



U.S. DEPARTMENT OF
ENERGY

Office of
Fossil Energy

Office of Environment,
Security, Safety and Health



Striving for Environmental, Security, Safety and Health (ESS&H) Excellence

Annual Report for Fiscal Year 2017

A Letter from the Assistant Secretary for Fossil Energy



The primary mission of the Office of Fossil Energy (FE) of the U.S. Department of Energy (DOE) is to discover and develop advanced fossil energy technologies to ensure American energy dominance, create American jobs, support a resilient infrastructure, maintain environmental stewardship, and enhance America's economy. FE also ensures America's access to and use of safe, secure, reliable, and affordable fossil energy resources and strategic reserves. During Fiscal Years (FYs) 2014–2017, our two sites—the Strategic Petroleum Reserve (SPR) and the National Energy Technology Laboratory (NETL)—have attained some remarkable achievements in the areas of environment, security, safety, and health (ESS&H) while keeping the organizational mission at the forefront of their priorities.

FE is unique in that we operate in many high-risk operational environments across our two sites, making the safety of our employees as the primary concern. To reinforce our commitment to safety, FE continued implementation of the *Heroes for Zero* program with the goal of driving FE's accidents, injuries, environmental releases, and regulatory violations towards zero by using our combined organizational attention to detail, accountability, and hard work. By applying safety best practices and lessons learned, refining our processes, and acting transparently when mistakes are made, we can together create a work environment that is fully dedicated to the safety of our employees.

During FYs 2014–2017, FE strengthened security by updating facilities and infrastructure and ensuring full compliance with DOE regulations and policies to identify and confront ongoing and potential threats to FE sites. In addition, FE reinforced strong emergency management practices by conducting exercises, training, and drills to prepare for potential security threats or emergency situations.

Moving forward, our employees will continue to uphold the principles of ESS&H and remain committed to achieving the highest levels of compliance and safety. I look forward to ensuring that strong ESS&H procedures and values are incorporated into every task we undertake.

A handwritten signature in black ink that reads "Steven E. Winberg". The signature is written in a cursive, slightly stylized font.

Steven E. Winberg
Assistant Secretary
Office of Fossil Energy

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EXECUTIVE SUMMARY

The Annual Report for Fiscal Year 2017, *Striving for Environmental, Security, Safety and Health (ESS&H) Excellence*, is an overview of ESS&H operations at the U.S. Department of Energy's (DOE) Office of Fossil Energy (FE). This report focuses on FE's ESS&H efforts at two of its facilities, the Strategic Petroleum Reserve (SPR) and the National Energy Technology Laboratory (NETL). It also highlights the progress being made at both sites to ensure that facility operations adhere to the highest standards of ESS&H excellence.

The last ESS&H report was published in 2013, and the current 2017 ESS&H report covers Fiscal Years (FYs) 2014–2017. The report's value and purpose have remained unchanged, as it provides an objective and comprehensive view of FE's ESS&H program. The SPR and NETL can review their performance in recent years to identify challenges and priorities, and they can use the information to develop goals and a roadmap for improving ESS&H performance. The insights from this report will help shape the future priorities of FE. While the trend analysis and highlighted efforts focus on ESS&H operations at the SPR and NETL in the last four years, some performance metrics provide data for a 10-year period going back to FY 2008 to enrich the analysis.

One key difference from the 2013 report is that FE no longer collects information from the Rocky Mountain Oilfield Testing Center (RMOTC), as it was sold to a private company in

January 2015. Consequently, data on FE include RMOTC, the SPR, and NETL up until FY 2015, and FYs 2016 and 2017 consist of the SPR and NETL data only.

Organization of the Report

This report is divided into four sections:

- I. Introduction
- II. Highlights of ESS&H Accomplishments
- III. Summary of ESS&H Performance Metrics
- IV. ESS&H Challenges, Goals, and Initiatives

Section I includes the introduction and provides a brief overview and history of FE and its sites, the SPR and NETL. Section II provides highlights of ESS&H accomplishments and captures the SPR's and NETL's efforts, programs, and achievements as they relate to the nine ESS&H priorities. Section III includes a summary of ESS&H performance, displaying and analyzing FE's performance for the metrics discussed. Section IV outlines each site's challenges, goals, and planned initiatives to achieve those goals for FY 2018 and beyond.

Summary of ESS&H Performance

FE's performance is outlined in sections II, III, and IV. See Table 1 for a summary of the SPR's and NETL's accomplishments (Section II) broken up into the areas of environment, security, safety and health, and operations.

TABLE 1 | Summary of FE Accomplishments from FYs 2014–2017

Topic Area	NETL	SPR
Environment	NETL provided more efficient and controlled hazardous waste operations by expanding the number of satellite accumulation areas, or areas that store dangerous hazardous waste.	Since 2014, the SPR has maintained its goal to divert or reduce at least 50 percent of construction and demolition waste and municipal solid waste generated.
Security	NETL conducted full-scale emergency exercises, table top exercises, drills, and evaluations at all its sites to assess the lab’s readiness for emergencies. These exercises helped NETL identify 121 corrective actions—108 of which have been already addressed.	The SPR conducted annual Hurricane/ Continuity of Operations exercises to help improve preparedness in the event of an emergency.
	NETL installed access readers in all its high-priority areas, including laboratories, telecommunication closets, and computer rooms. Security officers can now monitor 100 percent of all traffic entering and exiting these key areas.	The SPR finalized the installation of the Secret Internet Protocol Router Network (SIPRNet), which will provide the SPR employees with rapid access to intelligence information, policies, and procedures to improve decision making and situational awareness.
Safety & Health	NETL made a better effort to identify and document safety lessons learned.	The SPR implemented various employee training programs to encourage exemplary safety and health conditions at all its facilities.
	NETL reduced the number of compressed gas cylinders and high-hazard chemicals—many of which were unused or past their useful life—at each of its facilities.	The SPR has completed its annual Integrated Safety Management (ISM) validation and documented its performance in the ISM Annual Review every year from FYs 2014–2017.
Operations	NETL instituted a safety campaign that emphasizes a safety topic each month and includes an ESS&H presentation to all employees. Several communication materials, such as flyers and fact sheets, were developed to promote awareness of the safety topic.	The SPR holds an annual ESS&H summit that includes briefings by the safety, health, and environment departments and the security subcontractor, followed by an open forum to discuss ideas and opportunities for improvement.

The performance section (Section III) displays FE data only, the aggregate of both NETL's and the SPR's results for

each metric. Table 2 provides a high-level summary of FE's performance from FYs 2014–2017.

TABLE 2 | Summary of FE Performance Metrics, FYs 2014–2017

Metric	2014	2015	2016	2017
DART Case ¹ Rate	0.66	0.28	0.13	0.22
DART Rate ¹	25.85	28.42	11.78	10.59
TRC Rate ¹	1.03	0.97	0.53	0.44
Operational Occurrences ²	24	12	23	23
Environmental Releases ²	5	3	5	6
Potable Water Intensity (gallons per gsf) ³	17.91	19.24	14.91	16.07
Energy use Intensity (MBtu per 1000 gsf) ³	193,851	235,097	201,106	227,838
Fleet Fuel Consumption (GGE) ³	74,265	79,222	62,492	58,702
Regulatory Violations ⁴	1	2	1	0

¹ Data collected from Computerized Accident Incident Reporting System Database, as of March 31, 2018

² Data collected from Occurrence Reporting and Processing System Database, as of March 31, 2018

³ Data collected from DOE Sustainability Dashboard.

⁴ Data are from 2017 ESS&H Data Calls

Acronyms: DART – Days Away/Restricted or Job Transfer; TRC – Total Recordable Case

Within FE's environmental operations, there have been improvements in three metrics: Potable Water Use, Energy-Use Intensity, and Vehicle Fleet Fuel Consumption. However, one area that needs further improvement is mitigation of environmental releases as there were more releases recorded in FY 2017 than in every FY since 2011.

Both the SPR and NETL made security enhancements such as upgrading building alert systems and collaborating with partners to identify and mitigate cybersecurity risks. Both sites are also focused on improving emergency management by increasing trainings and drills and by upgrading staff's capabilities for emergency response.

The safety record also improved during FYs 2014–2017. There were downward trends in the Total Recordable Case (TRC) rate; Days Away, Restricted, or Job Transfer (DART) Case rate; and DART rate at FE. Within the last four-year period (FYs 2014–2017), FE recorded better safety performance than in any other four-year period in the last decade. These improvements can be attributed to the quality and continuous improvements of FE's safety programs, which are constantly assessed via metrics collected through the *Heroes for Zero* Campaign. Both the SPR and NETL implemented specific actions with the aim to achieve zero incidents. (See Table 1).

Although they have made many positive improvements in ESS&H, the SPR and NETL identified challenges that will require their attention to maintain a high level of performance. For example, they both cited staff turnover as a challenge because retirements result in the loss of institutional knowledge and new personnel require training exercises to become acclimated. Another challenge they identified relates to ESS&H program implementation. In recent years, sites have collected large amounts of data, thanks to advancements in information technology, which will require advanced data analytics to assess and further improve ESS&H performance.

In response to some of these ESS&H challenges facing FE, both the SPR and NETL have set goals and priorities for FY 2019. For example, the SPR has a goal to achieve a TRC rate of 1.4 or lower. In order to achieve this goal, the SPR plans to prioritize staff education programs, especially those pertaining to safety oversight. NETL plans to prioritize emergency management, which will entail full-scale exercises, table top exercises, and drills at all three of its sites. NETL also plans to continue improving its Environmental Management Program by upgrading to the International Organization for Standardization (ISO) standard ISO 14001:2015.

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INTRODUCTION

The U.S. Department of Energy's (DOE) Office of Fossil Energy (FE) plays a key role in helping the United States meet its growing need for secure, affordable, and environmentally sound fossil energy supplies. With almost two-thirds of the nation's energy supplied by fossil fuels, FE plays a critical role in ensuring that the United States can continue to rely on traditional and domestic resources for our energy needs.

FE has proven its commitment to ensuring the highest possible standards for the environment, security, safety and health (ESS&H) of its sites and operations by:

- Maintaining strong emergency preparedness and response programs
- Integrating ESS&H into all program activities
- Eliminating injuries and incidents
- Promoting environmental protection
- Adopting the highest applicable standards of performance
- Ensuring management and employee accountability
- Encouraging worker participation
- Facilitating public participation.

These core actions support FE's integration of ESS&H into all aspects of the work planning and implementation processes.

This report summarizes FE's ESS&H performance for Fiscal Years (FYs) 2014–2017 and includes data from the National Energy Technology Laboratory (NETL), Strategic Petroleum Reserve (SPR), and FE Headquarters (FE-HQ). FE data also

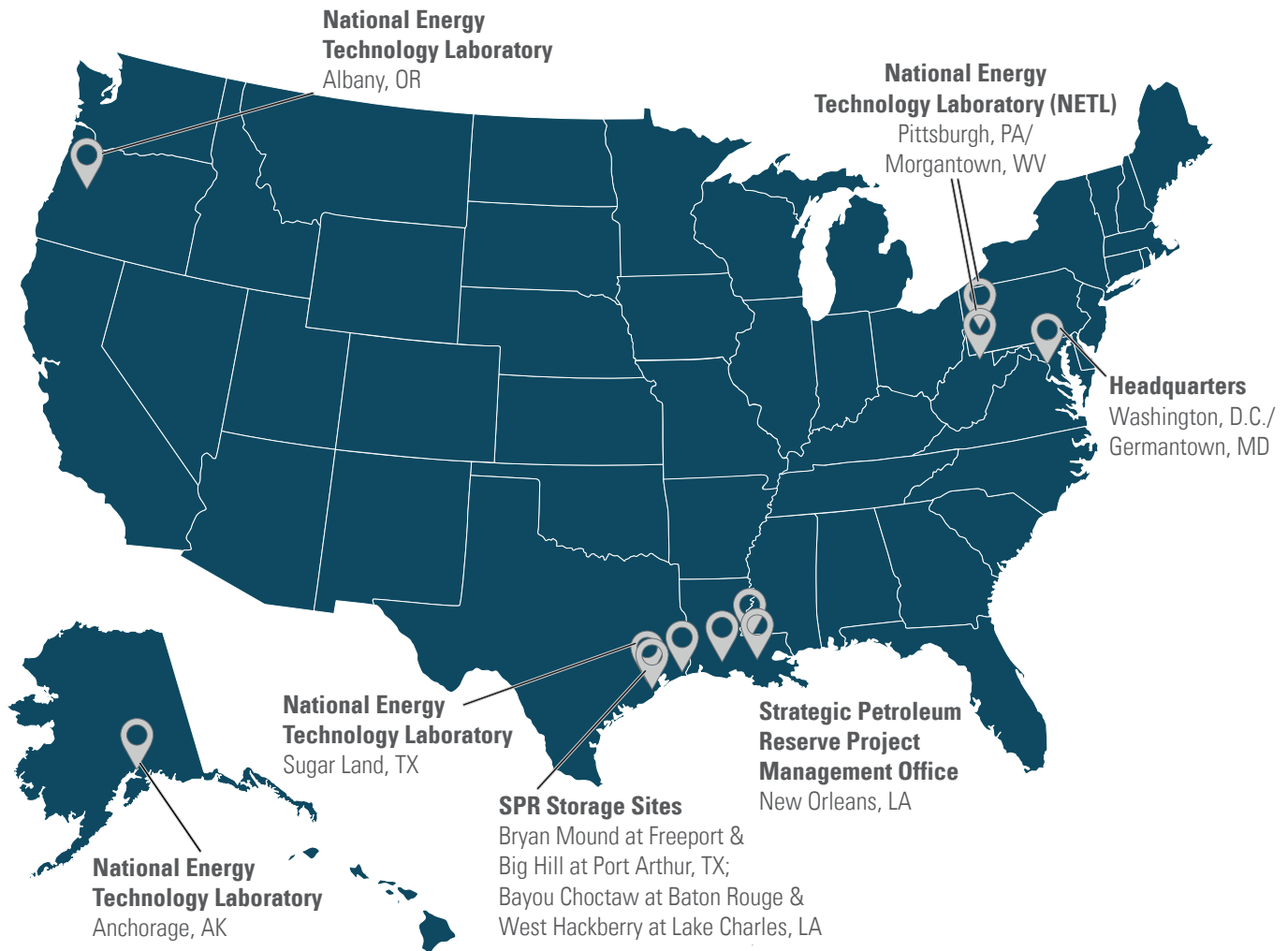
includes Rocky Mountain Oilfield Testing Center (RMOTC) up until FY 2015, but the report does not include any narrative on the site because it was sold in 2015. Section I of the report introduces the document and FE's operations and sites. Section II provides a comprehensive overview of FE's key accomplishments during FYs 2014–2017. Section III summarizes the FE-wide key ESS&H performance metrics. Section IV describes key challenges, goals, and planned initiatives outlined for FY 2018 and beyond.

Office of Fossil Energy Operations

FE is responsible for federal research and development (R&D) efforts to improve the performance of existing coal-fueled power generation, to develop advanced fossil energy systems, and to advance prudent development of domestic oil and natural gas resources. In addition, FE reviews applications for exports of natural gas and manages the nation's SPR and other strategic reserves (e.g., Northeast Home Heating Oil Reserve), which are key emergency response tools available to protect the nation from energy supply disruptions.

FE has its headquarters in Washington, D.C. and Germantown, Maryland; it also has field sites in Morgantown, West Virginia; Pittsburgh, Pennsylvania; Anchorage, Alaska, Albany, Oregon; Sugar Land, Texas; and New Orleans, Louisiana. The FE organization comprises nearly 2,600 federal and contractor employees—scientists, engineers, technicians, and other professionals—located at FE-HQ, NETL, the SPR Project Management Office (PMO), four SPR storage sites in the Gulf Coast region, and a marine terminal (See Figure 1).

FIGURE 1 | Fossil Energy Laboratories and Facilities



FE’s innovative R&D programs focus on the efficient and clean use of the nation’s most abundant energy resources. Activities encompass the federal R&D effort on advanced carbon capture, utilization, and storage (CCUS) technologies, advanced fossil energy systems, and crosscutting fossil energy research. FE also conducts research related to the prudent and sustainable development of domestic oil and natural gas resources, with a focus on natural gas technologies and unconventional resources. Recent R&D programs have focused on improving carbon capture technologies and

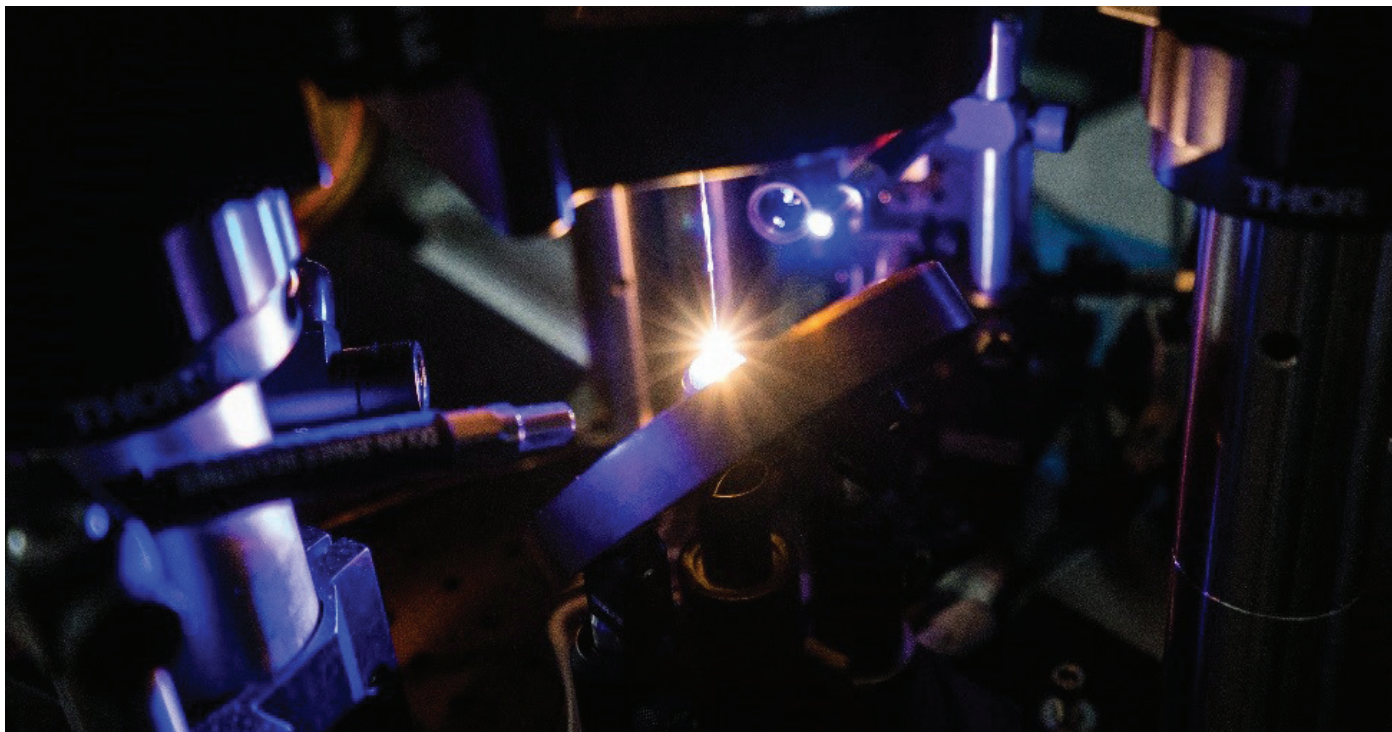
reducing costs. These selected projects aim to reduce energy consumption and capital costs associated with next-generation carbon capture systems.¹

National Energy Technology Laboratory (NETL) Overview

NETL is the only DOE National Laboratory devoted primarily to fossil energy research. The lab’s expertise in coal, natural gas, oil technologies, energy systems, and international energy analysis enables the formation of research partnerships with

¹ “Energy Department Invests \$44M in Advanced Carbon Capture Technologies Projects,” U.S. Department of Energy, Office of Fossil Energy, February 16, 2018, <https://energy.gov/articles/energy-department-invests-44m-advanced-carbon-capture-technologies-projects>.

FIGURE 2 | A CO₂ laser melting a rod of alumina which will create a sapphire optical fiber, capable of withstanding the most adverse environmental conditions.



industry, universities, and other government entities. In turn, these partnerships, coupled with federally owned laboratory research, allow NETL to pursue new systems and technologies that will promote affordable and sustainable energy solutions.

NETL also seeks to enhance America's energy security, improve the environmental acceptability of energy production and use, and ensure a robust U.S. energy future. NETL conducts research on topics including secure and reliable

energy; coal, oil, and natural gas efficiency; clean power generation from coal; CCUS; the future role of hydrogen; and critical infrastructure assurance.

With more than 1,200 federal and contractor employees across five sites located in Morgantown, West Virginia; Pittsburgh, Pennsylvania; Albany, Oregon; Sugar Land, Texas; and Anchorage, Alaska, NETL functions as both an on-site science and technology research center and as

FIGURE 3 | NETL Site Locations: Albany, OR; Pittsburgh, PA; Morgantown, WV



Oregon



Pennsylvania



West Virginia

INTRODUCTION

the administrator of nearly 1,800 contracts with external organizations. NETL also funds nearly 500 university research projects that support the training of the next generation of energy scientists.

In addition, NETL Regional University Alliance (RUA) in Pittsburgh received the Corporate Innovation Award from Carnegie Science, given to organizations that encourage an environment that promotes innovation in science and technology. NETL-RUA combines its facilities, resources, and expertise with those of five research universities: Carnegie Mellon, the Pennsylvania State University, the University of Pittsburgh, Virginia Polytechnic Institute, and West Virginia University.

Strategic Petroleum Reserve (SPR) *Overview*

The SPR is a DOE-owned, contractor-operated complex of sites that stores oil in 62 subterranean salt dome caverns along the Gulf of Mexico. The SPR has a storage capacity of 727 million barrels of oil and is the largest stockpile of government-owned emergency crude oil in the world. As of 2017, the SPR comprises 110 federal employees and more than 700 major contractors and subcontractors. Established after the 1973–1974 oil embargo, the SPR provides the President the authority to respond to disruptions in the commercial oil supply by withdrawal and distribution of oil from the reserves. It is also a critical component for the United States to meet its International Energy Agency obligation to maintain emergency oil stocks. Figure 7 displays the SPR's annual inventory dating back to 1977.



FIGURE 4 | NETL researchers Mac Gray and Chris Wilfong extracting rare earth elements



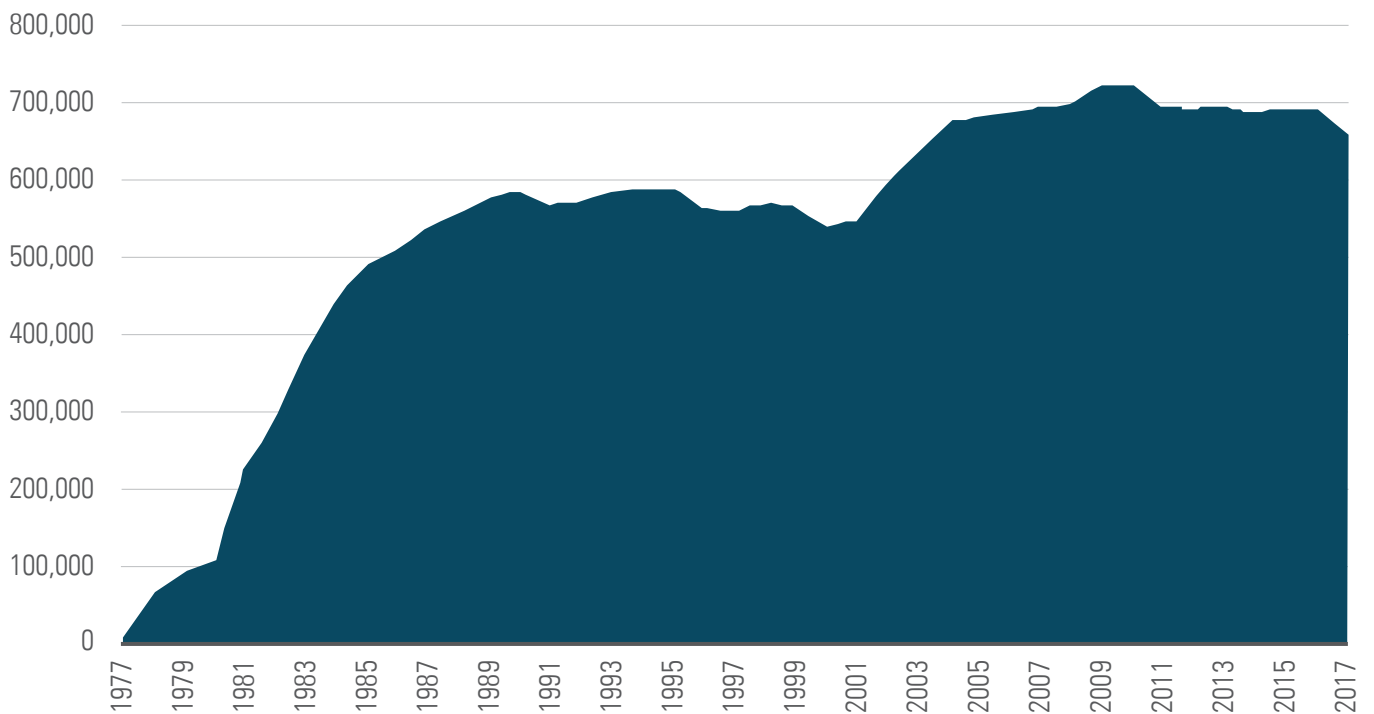
FIGURE 5 | Coal samples taken from NETL's Severe Environment Corrosion Erosion Facility

FIGURE 6 | A view of the SPR's Bryan Mound Site



FIGURE 7 | Crude oil stocks in the SPR since 1977 (thousand barrels)

U.S. Crude Oil Stocks in the SPR (Thousand Barrels)

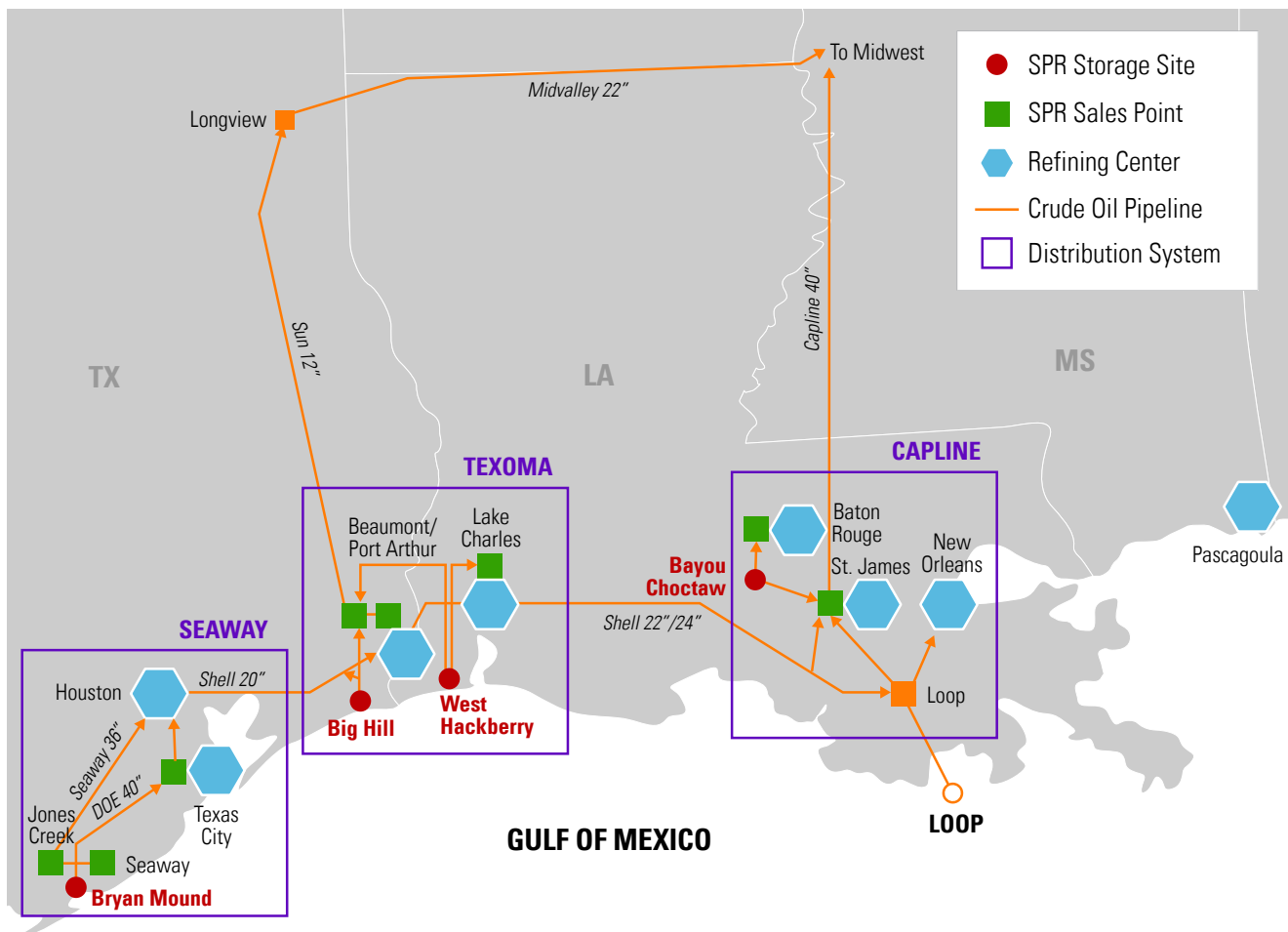


Source: U.S. Energy Information Administration

The SPR's PMO is headquartered in New Orleans, Louisiana, and its four operating sites are Bayou Choctaw and West Hackberry in Louisiana and Bryan Mound and Big Hill in Texas. The PMO oversees daily operations of the major crude

oil storage sites and logistical facilities for the nation's oil stockpile. As of February 2018, the SPR's inventory was 666 million barrels of crude oil. Figure 8 shows the locations of the SPR storage sites along the Gulf Coast.

FIGURE 8 | The SPR has storage sites along the Gulf Coast.



In the event of an energy emergency, the SPR oil is distributed by competitive sale. The SPR has been used under these circumstances only three times—most recently in June 2011 when the President directed the sale of 30 million barrels of crude oil to offset disruptions in supply due to the Middle East unrest. The other emergency drawdowns include the 1991 drawdown during Operation Desert Storm to limit the disruption to world oil prices and the 2005 drawdown after Hurricane Katrina. Although the SPR was established to cushion oil markets during energy disruptions,² the Secretary of Energy can authorize non-emergency sales of oil to respond to lesser supply disruptions or to raise revenues.

The SPR also manages the one-million-barrel emergency Northeast Home Heating Oil Reserve (NEHHOR), which houses fuel oil at three sites throughout the northeastern United States, and the Northeast Gasoline Supply Reserve (NGSR), which holds one million barrels of gasoline. Because about 69 percent of people in the Northeast rely on oil to heat their homes, it is important to maintain this reserve in case of supply disruptions, especially during the cold winter months. The first-ever and most recent emergency withdrawal took place in late 2012, following the damage that Hurricane Sandy wrought in the Northeast. The President directed the transfer of fuel from NEHHOR to the Department of Defense to support those affected by the storm and support emergency operations.

² The oil embargo of 1973–1974 spurred the creation of the SPR, as a part of the Energy Policy and Conservation Act of 1975.



HIGHLIGHTS of ESS&H ACCOMPLISHMENTS

In FY 2017, FE identified nine priorities that fall under ESS&H activities and operations. Information in this section was gleaned from a data request that FE distributed to the SPR and NETL. The request contained inquiries relating to each of the priorities. These priorities are either specific to one subject area or extend to all operations and subject areas. As such, this section is organized by subject areas and their relevant priorities:

Environmental

- Maintaining strong environmental stewardship and eliminating environmental legacies

Security

- Improving responsiveness and effectiveness of emergency management activities
- Developing programs and making efforts to enhance site security

Safety & Health

- Striving for “zero” injuries and illnesses (Heroes for Zero)
- Integrating safety into all activities as an integral practice

ESS&H Operations

- Achieving self-assessment and external certification of ESS&H programs
- Building a strong ESS&H culture
- Increasing on-site quality assurance
- Fostering a continuous learning environment

Environmental

FE strives to be a leader among DOE programs in promoting environmental stewardship. FE maintains close relationships with its field sites, and it encourages and rewards environmental innovation, waste reduction, and operational efficiency. Descriptions of the specific efforts that FE sites have made are below.

Maintaining Strong Environmental Stewardship and Eliminating Environmental Legacies

FE is committed to maintaining robust pollution prevention programs and promoting environmental stewardship in all its operations. FE sites implement programs that aggressively pursue pollution prevention, and prevent and remediate environmental legacies.

Executive Order (EO) 13693 expanded the energy use reduction and environmental performance requirements of EO 13514. Its goal is to maintain federal leadership in sustainability and pollution reduction where it is cost-effective. FE sites continue to actively respond to the requirements outlined in the EO by reducing harmful emissions and maximizing the sustainable use of energy and natural resources to meet DOE's goals. Each FE site applies a broad-based approach to implementing EO 13693 by conducting activities, such as training and education to foster behavioral change in the office, and researching and implementing options for reducing energy and water intensity.

Each year, NETL publishes an Annual Site Environmental Report to communicate the status of its compliance with

environmental policies. NETL ensures compliance by working with FE-HQ staff members to conduct Site Assistance Visits for additional oversight. The SPR also publishes an Annual Site Environmental Report to communicate its compliance efforts and highlight successful programs and achievements for each calendar year.

NETL Environmental Efforts

NETL has taken several steps to reduce pollution throughout its operations. In September 2017, NETL implemented an effort to review satellite accumulation areas—locations where dangerous waste accumulates in a container. NETL conducted these reviews to ensure that personnel were separating, accumulating, and handling wastes—specific to each research project—appropriately. Since then, the lab has expanded the number of satellite accumulation areas, identified more streams, and increased the frequency of waste pickups. NETL has noted that this effort has resulted in greater awareness by researchers in taking inventories and responsibly recycling/dispersing of unnecessary and unused containers.

As part of DOE’s Pollinator Protection Program, NETL eliminated landscape maintenance across suitable areas at all three sites to enable native plants to thrive. Each site committed to using bee-friendly herbicides and pest-control products to prevent any adverse effects on the bee population. NETL also has made considerable progress at the underground coal gasification remediation site in Hoe Creek, Wyoming. In 2016, NETL conducted surface revegetation to help restore the site after cleanup of groundwater contamination and, in 2017, the site was deemed safe to close. NETL received approval for bond closure with the State of Wyoming.

The SPR Environmental Efforts

The SPR has pursued numerous activities and programs to reduce pollution, enhance its environmental management, and eliminate waste. The SPR demonstrated its commitment to maintaining environmental compliance and excellence by providing oversight to maintain zero notices of violation from implementing agencies against the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act. Moreover, the SPR conducted a Climate Change



FIGURE 9 | NETL-Pittsburgh Site Water Line Project, vegetation restoration phase, June 2015



FIGURE 10 | Green roof on Building 39 at NETL-Morgantown

Risk and Resilience Assessment in 2017. The assessment brought together the SPR, the National Renewable Energy Laboratory, and the Southern Climate Impacts Planning Program to develop resilience strategies for the SPR’s sites.

Reducing waste is central to the SPR’s environmental efforts. For example, since 2014, the SPR has reached its goal of diverting at least 50 percent of construction and demolition waste and municipal solid waste generated. Not only did the SPR meet that goal in each year from FY 2014 through 2017, but in 2017, the SPR recycled more than 62 percent of debris and solid waste. Diverting waste reduces pollution and yields significant cost savings.

Security

One of FE's major responsibilities is to ensure that its mission is carried out in full compliance with all applicable DOE safeguards and security standards. This section contains two priorities that capture both NETL's and the SPR's innovative efforts to improve security at their sites and the effectiveness of their emergency management programs.

Improving Response and Effectiveness of Emergency Management Activities

FE strives to maintain secure and resilient operations. Doing so requires a robust emergency management program that will help FE protect against, mitigate, and quickly respond to and recover from all hazards. Both of FE's sites develop their own procedures and efforts to ensure that they are prepared for all emergencies. These efforts include hosting and conducting organization-wide emergency response exercises, training, and drills to prepare for potential security threats or emergency situations.

NETL Emergency Management Efforts

In the last few years, NETL has taken significant steps to improve its emergency management, response, and recovery procedures. For example, NETL conducted full-scale emergency exercises, table top exercises, drills, and evaluations

at all of its sites to assess the lab's readiness for emergencies. These exercises helped NETL identify 121 corrective actions, 121 of which have been addressed, resulting in significant enhancement of NETL's emergency management program.

Each NETL site cultivated a relationship with their Local Emergency Planning Committees (LEPCs). Relationships with the LEPCs have brought in local expertise, which has led to several efforts to improve NETL's emergency management programs. These efforts include the following:

- Review of regional emergency plans and training programs,
- Monitoring of area hazardous material (hazmat) inventories to support regional emergency management planning activities, and
- Coordination with other LEPCs to prepare for regional emergency incidents.

Because of this initiative, NETL earned a community citation of recognition by the Allegheny County Executive for support of the Pittsburgh regional LEPC. In addition, NETL has maintained and updated its General Employee Emergency Response Training, which helps prepare employees to manage and respond to all site emergencies.

FIGURE 11 | NETL-Morgantown Emergency Response Organization assemble with off-site responders for debriefing during a 2017 full-scale exercise.



The SPR Emergency Management Efforts

The SPR strengthened its emergency management program by administering training, drills, and exercises for employees. During FYs 2014–2017, the SPR conducted four annual Hurricane/Continuity of Operations (COOP) exercises involving the PMO, four storage sites, and the Stennis warehouse facility to help improve emergency preparedness. Furthermore, the SPR partnered with local National Weather Service meteorologists to utilize weather graphics and gain greater access to accurate and real-time micro-weather updates. The SPR emergency response teams will, therefore, have more time to respond to and prepare for imminent, large-scale weather events.

FIGURE 12 | The SPR Emergency Response Training at Fire Academy, 2017



The SPR also conducted an emergency response team refresher during each of the last four years for more than 1,000 team members per year, e.g., emergency response training at the Fire Academy in 2017. The annual training ensures that all team members are kept up to date on all changes and/or revisions to the SPR's emergency response plans.

Developing Programs and Making Efforts to Enhance Site Security

FE increased its protection measures for personnel and site infrastructure to better identify and confront ongoing and emerging threats. During FYs 2014–2017, FE strengthened employee and site security by augmenting the security of FE facilities and infrastructure, and ensuring compliance with DOE regulations and policies.

NETL Site Security

NETL took several measures to enhance security across its sites. For example, NETL recently initiated the Personal Identity Verification-Interoperable badging process. This ensures that all employees accessing NETL's system are deploying multiple certifications before accessing the NETL network. In the last few years, NETL's site security officers have also begun conducting daily routine checks to ensure that all individuals, including federal and contractor employees, as well as foreign nationals, are complying with Site Security Plans.

NETL also installed access readers in all high-priority areas, including laboratories, computer rooms, and telecommunication closets, which contain the sites' telecommunication network systems and devices. Security officers can now monitor 100 percent of all traffic entering and exiting these key areas. This monitoring is important for daily operations, but it becomes especially valuable in case of an emergency event. For instance, during an event, the site's security team can quickly take account of any persons within the key areas, which can save time for Incident Commanders and emergency responders.

The SPR Site Security

The SPR's efforts to improve security include technological and staffing upgrades. The recent "Life Extension 2" initiative, which was approved by Congress, covers the replacement of the SPR's current detection and assessment system. The new system will improve armed officers' response times to alarms, and it can also act as a more effective deterrent to potential

FIGURE 13 | SPR K9 unit conducts training on explosives detection during a field exercise.



criminals and terrorists. The SPR also finalized the installation of the Secret Internet Protocol Router Network (SIPRNet) at the PMO. SIPRNet, originally designed for the Department of Defense, is a system of interconnected computer networks used to share unclassified and classified information. SIPRNet will provide the SPR employees with rapid access to intelligence information, policies, and procedures that will help improve decision making and situational awareness.

In addition to technological and physical upgrades, the SPR began participating in the Local Intelligence Threat Working Group. Staffed by both federal and state agencies, law enforcement, and counterintelligence organizations, the group works to collaboratively identify and mitigate risks. Participation in the Local Intelligence Threat Working Group is expected to improve situational awareness for intelligence at the SPR field sites.

Safety & Health

FE is committed to providing a safe and healthy work environment for its employees, contractor staff, and visiting public. From office work environments to industrial, laboratory, or heavy construction sites, principles of awareness, staff's fitness for duty, sites' hazard mitigation efforts, and communication are critical to ensuring that DOE provides a safer work environment. This section details two priorities that help shape both NETL's and the SPR's efforts in safety and health.

Striving for Zero Injuries and Illnesses

The *Heroes for Zero* safety campaign centers around the goal of zero injuries and illnesses. *Heroes for Zero* promotes employee awareness of personal responsibility in safety and fosters a philosophy of high safety standards across all FE programs through enhanced education and training. The program's stringent "zero" goal recognizes that even a single workplace accident or injury is "one too many." Both NETL and the SPR participate in this program by focusing on the following activities:

- Conducting safety training to refine employees' skills
- Ensuring the safety of workers via observation, oversight, and reporting
- Improving worker safety protocols and procedures by addressing both new and recurring safety issues
- Promoting employee health and wellness through preparedness and prevention
- Continuing to upgrade facilities and site infrastructure to ensure a safe work environment.

NETL Safety and Health Efforts

NETL has enhanced safety throughout its operations by improving training for employees, identifying lessons learned and corrective actions following accidents, and mitigating risks and hazards. NETL focused on improving one key metric, "Instances of Incomplete or Expired Training," as a means to improve safety. A well-trained workforce can help reduce the risks of occupational-related injuries and operational incidents. NETL's effort resulted in a reduction from 500 to 100 instances of incomplete/expired training. NETL also continued to perform its site-wide annual Confined Space Audit, in which the lab works with site managers to educate them on operations. During one of the audits, site managers recognized that they were not fully complying with the Occupational Safety and Health Administration (OSHA) 1910.146 requirements and requested re-training staff with updated training requirements to ensure compliance.

FIGURE 14 | The NETL-Pittsburgh Emergency Response Organization Hazmat/Rescue Team removes an injured patient from the Incident Hot Zone during an exercise.



NETL also took initiative in the past few years to identify and document safety lessons learned. This effort enabled NETL to focus on the root cause(s) of incidents and to develop the appropriate corrective actions to resolve the incident and prevent recurrence. For example, in 2016, one of the lessons learned revolved around an injury that resulted from an individual slipping and falling off the back of a pick-up truck during an off-load activity. The lesson focused on the importance of implementing measures to protect employees from falls of less than four feet, even though fall safety at a height of four feet would not trigger an OSHA violation.

FIGURE 15 | Compressed gas cylinders at NETL-Pittsburgh



NETL has also made a collective effort since 2014 to reduce the number of compressed gas cylinders and high-hazard chemicals located at each of its facilities—especially since many of them were unused or already past their useful life. Though a simple action, it is an extremely important safety initiative that helps eliminate the risk of exposure to chemicals or any hazard associated with old compressed cylinders.

The SPR Safety and Health Efforts

The SPR has taken a holistic approach towards its safety and health programs and has made efforts to improve many different areas of its operations. For example, the SPR has continued to comply with its Semi-Annual Weapons Qualification requirements, which has helped maintain a record of zero injuries and fatalities. The SPR has implemented various employee training programs to encourage exemplary safety and health conditions at all its facilities. One of these programs is the Basic Orientation Plus Safety Training that started in 2014. This program is designed to reduce injuries through education by informing employees of all safety rules, regulations, practices, and principles. The SPR also ensured that safety was a priority among all contractors and subcontractors by training all Subcontract Manager Technical Representatives and informing them of the SPR's safety and health requirements. In 2017, the SPR established a process improvement team to review and assess its Lockout-Tagout program. The team created new procedures and incorporated goals to reduce incidents, improve work planning, and increase awareness for the program.

The SPR also made technical improvements and additions to existing processes to maintain safe work practices. One improvement was the purchase of 28 five-gas meters (measures five different gases) to improve sites' readiness posture in responding to emergencies and to increase their air monitoring capability. Furthermore, the SPR developed an automated Job Hazard Analysis program, which uses drop prompts that aid workers in identifying hazards and controls for a specific task. The SPR managers have already observed improvements in the quality and consistency of the existing Job Hazard Analysis program.

Integrating Safety into All Activities As an Integral Practice

Integrated Safety Management (ISM) offers a systematic method of integrating ESS&H into all steps of the work planning and implementation processes. ISM's approach incorporates guiding principles and core functions into all operations, helping to maintain a standardized ESS&H process across FE.

Both NETL and the SPR integrated safety into their management activities by championing the *Heroes for Zero* program; sharing safety best practices and lessons learned at Safety Days and during meetings; and implementing new processes to ensure the safety of all employees. In addition, NETL and the SPR conducted site-specific activities to demonstrate their commitment to the principles of ISM.

NETL Safety Integration

Some of NETL's efforts to better integrate safety into management stemmed from corrective actions. For example, following an incident in 2014, the groundskeeping contractor developed mowing plans that identified slope areas and the appropriate equipment to use on those areas. Following an incident in 2016, NETL emphasized the use of non-destructive excavation, also known as soft dig, to help locate utilities before an excavation project.

Furthermore, NETL made efforts to integrate safety into all of its operations as a preventative measure. One measure features an automated process for removing expiring peroxide formers from its sites' chemical inventory by tracking expiration dates. Better tracking of chemicals can enhance laboratory safety and allows NETL to responsibly manage its waste chemicals. In 2015 and 2016, NETL completed Facility Fire Protection Appraisals at its Pittsburgh and Morgantown sites, respectively.

The SPR Safety Integration

In the last few years, the SPR has made improvements to existing efforts for integrating safety into management and has also developed new efforts for promoting safety in all operations. For example, the SPR's Change Board has continued to evaluate the safety and health impacts of projects when allocating funds. The SPR has also completed its annual ISM validation and documented its performance in the ISM Annual Review every calendar year from 2014 through 2017.

FIGURE 16 | Licensed Physical Therapist Ergonomic Specialist Dr. Richard Bunch talks with the SPR employees about how changing work and lifestyle behaviors can improve health.



Some of the SPR's recent developments include a *Management in Action Program*, the *Speak Up! Listen Up!* Program, and expansion of its Executive Safety Council. The *Management in Action* and *Speak Up! Listen Up!* programs began in 2015. The former required managers, directors, and supervisors to conduct a weekly walk-through and then engage in dialogue with employees on their observations—as they pertain to safety conditions. The latter was designed to foster a safe work environment by increasing employee awareness of safety concerns and offering suggestions to employees on how they can approach and engage peers who commit unsafe acts. This program was developed to reduce the anxiety that tends to overcome employees when they give or receive safety-related feedback. The Executive Safety Council was expanded to include briefings by the SPR site directors on safety statistics and vehicle accidents.

ESS&H Operations

The Office of Environment, Security, Safety, and Health supports DOE's mission by safely operating and safeguarding its facilities; proactively protecting its workers, the public, and the environment; and fully complying with applicable federal,

state, and local ESS&H requirements. This section contains four priorities that span across all FE ESS&H operations.

Achieving Self-Assessment and External Certification of ESS&H Programs

Internal and external ESS&H assessments, as well as third-party certifications, assist FE in identifying best practices, recognizing strong performance, and targeting areas in need of improvement. Assessment and recognition of ESS&H programs demonstrate FE's commitment to ESS&H soundness.

NETL Assessments and Certifications

NETL has continued to pursue third-party certifications for its ESS&H program. The NETL sites in Morgantown, Pittsburgh, and Albany underwent a recertification audit near the end of 2016 to comply with the ISO 14001:2004 and Occupational Health and Safety Assessment Series (OHSAS) 18001:2007 standards. These audits are completed at least once per year at each site. NETL also conducts two internal audits per year to evaluate internal directives and manuals, construction activities, support operations, R&D activities, and ESS&H programs.

FIGURE 17 | SPR employees participating in *Speak Up! Listen Up!* Safety Training



NETL demonstrated the value and importance of external oversight in achieving its goals by coordinating several inspections and site visits. For example, DOE-HQ Site Assistance Visits were conducted annually from calendar years (CYs) 2014 through 2017 at all NETL sites. Other inspections/site visits include: City of Albany Industrial Wastewater Permit Inspection (CYs 2014 through 2017), Annual Morgantown Utility Board Inspection (CYs 2014 through 2017), Annual Pleasant Hills Authority Inspection (CYs 2014 through 2017), Hazardous Waste Permit Inspections at all sites, and the Environmental Compliance Program Site Visit at the Albany site conducted by the Oregon State Historic Preservation Office. These oversight visits and third-party inspections allow NETL to identify issues (if present) and opportunities to improve performance at its sites and facilities.

DOE's Office of Sustainable Environmental Stewardship recognized NETL's efforts in ESS&H operations with the 2015 Federal Green Buy Award. NETL earned the Leadership Goal for nine products in five distinct categories, achieving excellence in Sustainable Acquisition.

FIGURE 18 | A Site Assistance Visit at NETL-Pittsburgh, conducted by the Office of ESS&H.



The SPR Assessments and Certifications

The SPR has undertaken several activities to achieve third-party certifications and external recognition. For example, since 2014, the SPR has ensured that its four storage sites are rated as Star facilities in both OSHA's and DOE's Voluntary Protection Programs. In addition, an auditor certified by the National Accreditation Board, a non-governmental organization jointly owned by the American National Standards Institute and the American Society for Quality, performed an assessment of the SPR's Environmental Management System. The auditor found the system to be compliant with ISO 14001:2004 standard after each audit. The SPR is currently updating its Environmental Management System's written plan, policies, procedures, and employee training in preparation for obtaining a certification of compliance with the ISO 14001:2015 standard.

In the last few years, the SPR has also welcomed several external oversight visits and inspections, conducted assessments of its operations, and participated in ESS&H appraisals. For example, a team from FE and the Office of Petroleum Reserves conducted two headquarters assessments in 2017—the SPR PMO Safety Oversight Assessment and the West Hackberry Tank 14 Judgment of Need Effectiveness Review—and discovered opportunities for improvement and identified best practices. Other assessments of the SPR conducted in the last few years include the Technical Assessment of the Industrial Hygiene Program, Organization Assessment by Maintenance & Operations (M&O) Contractor, OSHA Voluntary Protection Program Assessments, ISO 9001 Certification, and Technical Assessments covering several topics. Many of these assessments were conducted to ensure that the SPR was complying with policies and DOE Orders and to promote an environment of continuous improvement as they identify corrective actions.

The SPR personnel have received awards and recognition for many of these efforts. Each SPR site received awards in 2016 and 2017 through the OSHA and DOE Voluntary Protection Program. The SPR also received the Electronic Product Environmental Assessment Tool (EPEAT) Purchasers Award in 2016 from the Green Electronic

FIGURE 19 | Awards were given to the SPR at the national Voluntary Protection Program Participants' Association Conference in August 2017.



Council, showcasing its commitment to environmental stewardship and sustainable procurement. The SPR's efforts have also trickled down to its contractors. The project manager and project lead on safety and health from the SPR's M&O contractor were recognized as a "CEO That Gets it" and a "Rising Star," respectively, by the National Safety Council. The M&O contractor also received the Energy and Nuclear Award for Environment, Security, and Health Performance from the Fluor Corporation.

Building a Strong ESS&H Culture

FE sites are dedicated to building a strong culture of ESS&H across the organization. It is vital for the sites to cultivate and maintain an organization-wide culture that fosters environmental stewardship and a safe, secure, and healthy work environment.

NETL Culture Building

The hallmark of NETL's efforts to build a strong ESS&H culture is its Safety Campaign, which first started in 2017. The campaign emphasizes a safety topic each month and includes an ESS&H presentation to all employees. Furthermore, several communication materials, such as flyers and fact sheets, were developed and distributed to promote awareness of the safety topic. For example, one of the monthly topics was "Slips, Trips, and Falls," and the communication material described preventative measures for workplace injuries that result from these incidents.

NETL also contributes to its ESS&H culture by engaging with its community. In 2017, NETL conducted the Regional Workforce Initiative where community groups and technical colleges tour the NETL facilities in Morgantown, West Virginia. The initiative helps support NETL's engagement with the community and cultivate strong relationships.

FIGURE 20 | NETL Regional Workforce Initiative tour



The SPR Culture Building

In 2014, to promote a strong ESS&H culture, the SPR initiated an annual Environment, Safety, and Health (ES&H) Week, which involves the sites holding special activities for all employees. An ES&H Summit is also held annually and includes briefings by the safety, health, and environmental departments and the security subcontractor, followed by an open forum to discuss ideas and opportunities for improvement.

The SPR also conducts community outreach events to build an ES&H culture. For example, the SPR annually hosts Environmental Advisory Committee meetings, which include environmental experts and community representatives, as part of the SPR's outreach efforts. The SPR also conducts outreach during its annual Earth Day event, in which employees travel to elementary schools to promote sustainability awareness and hold photo contests for the students.

Some of the SPR's other efforts are intended to build its safety culture. For example, in 2014, the SPR completed a focus group study to gauge safety culture and make improvements where needed. Since 2014, the SPR has been holding annual Tripartite Safety council meetings, which give employees an opportunity to address safety issues directly with the Project Manager.

In 2017, the M&O contractor used the Safety Barometer survey from the National Safety Council to provide a measure of safety culture at the SPR. The survey also allows employees to provide their feedback on the strengths and weaknesses of the safety program.

Increasing On-Site Quality Assurance

Every FE task is subject to a rigorous, systematic quality assurance (QA) process that validates its alignment with the organization's mission and reflects the highest standards of excellence. The QA process instills confidence of employees and customers in each ESS&H product and service offered by FE. This section details efforts of NETL and the SPR to comply with the QA requirements of DOE Order 414.1D, Chg 1.

NETL Quality Assurance

From FY 2014 through 2017, NETL made several efforts to increase QA across its operations. One example is NETL's process for evaluating R&D projects. The lab conducts initial and annual assessments on all R&D projects to ensure their compliance with NETL-adopted codes and standards, as well as design and safety requirements. NETL also initiated the Conduct of Research Operations process, which requires Quality Packages to be assembled from design and safety processes. This helps ensure that the initial fabrication of projects meet the intended design.

FIGURE 21 | NETL-Morgantown Site Assistance Visit



The SPR Quality Assurance

As part of its efforts to comply with DOE Order 414.1D, Chg 1, the SPR launched an initiative in 2014 to develop annual Oversight Management Plans (OMPs) at each organization. The OMPs establish oversight schedules and priorities using a risk-based approach, and oversight activities are then presented to the Project Manager quarterly.

The SPR also made efforts to augment existing programs and assessments to ensure QA. For example, the SPR added Technical Assessments (TAs) as an oversight tool. TAs are an improvement from Management Appraisals because they are more comprehensive and thorough. The SPR seized upon an additional opportunity to incorporate QA into its operations through the insertion of a workflow “front end” to the assessment programs. This automates the documentation and review of assessment results, which reduces time spent in routing and avoids duplicative efforts. Automation also utilizes electronic storage of results as opposed to maintaining hard copies.

Fostering a Continuous Learning Environment

For continuous performance improvement, FE fosters a learning environment that emphasizes the importance of training, development, and the incorporation of best practices into operations. The FE sites conduct trainings focused primarily on safety, health, and wellness on the job; environmental management, remediation, and sustainability; waste minimization; implementation of strong security procedures; adequate preparation for emergencies; and root cause analysis.

NETL Trainings

NETL's efforts promote a continuous learning environment. One of these efforts includes a goal developed to reduce “Instances of Incomplete or Expired Training” across all its operations. Since 2014, NETL has already reduced the number of these instances from more than 500 to now fewer than 100. NETL also displayed its dedication to this effort along with its commitment to emergency response with the development of the General Employee Emergency Training,

which helps prepare all employees for an array of emergency events. Another example exhibits the results of an open learning environment. During a Confined Space Audit in 2016, DOE recognized that the permit system was not being implemented in accordance with OSHA requirements. In response, site managers requested an updated training so that all employees could better understand those requirements. NETL's own employees suggested the training exercise to improve operations, which validates that NETL has clearly communicated the value of workplace training and education to its employees.

SPR Trainings

As part of its commitment to safety and prevention of injuries, the SPR implemented Basic Orientation Plus Safety mandatory training for all M&O contractor personnel and subcontractors. The training informed employees of general safety rules, regulations, practices, and principles. The SPR made another effort to encourage safety through education with the Lockout-Tagout Program training exercise (see Figure 22). It is important for employees to understand the procedures involved with this program because it helps reduce incidents, improves work planning, and increases program awareness.

FIGURE 22 | The SPR West Hackberry site – Lockout-Tagout training, August 2017



Each FY during 2014 through 2017, the SPR conducted four refresher academies for the members of each site's emergency response team. As part of its emergency response team program, the SPR also sent 10 employees to the Advanced Exterior Industrial Fire Brigade Training at the end of 2017.

The training consisted of three days in the classroom developing a solid foundation of knowledge and skills to safely resolve exterior fire emergencies, plus a day of hands-on training (see Figure 23).

FIGURE 23 | Ten SPR employees attended the Advanced Exterior Industrial Fire Brigade Training at the Delgado Training Center in New Orleans.





SUMMARY of ESS&H PERFORMANCE METRICS

FE is committed to the goal of reducing work-related injuries, illnesses, and environmental releases – striving for zero instances in all of these areas using our outstanding ESS&H programs. This section highlights progress made during FYs 2014–2017 to improve FE-wide ESS&H performance measures. Data related to health and safety performance of FE and DOE represent all workers, including federal employees, contractors, and subcontractors. FE obtained safety and health data and information about accident root causes from DOE’s Computerized Accident/Incident Reporting System (CAIRS) and data on operational occurrences, environmental releases, and regulatory violations from DOE’s Occurrence Reporting and Processing System (ORPS). All DOE sites are required by DOE Order 231.1B, *Environment, Safety and Health Reporting Order* and DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information* to report data to CAIRS and ORPS, respectively. Additionally, data on incidents of security concern (IOSC) were obtained directly from the FE sites. Appendix A summarizes site-specific ESS&H quantitative performance information, including comparisons of FE performance to other DOE sites. All data included in this report are as of March 31, 2018.

During FYs 2014–2017, FE experienced decreases in key accident/injury metrics, such as the Total Recordable Case (TRC) rate and the Days Away, Restricted, or On-Job Transfer (DART) rate. To support the effort of maintaining

improvements in accidents and injuries prevention, FE is strengthening its safety culture by empowering its employees to make decisions on the type of trainings and corrective actions that should be implemented.

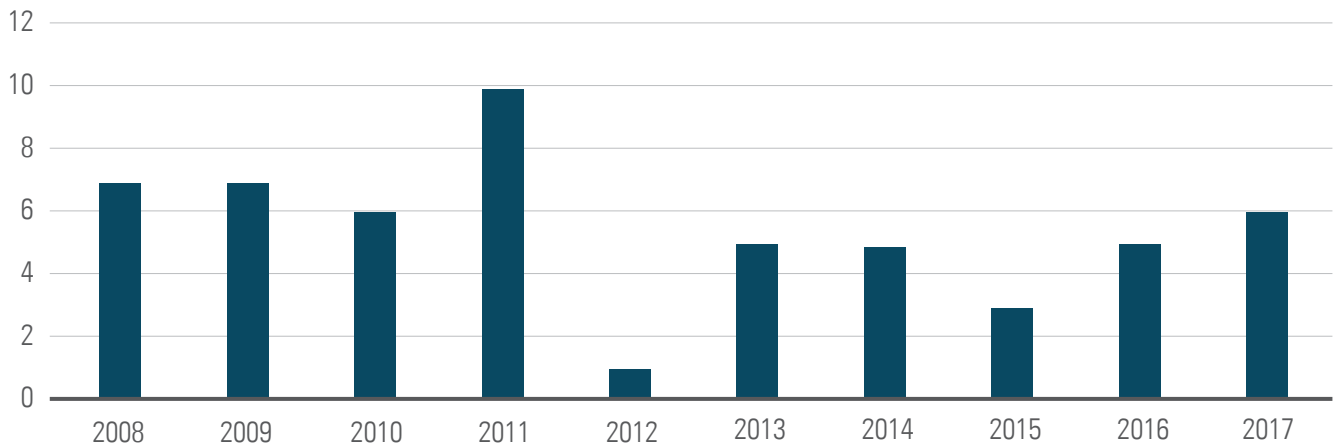
Environmental

Environmental Releases

Environmental releases represent the total number of spills, leaks, and discharges of hazardous substances, oil, and regulated pollutants into the environment that must be reported with the ORPS database. Occurrences with the 12D-EH Categories – Environmental Releases/Compliance tag were counted as an environmental release. Oil and brine spills make up most of the environmental releases. FE sites reported 19 environmental releases from FYs 2014–2017 (see Figure 24), averaging almost 5 releases annually. This is fewer than the 10-year running average of 5.5 releases.

Of FE’s 19 releases in the last 4 fiscal years, the SPR accounted for about 75 percent of them. However, it is important to note that 11 of those spills occurred in FY 2016 and FY 2017, the SPR’s two highest totals in the last decade. These spills consisted of brine, oil, and diesel leaks. The previous high was recorded in 2016 with three releases. NETL reported one release in FY 2014 and no releases during the following three fiscal years.

FIGURE 24 | The number of environmental releases at FE sites by FY



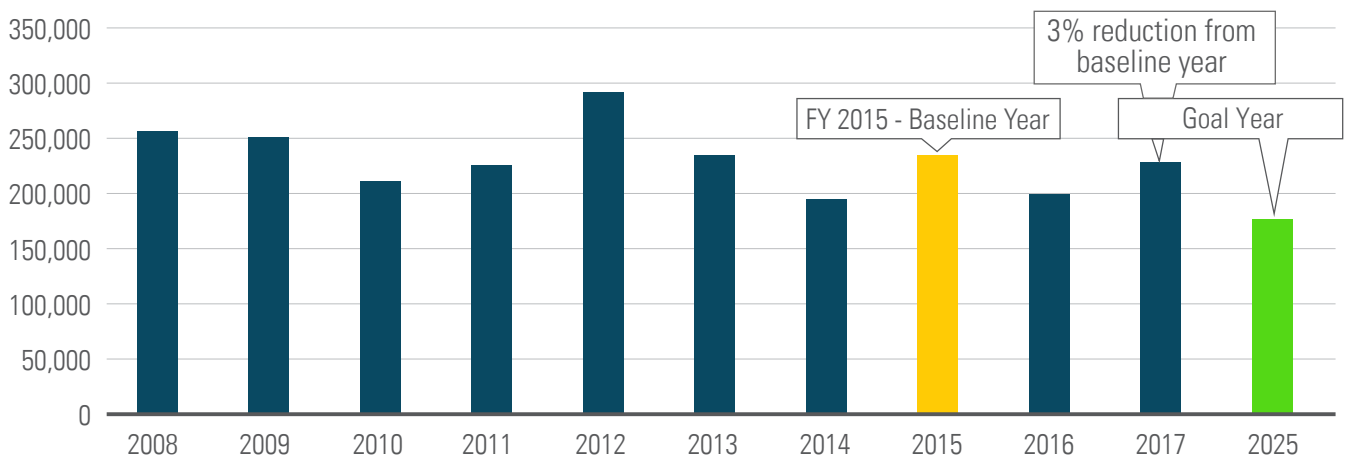
Source: Occurrence Reporting and Processing System as of March 31, 2018

Energy Use Intensity

Energy use intensity is defined as energy consumption, often measured in British thermal units (Btu) or millions of British thermal units (MBtu), per gross square foot (gsf) of building space. Per EO 13693, agencies must reduce building energy use intensity by 2.5 percent annually, or by 25 percent in 2025, relative to the baseline of FY 2015. There are various means of achieving this goal with common practices, such as:

- Using remote auditing technology for assessing buildings' energy performance
- Participating in demand management programs
- Ensuring that monthly performance data is entered into the ENERGY STAR® Portfolio Manager of the U.S. Environmental Protection Agency (EPA)
- Incorporating, where feasible, the standard Green Button data access system
- Implementing space utilization and optimization practices and policies
- Identifying opportunities for transition to energy-efficiency technologies
- Conforming to city energy performance benchmarking and reporting requirements.

FIGURE 25 | Energy use intensity in FE buildings by FY (millions of Btu per 1,000 gross square feet)



Source: DOE Sustainability Dashboard

As of FY 2017, FE has reduced energy use intensity by 3 percent from the 2015 baseline year, which is slightly below the annual 2.5 percent reduction goal (see Figure 25). However, it is evident that both sites are continuing to pursue further reductions in their energy use intensity. For example, the SPR has upgraded many of its high-pressure sodium lights to LEDs, yielding over 2 megawatts of energy savings. The SPR still has many opportunities to reduce energy consumption as its energy use intensity has increased by 6 percent from 2015.

NETL has reduced the energy use intensity of its facilities by 17 percent since 2014 and by 11 percent since 2015. This comes as no surprise because NETL has completed several projects within the last few years to bring existing buildings into compliance with the DOE Federal Energy Management Program’s High Performance and Sustainable Buildings Plan’s Guiding Principles (HPSB GP). Furthermore, NETL created a requirement for all new construction and renovation to meet HPSB GP and, beginning in 2020, it will integrate the energy net-zero requirement of EO 13693 into new building designs.

Potable Water Intensity

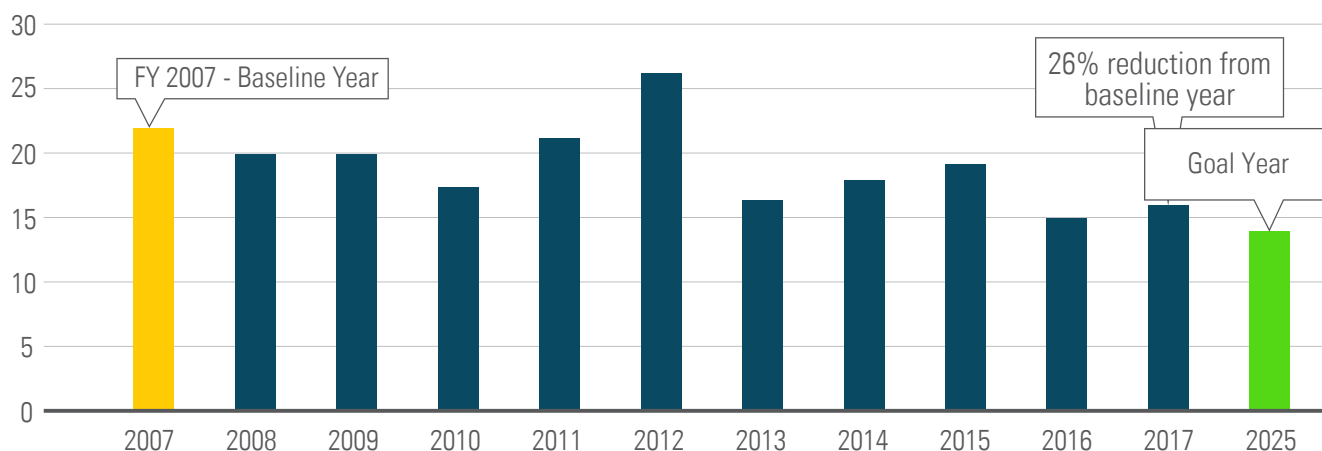
DOE has a goal in place to reduce potable water intensity by 36 percent by FY 2025 relative to the FY 2007 baseline. In

FY 2017, FE’s potable water intensity was about 16 gallons per gsf, marking a 20 percent reduction from the baseline year of FY 2007, and a 10 percent reduction since FY 2014 (see Figure 26). If FE continues to reduce water intensity at this rate (~2 percent reduction annually), it will achieve its goal by the target year, FY 2025.

Despite FE’s reduction in potable water intensity, the SPR’s water intensity is up 73 percent from FY 2014, and up 81 percent from the baseline in FY 2007. However, the SPR’s water consumption hinges on crude oil sales; thus, a spike in water intensity is often the result of a congressionally mandated crude oil sale. Nevertheless, there are still opportunities for the SPR to increase its water use efficiency. Research showed that the SPR could reduce potable water use by installing more efficient water fixtures and by installing a rainwater harvesting system.

Since FY 2007, NETL has reduced potable water intensity by 56 percent; well beyond the goal of a 36 percent reduction by FY 2025. Most of NETL’s reduction occurred within the last few years and, since 2014, its sites have reduced water intensity by more than 38 percent. This reduction results from NETL’s efforts to install water-conservation measures at each of its sites, including low-flow toilets, urinals, sink faucets, efficient showerheads, and the incorporation of closed-loop cooling systems.

FIGURE 26 | Potable water intensity by FY in gallons per gross square foot



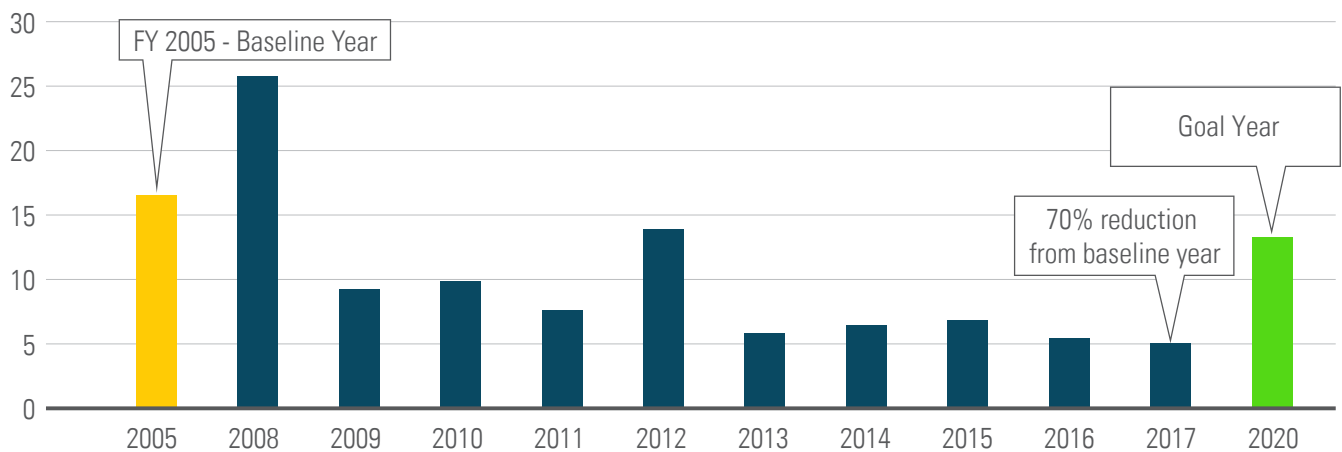
Source: DOE Sustainability Dashboard

Vehicle Fleet Fuel Consumption

According to EO 13693, every agency with a fleet of at least 20 motor vehicles must reduce the fleet’s total consumption of petroleum products by 2 percent annually through the end of FY 2020 relative to a 2005 baseline. Despite a few years of increased fuel consumption, as of FY 2017, FE had reduced its fleet fuel consumption by 45 percent since 2005 (shown in Figure 27). This equates to almost a 4 percent annual reduction in fuel use. FE met the 30 percent reduction goal in 2015 and has continued to cut consumption since then.

During and after FY 2014, FE has purchased more than 1,300 vehicles to add to or replace vehicles in its fleet. NETL added 449 vehicles to its fleet between the Morgantown and Pittsburgh sites, and the SPR added 860 between all four of its sites. About 10 percent of NETL’s total acquisitions were hybrid vehicles, which demonstrates its commitment to increasing the fuel efficiency of its fleet. The SPR purchased 102 hybrid vehicles, equal to 12 percent of its total vehicle acquisitions.

FIGURE 27 | FE vehicle fleet fuel consumption by FY [gallons of gasoline equivalent (GGE)]



Source: FE Sustainability Dashboard Performance Graphs

Security

Incidents of Security Concern

DOE Order 470.4B Chg 2, Attachment 5, outlines the details of Incidents of Security Concern (IOSC). The objective is to ensure that the occurrence of a security incident prompts the appropriate graded response, which includes an assessment of potential impacts, notifications, extent of conditions, and corrective actions, if applicable. There are also several other purposes that the IOSC program serves, including:

- Ensuring the security incidents are communicated to DOE/National Nuclear Security Administration line management, Congress, and other federal agencies
- Meeting regulatory reporting requirements
- Enhancing the ability to track and trend the health of the security program
- Ensuring that incidents are assessed relative to the impact to national security and the collateral impact with other programs and security incidents
- Enabling mechanisms to support performance assurance, self-assessment, and/or oversight
- Enhancing the ability to influence policy development and site security implementation
- Ensuring that the Security and Services (S&S) program's successes are identified and communicated.

Incidents are categorized by their severity. Category A incidents are those that may impact national security, whereas Category B incidents are of much lesser significance (i.e., incidents that do not meet Category A criteria) and are often managed and resolved by the Cognizant Security Office (CSO). Incidents can consist of a range of possible actions, inactions, or events that could cause the following:

- Pose threats to national security interests and/or Departmental assets
- Create potentially serious or dangerous security situations
- Have a significant effect on the S&S program's capability to protect DOE S&S interests
- Indicate the failure to adhere to security procedures

- Illustrate that the system is not functioning as designed by identifying and/or mitigating potential threats (e.g., detecting suspicious activity, hostile acts).

Managers often have discretion in categorizing an incident as a Category A or B. Examples of IOSCs reported by the SPR and NETL from 2014–2017 are provided below:

- Bomb threat (Category A)
- Foreign nationals denied access for lack of proper identification (Category B)
- Missing DOE badge (Category B)
- Drugs found during vehicle inspection (Category B)
- Denied entry for prohibited items (Category B)
- K9 alerts (Category B)
- Minor security incidents for expired driver's license, improper delivery documents (Category B)
- Communication center alarm (Category B)
- Accidental discharge of weapon by the Protective Force (Category B)

Corrective actions were identified and taken by the sites for each of these incidents. For example, for any denied entry, the site followed up by writing a report and documenting the incident in the Safeguards and Security Information Management System (SSIMS).

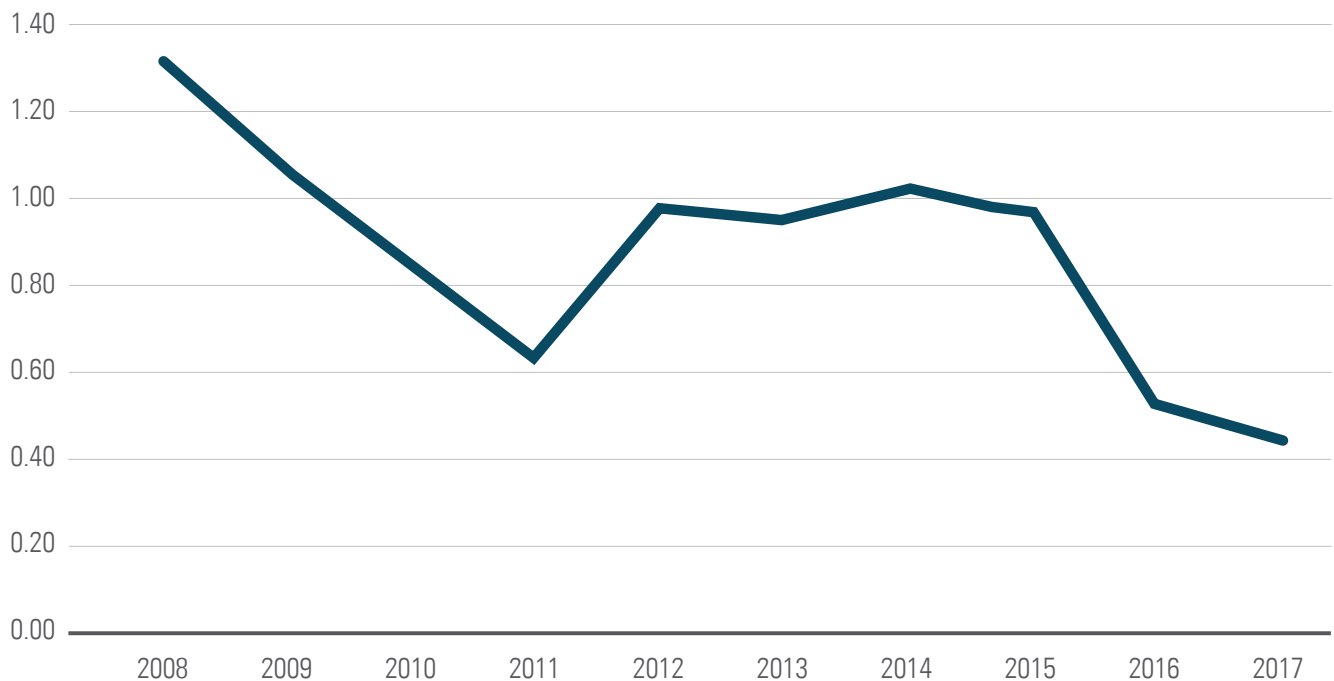
Safety & Health

Total Recordable Case (TRC) Rate

The TRC rate consists of the number of injuries and illnesses incurred by federal and contractor employees in a year that are serious enough to result in medical treatment, loss of

consciousness, restriction of work activity, or time away from work. The TRC rate accounts for the number of injuries and illnesses normalized for the hours worked at FE sites. The basis for this normalization is 200,000 hours worked, which is equivalent to the number of hours worked by 100 workers in 1 year.

FIGURE 28 | FE TRC rate by FY (number of injury and illness cases per 100 workers)



Source: Computerized Accident/Incident Reporting System as of March 31, 2018

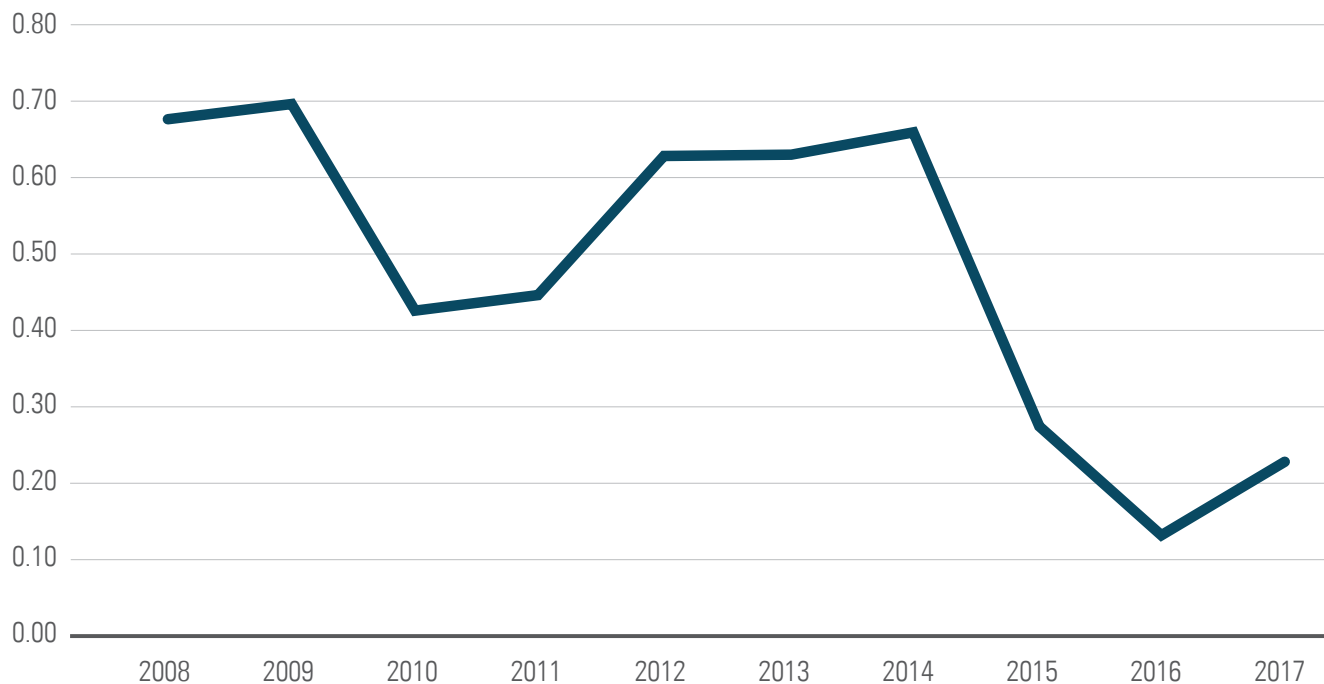
FE's TRC rate has declined from a high of 1.31 in FY 2008 to a low of 0.44 in FY 2017, the most recent fiscal year reviewed in this report (see Figure 28). Although there was a spike in the TRC from FY 2011 through FY 2014, the TRC rate has steadily declined since then. Part of this trend could be explained by FE's sale of the Rocky Mountain Oilfield Testing Center, but there are also other variables to consider that are beyond the scope of this report. The decline may be attributed to the success of FE's safety and health programs and efforts.

Days Away, Restricted, or On-Job Transfer (DART) Case Rate

FE's DART Case Rate represents the number of work-related injuries that resulted in employees missing days of

work, returning to work on restricted duty, or working in a different function, normalized to hours worked. Unsatisfactory performance in this category can have serious consequences and cost implications because the organization loses the productivity of injured employees while they recuperate. During FY 2014 through FY 2017, FE's DART Case Rate dropped from 0.66 to 0.22, a 66 percent decrease (see Figure 29). In FY 2016, FE's DART Case Rate was 0.13, the lowest rate in well over a decade. During the same period, both the SPR and NETL reduced their DART Case Rates by 71 percent and 70 percent, respectively.

FIGURE 29 | FE DART Case Rate by FY (number of cases per 100 workers)



Source: Computerized Accident/Incident Reporting System as of March 31, 2018

Days Away, Restricted, or On-Job Transfer Rate (DART)

The DART rate is the actual number of lost workdays, days of restricted work activity, or job transfer resulting from these injuries per 200,000 hours (approximately 100 person-years). This rate is commonly used as an indicator of accident severity.

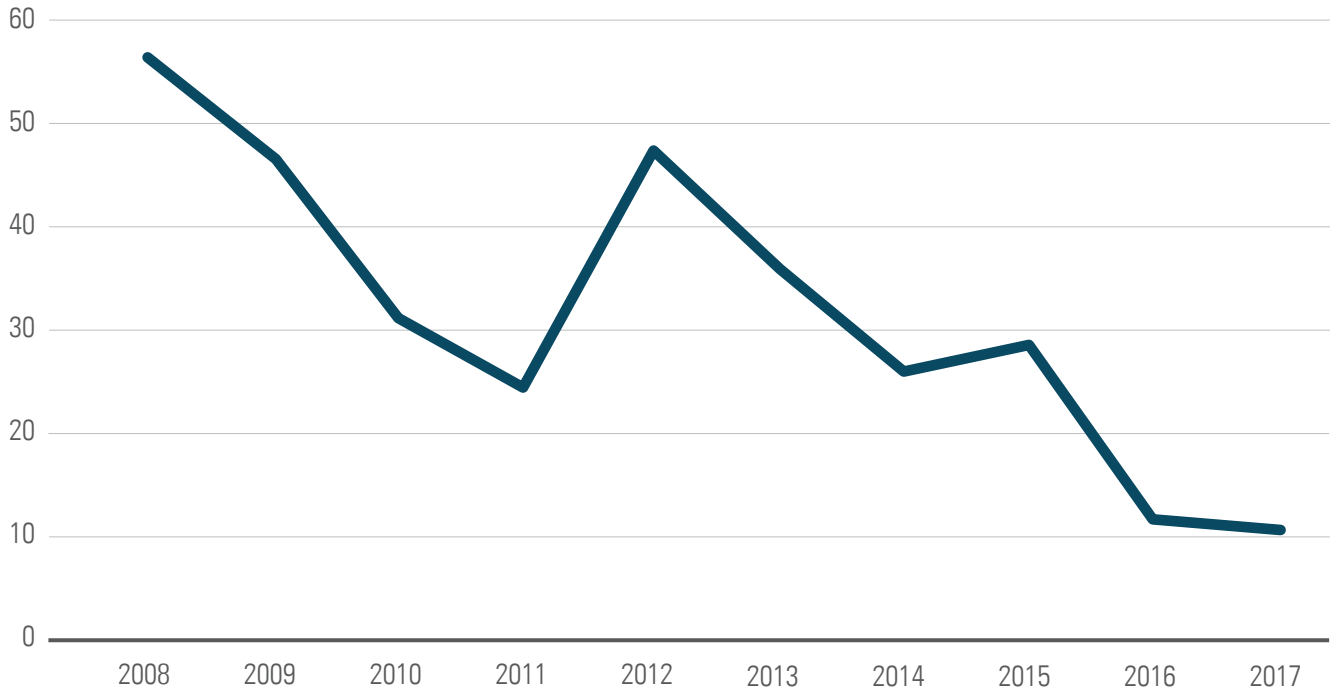
FE had a DART rate of 10.6 in FY 2017, a 10 percent decrease from FY 2016 and almost an 80 percent decrease since FY 2008 (see Figure 30). In FY 2017, FE had 238 lost workdays, days on restricted duty, or transfer. Of this total, 162 were lost workdays and 76 were on restricted duty or on-job transfers. Lost workdays—which contribute to the DART rate—are the result of work-related accidents such as slips, trips, and falls, that result in an employee missing time from work. Both NETL and the SPR significantly improved their DART rates since FY 2008. While the rate increased from FY 2010 through FY 2014, it fell rapidly beginning in FY 2015—a rate that both sites have maintained through FY 2017.

Operational Occurrences

The operational occurrences metric represents the number of operational events or conditions that may adversely affect federal and contractor personnel, the public, DOE property, the environment, or the DOE mission. During FYs 2014–2017, there were 82 total operational occurrences (including the RMOTC), an average of about 20 occurrences per year (see Figure 31).

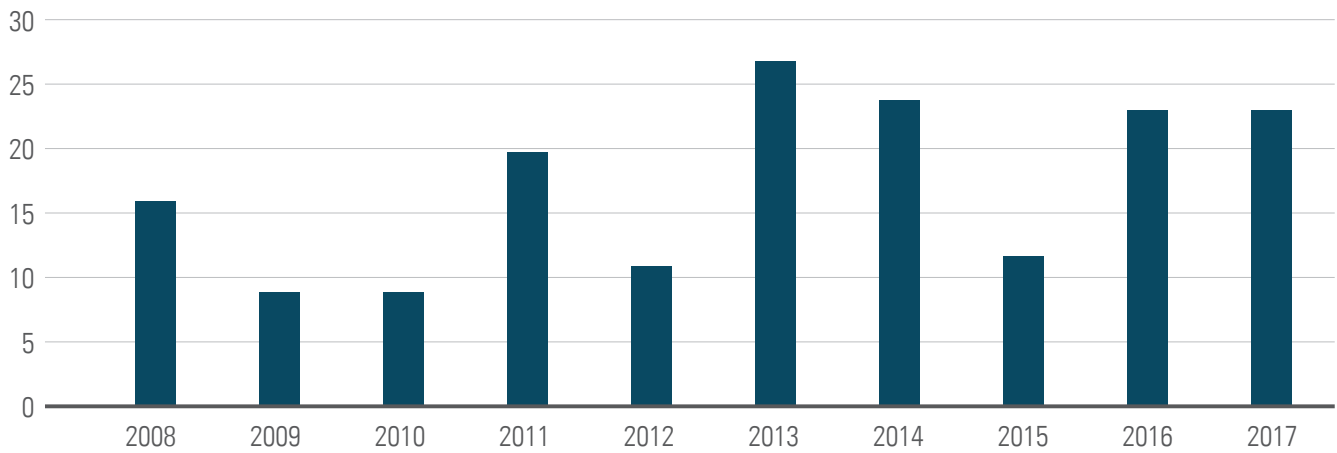
The SPR had 45 of the 82 operational occurrences. The SPR’s highest count was in FY 2017 and totaled 17 operational occurrences. The causes of the operational occurrences varied from environmental incidents (e.g., oil and brine releases) to safety incidents (e.g., a flash fire that occurred at the West Hackberry site and more severe employee accidents or falls). The SPR will continue to focus on mitigating risks from both environmental and on-the-job safety hazards.

FIGURE 30 | FE DART rate by FY (number of days per 100 workers)



Source: Computerized Accident/Incident Reporting System as of March 31, 2018

FIGURE 31 | FE number of operational occurrences by FY



Source: Occurrence Reporting and Processing System as of March 31, 2018

ESS&H Operations

Regulatory Violations

Regulatory violations are the total number of citations received from external regulatory agencies, such as the EPA, OSHA, or state regulatory agencies. During FYs 2014–2017, there were four regulatory violations at FE—all of which were issued to the SPR sites (see Table 3).

The four violations at the SPR included two monitoring and reporting violations (one for failing to collect lead and copper samples and the other for failing to submit a disinfectant level quarterly operating report) and two compliance violations (one for not providing notification of a failed mechanical integrity test and another for failing to collect samples of brine that flowed to the Gulf of Mexico).

By the end of FY 2016, the SPR had implemented corrective actions for all four violations to prevent reoccurrence. For example, in response to the Lead and Copper Rule Monitoring and Reporting Violation, the SPR now uses a web-based data warehouse that provides advance notices for when to collect samples.

Although NETL was not issued a formal regulatory violation during FYs 2014–2017, staff had identified two potential violations in FY 2016, and NETL immediately addressed both with corrective actions. For example, following the discovery of the improper disposal of an asbestos-containing material, NETL modified its work order review process to increase the awareness of environment, safety, and health guidelines.

TABLE 3 | FE Regulatory Violations or Notices of Violation by FY

Fiscal Year	FE Regulatory Violations or Notices
2008	0
2009	1
2010	1
2011	1
2012	2
2013	0
2014	1
2015	2
2016	1
2017	0



ESS&H CHALLENGES, GOALS, and INITIATIVES FOR FY 2018

During FYs 2014–2017, FE made progress in its ESS&H performance, as evidenced in Section III, by making improvements in many of the metrics. In FY 2018, FE will continue to focus on minimizing accidents and injuries, improving industrial hygiene programs, educating employees, enhancing emergency responses through exercises, eliminating IOSCs, and minimizing environmental releases. This section provides an overview of FE’s ESS&H challenges, priorities, and the initiatives to be addressed during FY 2018, followed by a summary of site-specific actions.

Key Challenges to Performance

Both the SPR and NETL face challenges to their ESS&H efforts in FY 2018, and while they share some of those challenges, others are site-specific. One common challenge includes employee turnover which can make it difficult to maintain progress. Another substantial challenge involves Continuity of Operations (COOP) planning. This is defined in the National Security Presidential Directive 51/Homeland Security Presidential Directive–20, as an effort within individual executive departments and agencies to ensure that Essential Functions continue to be performed during a wide range of emergencies. See more under Emergency Response and COOP Actions.

NETL Challenges

NETL identified employee turnover as one potential challenge to its ESS&H performance in FY 2018 and future years. NETL’s Emergency Response Organization is staffed by volunteers, and it is a challenge to court enough volunteers to support the organization. It is a significant time commitment

by hazmat or rescue staff as they are required to participate in a comprehensive, focused monthly training program. Aside from the time commitment, retirements and reassignments make it difficult to hold onto volunteers.

The SPR Challenges

The SPR has identified a couple of challenges for its performance in FY 2018. One is the result of high staff turnover, which makes it difficult to retain and transfer knowledge of programs and trainings. This makes it more difficult to continue running existing programs and also adds expenses because of the need to train incoming employees.

Another challenge the SPR has identified pertains to its Industrial Hygiene Program. As the program continues to mature, the amount of data needed to be warehoused will increase. This presents a challenge because the current software and database system is not sufficiently equipped to process and analyze large sets of data.

Emergency Response and COOP Actions

FE participated in the Eagle Horizon (EH 18) exercise in May of 2018, which was an annual continuity exercise that all Federal Departments and Agencies participate in to test their continuity operations. It focused on decision-making processes within the respective departments. The EH 18 was unique this year because it was integrated with the larger National Level Exercise (NLE 18) under one common scenario. FE will play a much bigger role than in the past because it is essential to DOE’s third Primary Mission Essential function (PMEF) which is to: *Continuously monitor and manage the National*

Energy Infrastructure and execute incident management responsibilities under the National Response Framework (NRF), to include responding to energy infrastructure disruptions, to ensure rapid recovery of energy supplies.

Priorities and Goals for FY 2018

In the wake of challenges that both NETL and the SPR will face in FY 2018, each site has outlined priorities and goals for improving its ESS&H program.

NETL Goals

Despite the challenges NETL expects to face in FY 2018, it has identified several priorities to improve its performance in ESS&H, emergency management, and quality assurance. Two of its priorities involve upgrades to current programs. NETL plans to upgrade to ISO 14001:2015 from its current Environmental Management program and expects to upgrade its consensus standards. NETL also plans to update its chemical inventory software, and export compliance advisor services and its medical database.

Several of NETL's planned efforts indicate prioritization of emergency management in FY 2018. For example, NETL will conduct enhanced emergency full-scale exercises, table top exercises, and drills at all three of its sites to assess their readiness assurance capabilities. Each site also plans on completing its Threat and Hazard Identification and Risk Assessment by the end of FY 2018.

The SPR Goals

The SPR's priorities for FY 2018 include educating its workforce; setting goals to reduce safety incidents (using metrics outlined in the Safety & Health section to evaluate performance); mitigating risks; providing greater oversight and improving quality assurance; ensuring environmental compliance; and maintaining certifications such as ISO 14001-2015.

More specifically, the SPR plans to take advantage of opportunities to educate DOE employees on better oversight practices. Topics include awareness of effective assessment techniques and the organization's assessment tracking system. The SPR also plans to improve federal and contractor staff's understanding of the Conduct of Operations and Work Planning and Control frameworks.

In addition, the SPR's performance-based goals for FY 2018 include achieving an annual TRC rate of 1.4 or less, reducing its DART Case Rate to 0.90, ensuring zero Notices of Violation and zero OSHA violations. The SPR's operational goals and/or priorities for FY 2018 include the following:

- Provide safety and health support to the Life Extension 2 effort
- Continue improving the Industrial Hygiene Program
- Provide on-site support to high-risk projects and activities like workover and construction
- Ensure all NEPA actions are completed for Life Extension 2
- Have a greater focus on effective job planning and hazard mitigation
- Conduct eight oil spill drills each year.

2018 Site-Specific Initiatives to Improve Performance

The following are site-specific, actionable initiatives identified by NETL and the SPR to strengthen their ESS&H-related performance.

NETL Actions

- Install electric vehicle charging stations at the Morgantown and Pittsburgh sites, which will be available for the General Services Administration's leased and employee (pay-for-use) vehicle use.
- Implement the New Hire Safety Orientation and develop a NETL ESS&H Employee Handbook.
- Complete all remediation actions at the Hoe Creek Underground Coal Gasification Site near Gillette, Wyoming.

- Conduct Federal Emergency Response Program Manager self-assessments, FE-HQ Site Assistance Visits, and the National Nuclear Security Administration's Office of Emergency Operations (NA-40) reviews to identify shortcomings and process improvements to enhance the Emergency Management Program.
- Obtain and roll out the Alert, Warning, Accountability, and Response (AWARE) accountability software.
- Gain access to WebEOC through the Emergency Communications Network to enhance communication and delivery of incident situational reports to the DOE Watch Office.
- Redevelop NETL COOP Plan in order to fulfill all requirements.
- Continue to perform annual quality assessments for each research project.
- Perform surveillance and access system maintenance at all sites.
- Maintain ISO 14001 and OHSAS 18001 certifications.
- Enhance data reliability of the Power Monitoring Communication and Control for reporting, monitoring, and conserving electricity in buildings.
- Conduct an OSHA-Voluntary Protection Program recertification visit to West Hackberry.
- Enhance work planning and control to focus on effective job planning and hazard mitigation.
- Develop a comprehensive system for tracking and trending of first aid and recordable incidents.
- Continue to improve the Continuity of Operations (COOP) Program and perform drills that prepare the SPR employees for effective response to emergencies.
- Coordinate with FE-HQ to rewrite the FE COOP Plan and ensure all requirements are being met.
- Ensure the development, implementation, assessment, maintenance, and improvement of the M&O Contractor's QA program.
- Ensure the use of the Issues Management program.
- Promote the development and use of the SPR PMO's Lessons Learned Database.

The SPR Actions

- Update the Industrial Hygiene Program.
- Continue training the Site Safety Specialists to the level of Industrial Hygiene Program technicians.
- Implement the revised and improved Lockout-Tagout program.
- Establish a Process Improvement Team to evaluate and recommend changes to spill reporting and response.
- Enhance the use of the ESS&H data tracking system to monitor key environmental deliverables, due dates, and payment of fees associated with environmental programs.
- Improve Job Hazard Analysis as part of Improved Work Control.

APPENDIX A: OFFICE OF FOSSIL ENERGY ES&H DATA

TABLE A-1 | Environmental Data, FYs 2008-2017

Fiscal Year	Environmental Releases	Potable Water Intensity (gallons per gsf)	Energy Use Intensity (MBtu per 1,000 gsf)	Fleet Fuel Consumption (GGE)
2008	7	19.92	256,481	301,558
2009	7	20.09	251,336	106,787
2010	6	17.25	212,076	113,933
2011	10	21.15	226,975	88,766
2012	1	26.38	293,504	162,258
2013	5	16.39	235,425	67,744
2014	5	17.91	193,851	74,265
2015	3	19.24	235,097	79,222
2016	5	14.91	201,106	62,492
2017	6	16.07	227,838	58,702
FYs 2014–2017 % Change	20%	-10%	18%	-21%
10-Year % Change	-14%	-19%	-11%	-81%

Red numbers indicates percentage increase and green numbers indicate percentage decrease.

TABLE A-2 | Safety and Health Data, FYs 2008-2017

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
2008	0.68	56.17	1.31	16
2009	0.70	46.46	1.07	9
2010	0.43	31.00	0.85	9
2011	0.45	24.06	0.64	20
2012	0.63	47.31	0.98	11
2013	0.63	36.42	0.95	27
2014	0.66	25.85	1.03	24
2015	0.28	28.42	0.97	12
2016	0.13	11.78	0.53	23
2017	0.22	10.59	0.44	23
FYs 2014–2017 % Change	-66%	-59%	-57%	-4%
10-Year % Change	-67%	-81%	-66%	44%

*DART – Days Away/Restricted or Job Transfer Rate; TRC – Total Recordable Case

Red number indicates percentage increase and green numbers indicate percentage decrease.

APPENDIX B: STRATEGIC PETROLEUM RESERVE (SPR) ES&H DATA

TABLE B-1 | SPR Environmental Data, FYs 2008-2017

Fiscal Year	Environmental Releases	Potable Water Intensity (gallons per gsf)	Energy Use Intensity (MBtu per 1,000 gsf)	Fleet Fuel Consumption (GGE)
2008	0	26.84	440,425	112,225
2009	1	31.49	506,183	49,264
2010	0	23.95	367,565	59,175
2011	0	38.95	436,660	48,600
2012	1	64.50	801,429	48,468
2013	0	29.92	497,702	37,102
2014	1	21.63	272,815	52,770
2015	2	38.35	713,310	66,918
2016	5	22.97	567,121	54,632
2017	6	37.33	755,370	52,620
FYs 2014–2017 % Change	500%	73%	177%	<-1%
10-Year % Change	600%	39%	72%	-53%

Red numbers indicate percentage increase and green numbers indicate percentage decrease.

TABLE B-2 | SPR Safety and Health Data, FYs 2008-2017

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
2008	0.76	61.97	1.52	3
2009	1.23	93.80	1.64	2
2010	0.63	64.17	1.27	1
2011	0.50	32.49	0.80	1
2012	0.82	112.99	1.03	4
2013	0.72	63.81	1.13	10
2014	0.89	47.09	1.11	8
2015	0.36	35.88	0.95	8
2016	0.00	0.00	0.23	12
2017	0.23	12.64	0.57	17
FYs 2014–2017 % Change	-74%	-73%	-48%	113%
10-Year % Change	-70%	-80%	-62%	467%

*DART – Days Away/Restricted or Job Transfer Rate; TRC – Total Recordable Case

Red numbers indicate percentage increase and green numbers indicate percentage decrease.

APPENDIX C: NATIONAL ENERGY TECHNOLOGY LABORATORY (NETL) ES&H DATA

TABLE C-1 | Environmental Data, FYs 2008-2017

Fiscal Year	Environmental Releases	Potable Water Intensity (gallons per gsf)	Energy Use Intensity (MBtu per 1,000 gsf)	Fleet Fuel Consumption (GGE)
2008	4	17.97	163,250	20,677
2009	4	16.35	142,125	17,536
2010	2	15.09	125,167	19,148
2011	6	14.78	132,387	23,206
2012	1	12.54	116,906	20,267
2013	3	11.66	127,883	12,192
2014	1	16.63	166,856	9,942
2015	0	14.08	153,588	8,783
2016	0	12.74	138,653	7,860
2017	0	10.21	135,927	6,082
FYs 2014–2017 % Change	-100%	-39%	-19%	-39%
10-Year % Change	-400%	-43%	-17%	-71%

Green numbers indicate percentage decrease.

TABLE C-2 | NETL Safety & Health Data, FYs 2008-2017

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
2008	1.21	86.07	2.22	9
2009	0.51	34.78	1.03	5
2010	0.64	24.41	1.02	4
2011	0.66	31.14	0.77	12
2012	0.57	7.81	1.02	7
2013	0.90	31.97	1.24	12
2014	0.78	22.23	1.23	8
2015	0.41	43.16	1.23	3
2016	0.35	31.47	0.82	11
2017	0.35	15.08	0.59	6
FYs 2014–2017 % Change	-55%	-32%	-52%	-25%
10-Year % Change	-71%	-82%	-73%	-33%

*DART – Days Away/Restricted or Job Transfer Rate; TRC – Total Recordable Case

Green numbers indicate percentage decrease.

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