hazard on the SWP or STA. Workers were using gasoline-powered grass trimmers and periodically refueled with gasoline. Workers confirmed that no fire extinguisher was available. Additionally, the APM, section 54.0, does not reference having a fire extinguisher immediately available when handling flammable liquids. (See **OFI-FFPO-BC-2**.)

Developing and Implementing Hazard Controls

Many observed work evolutions included controls for identified hazards that were appropriately developed and implemented. During work observations, the FFPO BC control room conducted sitewide announcements using the public address system and radios notifying site personnel when AccuWeather RealFeel temperatures reached thresholds requiring implementation of Level I and Level II heat stress controls. The use of real-time monitoring and communications is considered a **Best Practice** because it ensures worker safety by enabling the timely implementation of required heat stress controls.

Observed work for work orders 1464453 and 1482235, *Install Grating Over Opening at Cavern 17 Road Crossing*, was appropriately authorized and conducted under SWPs and JHAs. Work control documents appropriately required workers to use proper PPE, including flame resistant work clothing, safety glasses, hard hats, and gloves, in accordance with controls stipulated in the JHA. Additionally, observed work on the pond sump pump included appropriate heat stress controls: the use of three shade umbrellas and a small job fan, measurements of core body temperature with maintained logs, and adherence to the APM, table 17-1, *Work/Rest Cycle*. During subcontractor RCI work to reposition actuators, wet bulb measurements were properly taken locally and determined to be less than 88°F, allowing continuous work without additional heat stress controls.

While many observed work evolutions included proper controls for identified hazards, the following weaknesses were identified:

- Contrary to NFPA 70E, article 130.5(H), and the APM, section 15.4.3, FFPO has not ensured that all work control documents and electrical enclosures/panels have the required equipment arc flash information and labeling. (See **Deficiency D-FFPO-BC-3**.) Not providing arc flash hazard information to qualified electrical workers (QEWs) prior to the conduct of work could result in worker exposure to uncontrolled arc flash hazards. Specifically, FFPO's PM activity documentation

conducted under SWP 468511 and SWP 468512, *PM Actuator*, including associated JHAs and STAs, did not adequately address arc flash control. Additionally, several electrical enclosures/panels at the entrance security gate lacked the required NFPA 70E equipment and arc flash labeling described in the APM, section 15.4.3. NFPA 70E, article 130.5(H) requires such labeling to specify, at a minimum, the available incident energy, working distance, required PPE, minimum arc rating of clothing, nominal system voltage, hazard/risk category, and arc flash boundary.

- Contrary to the APM, section 47.1.3; American National Standards Institute (ANSI) Z358.1, *American National Standard for Emergency Eyewash and Shower Equipment*; and 29 CFR 1910.151, *Medical services and first aid*, observed emergency eyewash and shower stations were not always readily available and properly maintained. (See **Deficiency D-FFPO-BC-4**.) The unavailability of properly maintained eyewash stations could result in unnecessary worker risk of injury. Specifically:
    - During observed work in the maintenance shop to repair a compressor air leak and replace air-end oil, chemicals (lubricants) were being used and the safety data sheets for these chemicals were readily available to workers. However, the eyewash station in the shop was visibly dirty and covered with cobwebs. Additionally, a fan was positioned in front of the eyewash station and plugged into a live electrical outlet directly below the eyewash station.
    - As part of the controls for the slop oil pump replacement, an eyewash station was required. Before beginning work, the eyewash/shower station was checked and found to be nearly empty, even though the inspection tag indicated a recent inspection date of August 27, 2025. While work was in progress, FFPO site safety personnel filled the tank with distilled water. After filling, the eyewash leaked throughout the day and into the following morning while work continued.
    - During weekly raw water pump testing (work order 1484626), the portable eyewash/personal shower station was available but lacked a method to maintain the water at a tepid temperature, as required by ANSI Z358.1 and the APM, section 47.1.3. This issue was also observed for the eyewash/shower station located on the east facing wall of Building 414, a storage building containing paint, herbicide, oil, and other chemicals. Both units are self-contained (polyethylene type, not hard plumbed) and are potentially exposed to freezing temperatures in winter and excessive heat in summer, further impacting their ability to maintain tepid water.
    - During observed grass cutting activities outside Brine Disposal Well Pad #1, workers used gas-powered trimmers that required periodic refueling with gasoline, without emergency eyewash capability as required by the APM, section 47.1.3, which states that eyewash equipment must be readily available at work areas when using hazardous chemicals that could injure workers' eyes. The BC S&H Manager stated that, in the event of an eye splash, bottled drinking water would be used until help arrived. The use of portable eyewash options for trucks in remote areas was discussed with FFPO site safety personnel. (See **OFI-FFPO-BC-3**.)
- SOC's *Protective Force Risk Assessment* document, Rev2, 8/21/2025 does not reflect all specialized training (e.g., environment, safety, and health orientation, SWP) and IH monitoring provided by FFPO for BC contractor protective force activities. (See **OFI-FFPO-BC-4**.)

Performing Work Within Controls

In most cases, observed work was performed in accordance with required controls from JHAs, STAs, subcontractor JSAs, and requisite APM sections. For example, observed work tasks for work order 1464453 included the drilling and tapping of packing bolts, which was generally conducted in accordance with JHA and STA requirements (with one exception discussed below), safely, and without incident. The observed subcontractor RCI's work to reposition actuators was appropriately authorized and conducted under SWP 4767745 and RCI's JSA 476745, *Rework Actuators 4HOOMOV600*. An effective pre-job

briefing was conducted by the RCI field work supervisor and included a discussion of the work scope, evacuation routes, emergency response procedures, and similar prior hazards and controls. Hazardous energy controls included a lockout/tagout identified by the FFPO control room, with the identified breaker opened by the operator.

PM and field activities were generally well controlled and performed in compliance with applicable requirements for several FFPO and subcontractor observed tasks/jobs. Reviewed JHAs and hazard controls were well tailored to task activities. For example:

- FFPO activities:
  - The removal of slop oil pump BCP-135 under SWP 468512 included a well-attended Controlled Evacuation Committee meeting to review the committee's checklist. The task was completed with proper lockout/tagout execution in accordance with the APM. Crane and rigging activities were conducted in accordance with the APM, sections 13, 31, and 32, with qualified operators, barricades, and spotter support in place.
  - Groundskeepers at Brine Disposal Well Pad #1 used the required PPE and followed Level I heat stress controls.
  - SOC security patrols were adjusted to mitigate heat stress hazards.
- Subcontractor activities:
  - Multiple operations, including MAC tasks at Caverns 15 and 19, demonstrated proper equipment setup, inspections, and access control.
  - At Cavern 102, ComplyRite fugitive emission sampling was performed using appropriate PPE and calibrated hydrogen sulfide detection equipment.
  - RCI welding activities under SWP 476751 were conducted with a fire watch, fire blankets, and PPE identified in the associated welding fume exposure control plan.

While many observed work evolutions were performed within applicable controls, the following weaknesses were identified:

- Contrary to the APM, sections 15.1.1, 15.3.3, and 15.5.2, and the JHA, FFPO QEWs did not follow hazardous energy control during two observed work evolutions. (See **Deficiency D-FFPO-BC-5**.) QEWs conducting tasks not in accordance with good electrical safety practices could result in worker exposure to uncontrolled electrical hazards. Specifically:
  - FFPO's *PM Actuators* was conducted in accordance with SWP 468512, a PM JHA, and an STA completed by workers. The work required a "simple" lockout/tagout for hazardous energy control. The APM, section 15, requires appropriate PPE and zero energy verification using a properly rated meter for voltage verification. While many SWP and JHA requirements were followed, an exception to required zero energy verification was observed. Contrary to the APM requirements, the routine practice for this PM is to observe the green indicator light on the actuator control box to confirm zero energy when extinguished without any additionally specified arc flash PPE (e.g., voltage rated gloves, face shield). Even though the JHA for PM Actuators requires appropriate meter use for zero voltage verification along with arc flash rated PPE, neither was used.
  - While performing voltage measurements inside a cabinet with a portable tester during the execution of a PM on security-related infrared equipment (SWP 468511), the instrument and electrical technician was observed crossing the limited approach boundary for shock hazards, wearing general-duty gloves instead of Class 00 insulating gloves, contrary to NFPA 70E, article 130.7(C)(7).

- Contrary to ANSI A92.22, *Safe Use of Mobile Elevating Work Platforms*; ASME B30.22, *Articulating Boom Cranes*; 29 CFR 1910, *Occupational Safety and Health Standards*; Empire Wireline's STA/JSHA; and the equipment manufacturer's requirements, during MAC tasks at Caverns 15 and 19, subcontractor Empire Wireline workers were observed engaging in multiple unsafe practices. (See **Deficiency D-FFPO-BC-6**.) Not following required safe work practices exposes workers to unnecessary risk that could result in injury. Observed unsafe practices included the following:
    - Climbing over the top rail to enter a manlift basket and tying off to the guardrail instead of the basket designated engineered anchor (contrary to ANSI A92.22)
    - Working near/under a suspended lubricator casing with the boom crane unattended and operating in neutral, with no fall zone (area where it is reasonably foreseeable that the load could fall) established, standing beneath the elevated boom, dragging the casing on the ground, and placing hands under a suspended load (contrary to ASME B30.22, the JSHA, and the equipment manufacturer's requirements)
    - Not using the proper tool to loosen nuts and bolts and relying on the leverage of a cheater bar that can cause the socket wrench or fastener components to break or shatter, creating a risk of flying debris (contrary to 29 CFR 1910.242(a), *General requirements*)
    - Not wearing ear protection near an operating impact wrench (contrary to 29 CFR 1910.95, *Occupational noise exposure*, and the STA).
- For work order 1464453, *BCP108 adjust/replace packing*, moderate work was conducted for greater than one hour without the FFPO maintenance workers or supervisors monitoring/managing the work/rest time, resulting in workers exceeding the required rest interval of 50/10 (10 minutes of rest for each 50 minutes of work conducted). (See **OFI-FFPO-BC-5**.)
- Heat stress controls were not implemented on three consecutive days for the ComplyRite subcontractor during fugitive emissions monitoring. FFPO safety personnel explained that such controls were not necessary because light work was being performed. However, the observed work was at least moderate work based on APM, table 17.4, *Estimating Work Activity Levels*, which defines moderate work as "Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light push and pulling, normal walking." The worker who performed the measurements engaged in continuous walking between survey points, stooped to reach tight areas, climbed a fixed vertical ladder to reach a survey location, and worked in a manlift with fall restraints for some survey locations. The manlift was operated by FFPO personnel, and the ComplyRite surveyor did the actual monitoring. The FFPO subcontract escort and FFPO safety personnel performing STA pre-job briefings for the ComplyRite worker did not recognize that the work being performed met the moderate work threshold. (See **OFI-FFPO-BC-5**.)
- During the removal of a faulty slop oil pump, a representative sample of core body temperatures for 10% of the FFPO maintenance crew was not recorded for the work performed the afternoon of September 10, 2025, despite the announcement for Level I controls at 09:00 AM that morning. The log showed no entries after 10:00 AM for workers on the slop oil pump job, only a record for a painter who was not involved in the work at 1:00 PM. The supervisor's interpretation was that 10% of all daily maintenance workers, regardless of crew or specific job, needed to be recorded. However, FFPO IH clarified that the representative sample applies to workers on the same job. Therefore, the crew working on the slop oil pump was required by the APM to record temperatures throughout the day. (See **OFI-FFPO-BC-6**.)

Feedback and Improvement

Observed activities demonstrated that effective feedback was provided to implement controls during work and during a safety stand-down where material handling (a common activity at the site) safety information was shared. For example, during RCI work at the high-pressure pump pad, a safety specialist informed a welder to wear hearing protection during metal grinding. Similarly, during the MAC task at Cavern 19, an Empire Wireline worker donned hearing protection as required by the JSHA when told by a safety specialist. Additionally, the FFPO LE2 project construction general superintendent instructed workers to use a tripod with a vice when operating the metal hand saw to cut angle iron instead of using a jack stand with another worker holding the angle iron.

Further, FFPO promptly held a safety stand-down meeting following an injury at another SPR site. The contractor proactively paused field activities and convened workers and management (including FFPO staff, subcontractors, and federal staff) at the BC conference room to discuss the incident. The discussion covered the injury (a hand/finger degloving incident while using a tag line), along with the potential for similar material handling situations and preventive measures to avoid these types of injuries. The meeting was well attended, and worker engagement was readily observed.

Work Planning and Control Implementation Conclusions

Implementation of WP&C institutional programs, including the ISM core functions, for FFPO and subcontractor work was generally adequate. FFPO is generally effective in managing site maintenance and operational work. FFPO's practice of monitoring AccuWeather RealFeel temperatures in the control room and conducting sitewide announcements to notify workers of the level of heat stress controls in effect is a best practice. However, weaknesses in WP&C documents associated with identifying and analyzing hazards, developing and implementing hazard controls, and performing work within controls were identified. Additionally, performance issues related to heat stress, electrical safety-related work practices, working under loads, noise exposure, fall protection, and working at heights were observed.

3.3 Flowdown of Safety and Health Requirements to Subcontractors

This portion of the assessment evaluated the effectiveness of FFPO's ISM program flowdown of applicable worker S&H requirements to ensure the safe performance of work carried out by subcontractors.

The FFPO contract appropriately includes DEAR 970.5223-1. The contract also requires FFPO to flow down S&H requirements to subcontractors. A review of three subcontracts and observations of associated subcontracted work demonstrated that the flowdown of S&H requirements to subcontractors was effectively accomplished through the FFPO procurement process. This process appropriately uses a graded approach based upon the complexity and risk associated with the tasks to be performed. Specifically, procurement subcontracts are separated into 4 different levels that range from Level I (least hazards, complexity, and risk) to Level IV (highest hazards, complexity, and risk).

The procurement process uses several appropriate mechanisms to support adequate flowdown, including the following:

- Purchase requisitions for onsite services (service and construction)
- Subcontract work documents that include detailed scope
- Safety procurement clauses and subcontract exhibits that specify applicable S&H requirements, including hyperlinks to required APM sections, and subcontractor submittals needed by FFPO procurement (e.g., training records, written safety plans)

- PHRs to identify expected hazards associated with the subcontract work and to determine the specific FFPO S&H requirements that will be applicable to the subcontract
- An FFPO S&H orientation video.

A Level I subcontract for ComplyRite included appropriate purchase requisition documents and exhibits to properly flow down DOE S&H requirements to the subcontractor. This included a detailed work scope; a PHR that identified anticipated hazards; exhibit 6-2, *Level 1-Safety and Health Requirements*; and exhibit 6.2, *Safety and Health Requirements*, which listed specific APM sections that applied to the subcontractor's work. The reviewed PHR form was generally adequate. The form appropriately identified the need to use manlifts, which flowed down the fall protection competent person training requirement submittal request and record of training.

The Level III subcontracts for SOCON Sonar Well Services and Empire Wireline, LLC included appropriate S&H exhibits. These included detailed work scope documents; PHRs to identify anticipated hazards; exhibit 6-2B, *Level 3-Safety and Health and Safety Requirements*, and exhibit 6.2, *Safety and Health Requirements* (with hyperlinks to the APM sections that apply to the subcontractors' work); competent/qualified person designation forms for fall protection; and the FFPO commercial onsite provisions applicable to the subcontractors. The PHRs for both subcontracts adequately identified anticipated life critical operations, other hazards, training, permits, and other relevant information. The subcontracts appropriately included additional safety provisions, such as exhibit 6-2B, *Level 3-Safety and Health and Safety Requirements*; exhibit 6.2-O, *Special Provisions For S&H Prequalification*; exhibit 6-2F, *Special Provisions For Motorized Heavy Equipment*; and exhibit 6-2H, *Special Provisions For Cranes And Rigging.*

Flowdown of Safety and Health Requirements to Subcontractors Conclusions

The FFPO contract appropriately includes DEAR 970.5223-1. The contract also requires FFPO to flow down S&H requirements to subcontractors. A review of three subcontracts and observations of associated subcontracted work demonstrated that the flowdown of S&H requirements to subcontractors was effectively accomplished through the FFPO procurement process.

3.4 Process Safety Management

This portion of the assessment evaluated FFPO's PSM[1] program and processes with a focus on written procedures and areas related to mechanical integrity, training for process maintenance activities, inspection and testing equipment deficiencies, and quality assurance (QA).

Written Procedures

FFPO has developed a generally adequate framework to support compliance with 29 CFR 1910.119. The PSM process documents for mechanical integrity appropriately include written maintenance procedures, training for process maintenance, process equipment inspection and testing, equipment deficiencies, and QA. Reviewed PSM documents (piping and instrumentation diagrams; ASL4330.91, *SPR Site Maintenance Plan* (Conduct of Maintenance); ASI4330.16, *SPR Plant Maintenance System Procedure*;

[1] PSM is an approach to prevent or minimize catastrophic releases of highly hazardous chemicals that could result in fire, explosion, or toxic hazards. OSHA regulates the processing of these chemicals through 29 CFR 1910.119. This standard provides a list of the types of chemicals for which the standard applies, including crude oil as it is "a flammable liquid with a flashpoint below 100 degrees Fahrenheit on-site in one location in a quantity of 10,000 pounds." SPR BC's processes are covered under this standard due to the presence and quantities of crude oil stored and processed there, and because the SPR sites are under OSHA enforcement jurisdiction for health and safety.

ASR 5000.55, *SPR Priority System Procedure*; ASI5700.15, *Management and Operations Contractor Quality Assurance Procedure*; and ASI4330.15, *Corrosion Control Instructions*) are effective in documenting the PSM program and mechanical integrity of process equipment.

Training for Process Maintenance Activities

FFPO training implementation has been effective in ensuring that maintenance personnel are adequately trained in conducting process maintenance activities. AAA9020.1324, *Process Safety Management Road Map*, details the training required for each employee involved in maintaining the ongoing integrity of process equipment. At the BC site, this training includes active force protection, *Basic Orientation Plus*, site safety orientation, BC crude oil and brine systems, SWP, and lockout/tagout. This training is augmented with on-the-job training applicable to the maintenance work performed. Final employee qualification is obtained by successfully demonstrating knowledge of the process, hazards, and applicable procedures. Five operators interviewed after completing a quarterly emergency shutdown system (ESD) exercise exhibited a comprehensive understanding of the equipment, hazards, and steps involved to successfully initiate and complete the ESD to include recovery of the system. Two reviewed employee training records validated the successful completion of the required PSM courses and were augmented with other safety-related courses including ISM, JHA, and spill prevention. Other interviewed maintenance and QA personnel demonstrated a similar level of understanding of the processes, hazards, and procedures appropriate to their tasks.

Inspection and Testing

FFPO performs generally effective inspections and testing on reviewed process equipment. Reviewed inspection documentation showed that inspections are conducted at the required frequency and consistent with recognized and generally accepted good engineering practices (RAGAGEP). The RAGAGEP used by FFPO at SPR include select American Petroleum Institute (API) consensus standards (e.g., API 510, *Pressure Vessel Inspection Code*, and API 570, *Piping Inspection Code*). Six reviewed vibration test records showed that the vibration testing frequency is appropriately established through the PM process and a weekly schedule. Three reviewed weld inspection reports associated with work orders for three pumps demonstrated that the vibration monitoring and welding inspections were adequate and in compliance with FFPO inspection and testing processes.

Further, six reviewed pressure safety valve certification test reports were fully completed with all required information, including data from previous tests, current results, and signatures of the technician, witness, and approver. In all cases the test results were within normal parameters with no issues identified. Four of the valves had been tested at an approximate 15-month interval. The interviewed Site Maintenance Manager explained that a potential lack of consistency in valve testing frequency existed, with some valves tested annually and others at 15 months, due to conflicting requirements between API and the U.S. Department of Transportation (the regulatory authority for offsite transmission of crude oil). (See **OFI-FFPO-BC-7**.)

While FFPO performs generally effective inspection and testing, the following weaknesses were identified:

- Contrary to 29 CFR 1910.119(j)(4)(iv), FFPO has not maintained the BCMP-1 meter prover inspection results from the 2020 ultrasonic testing (UT) scans. (See **Finding F-FFPO-BC-1**.) The loss of inspection records precludes FFPO's ability to ensure that important equipment will perform its intended function.

Inspection and testing documentation related to corrosion control for the BCMP-1 meter prover and associated equipment was requested but not received. Interviews confirmed that the meter prover is approximately 40 years old, and FFPO has been aware of potentially significant corrosion issues with the system since 2019. Severe external corrosion was identified in 2020. FFPO documents show that internal thickness measurements using UT scans at that time revealed "the piping to be at or near the engineering determined retirement thickness." An FFPO description of work to replace the meter prover and associated equipment dated January 2024 states "If the meter prover is not replaced it may be derated, forcing it to be bypassed which would not allow us to meet API measurement standards for oil custody transfers."

- Contrary to 29 CFR 1910.119(j)(4)(ii) and (iii), FFPO has not established an inspection frequency or performed additional inspections of the BCMP-1 meter prover since 2020 to monitor the rate and extent of corrosion. (See **Finding F-FFPO-BC-2**.) The lack of an established inspection frequency for the BCMP-1 meter prover could result in an inability of FFPO to ensure integrity of the meter prover and associated process equipment, increasing the risk of catastrophic system failure over time.

  When this issue was communicated to FFPO managers, they immediately contracted with a vendor to perform UT scans of the meter prover. Results showed that corrosion of the meter prover had not yet advanced to the point where the equipment would need to be derated below its current full rating of 740 pounds per square inch. However, due to the lack of inspection testing history, a corrosion rate and retirement date cannot be established. FFPO management acknowledged, based on the results of the current UT scans, the meter prover may need to be derated within one to two years. (See **OFI-FFPO-BC-8**.) FFPO has developed an approved work scope for the replacement of the meter prover and associated equipment, which was not included in the LE2 project. The original timeline for completing the project has been delayed due to lack of funding. Current plans call for completion of the project in 2028.

Corrosion testing for certain other process equipment has not been conducted in accordance with the frequencies previously established by FFPO. For example, documentation dated September 14, 2014, for pipe section BC-4-FW-10901-D shows that it was last tested on May 1, 2014, with the next test due on May 1, 2019. ASI4330.15, section 13.2 states, "Every year approximately 20% of the SPR inspection points are inspected so that no point's interval will be greater than 5 years. To this 20% inspection, additional inspections are added based on corrosion rates determined by PCMS[2]." Interviewed FFPO management personnel explained that corrosion monitoring for some piping was paused in certain instances as a result of the LE2 project, including for piping that was not replaced as part of the project. (See **OFI-FFPO-BC-9**.)

Quality Assurance

Each SPR site, including BC, has one site QA specialist who conducts most of the QA activities. Reviewed records of QA activities adequately documented routine daily observations of maintenance activities, including both preventive and corrective maintenance. Also, an effective chain of custody was properly documented for the performance of pump vibration testing and oil sampling.

Reviewed FFPO nonconformance reports demonstrated compliant and effective execution of the nonconformance process. For example, nonconformance report NCR-08-25-001 identified that a vendor had furnished material that was not in compliance with the applicable specifications. The vendor had furnished 24-inch fittings that had omitted requirements of American Society for Testing and Materials A860, *Standard Specification for Wrought High-Strength Ferritic Steel Butt-Welding Fittings*. In

[2] PCMS is a data management software tool used by FFPO to track and manage piping inspection data.

accordance with ASI5700.15, the Material Review Board (MRB) is responsible for determining the corrective action disposition: repair, scrap, standard repair, salvage, or "use-as-is." In this case, the MRB determined that the fittings could be used as-is with a note that the contractor must prevent recurrence. In another example, nonconformance report NCR-02-25-005 identified that stroke times for motor-operated valves installed as part of the LE2 project did not meet specifications. The MRB determined that the slower stroke times were acceptable and the valves could be used as-is. In both cases, the time between the initial nonconformance notification and the MRB disposition was timely.

Concerns were identified regarding the presence of "dead-legs" (sections of piping with minimal or nonexistent fluid flow) throughout the site. Dead-legs typically result from abandoned or blocked lines, blind ends, or closed shut-off valves, and are a known hazard in the oil industry. Dead-legs can lead to increased corrosion rates and potentially compromise piping integrity. A spreadsheet dated November 17, 2017, documented approximately 33 sections of abandoned piping at the BC site, most of which had been abandoned since 1997. In 2024, a safety engineer from SPR PMO determined that no actions had been taken to remove or mitigate this hazard and issued a finding to the contractor. Emails exchanged in June 2025 indicate that a corrective action plan was approved to add components to ASI4330.15 instead of establishing a separate dead-leg program. At the time of the onsite portion of this assessment, no further action was evident. (See **OFI-FFPO-BC-10**.)

SPR PMO and site management have identified concerns with the quality of certain aspects of equipment installed as part of the LE2 project. These concerns include visibly deflecting free-standing pipe supports, multiple pipe support shoes slipping, and some pipe support columns installed off-center. Additional concerns include the ergonomic positioning of some actuators and the inaccessibility of high vents, drains, and relief valves. FFPO provided an engineering analysis, *Final Analysis Report*, dated August 28, 2024, addressing the concerns regarding the deflected pipe supports. The report concluded that "FFPO intend [sic] not to take any corrective actions…Per calculation, there are no safety concerns." SPR PMO management indicated that they plan to contract with an independent third-party engineering firm to provide an independent analysis. (See **OFI-SPR PMO-1**.)

Process Safety Management Conclusions

FFPO has developed a generally adequate framework to support compliance with 29 CFR 1910.119. FFPO training implementation has been effective in ensuring that personnel are adequately trained in conducting process maintenance activities. Inspection and testing activities and QA program implementation have been generally effective in ensuring the integrity of process equipment such as pumps and valves. However, significant issues were identified regarding the maintenance of inspection and testing records and corrosion control.

4.0 BEST PRACTICES

Best practices are safety-related practices, techniques, processes, or program attributes observed during an assessment that may merit consideration by other DOE and contractor organizations for implementation. The following best practice was identified as part of this assessment:

- FFPO's practice of monitoring AccuWeather RealFeel temperatures in the control room and using the public address system and radios to deliver sitewide announcements to notify workers of the appropriate heat stress controls enables timely implementation of controls for safe work execution.

5.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site and program-specific issues management processes and systems developed in accordance with DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

Fluor Federal Petroleum Operations, LLC

Finding F-FFPO-BC-1: FFPO has not maintained the BCMP-1 meter prover inspection results from the 2020 UT scans. (29 CFR 1910.119(j)(4)(iv))

Finding F-FFPO-BC-2: FFPO has not established an inspection frequency or performed additional inspections of the BCMP-1 meter prover since 2020 to monitor the rate and extent of corrosion. (29 CFR 1910.119(j)(4)(ii) and (iii))

6.0 DEFICIENCIES

Deficiencies are inadequacies in the implementation of an applicable requirement or standard. Deficiencies that did not meet the criteria for findings are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

Fluor Federal Petroleum Operations, LLC

Deficiency D-FFPO-BC-1: FFPO did not notify affected employees of personal air monitoring exposure results within the required timeframe established by OSHA. (APM, sec. 26.5.1, and 29 CFR 1910.1028(e)(7)(i))

Deficiency D-FFPO-BC-2: FFPO inadequately identified and analyzed hazards for six work scopes. (DEAR 970.5223-1 and APM, sec. 27.2)

Deficiency D-FFPO-BC-3: FFPO has not ensured that all work control documents and electrical enclosures/panels have the required equipment arc flash information and labeling. (NFPA 70E, article 130.5(H); and APM, sec. 15.4.3)

Deficiency D-FFPO-BC-4: FFPO has not ensured that emergency eyewash and shower stations are always readily available and properly maintained. (APM, sec. 47.1.3; ANSI Z358.1; and 29 CFR 1910.151)

Deficiency D-FFPO-BC-5: FFPO QEWs performing two PMs conducted electrical work contrary to requirements for zero energy verification and/or the required level of PPE. (APM, secs. 15.1.1, 15.3.3, and 15.5.2; and the JHA for PM Actuator)

Deficiency D-FFPO-BC-6: During MAC tasks at Caverns 15 and 19, subcontractor Empire Wireline workers were observed engaging in multiple unsafe practices. (ANSI A92.22, ASME B30.22, 29 CFR 1910.242(a), 29 CFR 1910.95, Empire Wireline's STA/JSHA, and the equipment manufacturer's requirements)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFIs shown below to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

Fluor Federal Petroleum Operations, LLC

OFI-FFPO-BC-1: Consider systematically analyzing work activities to ensure that heat stress hazards likelihood, severity, and controls are understood and included in JHAs.

OFI-FFPO-BC-2: Consider adding a requirement in the APM, section 54.0, to have a Class B fire extinguisher on hand when flammable liquids are handled.

OFI-FFPO-BC-3: Consider having portable eyewashes available when working in remote locations with hazardous chemicals that could injure workers' eyes.

OFI-FFPO-BC-4: Consider enhancing the SOC's *Protective Force Risk Assessment* document, Rev2, 8/21/2025, by noting that FFPO provides BC SOC workers with key hazard control measures such as specialized training and IH monitoring.

OFI-FFPO-BC-5: Consider remedial training for FFPO Level I escorts, line supervisors, and site safety personnel emphasizing proper application and interpretation of APM, table 17.4, and further clarifying the workload examples to ensure that controls are consistently applied for the level of activity.

OFI-FFPO-BC-6: Consider attaching the *Core Body Temperature Log* to the STA for jobs where heat stress is identified as a hazard/control to assist workers and line supervisors in tracking temperatures and work/rest regimes specific to the job task. Linking temperature logs with the job task(s) would allow for evaluation of controls specific to the job and facilitate identification of any areas for improvement.

OFI-FFPO-BC-7: Consider revising SPR process documents to establish a consistent pressure safety valve testing frequency maximum.

OFI-FFPO-BC-8: Consider establishing an accelerated inspection schedule for the meter prover until the planned replacement project can be completed.

OFI-FFPO-BC-9: Consider conducting an extent-of-condition review across SPR to determine whether other process equipment has exceeded inspection due dates.

OFI-FFPO-BC-10: Consider updating ASI4330.15 to include procedures to identify and mitigate dead-legs at the BC site.

Strategic Petroleum Reserve Project Management Office

OFI-SPR PMO-1: Consider contracting with a qualified professional engineering firm to conduct an independent analysis of construction quality of the LE2 project at the BC site.

Appendix A
Supplemental Information

Dates of Assessment

July 23 to September 11, 2025

Office of Enterprise Assessments (EA) Management

John E. Dupuy, Director, Office of Enterprise Assessments
William F. West, Deputy Director, Office of Enterprise Assessments
Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments
David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments
Sarah C. R. Gately, Acting Director, Office of Nuclear Safety and Environmental Assessments
David Olah, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
Brent L. Jones, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

William F. West, Advisor
Kevin G. Kilp, Chair
John S. Boulden III
Christopher E. McFearin
William A. Eckroade

EA Assessment Team

Harrichand Rhambarose, Lead
Kevin G. Kilp
Amber M. Pentecost
Leslie A. Bermudez
Carole A. Fried
James K. Haas
Joseph Lischinsky
Mario A. Vigliani