



U.S. DEPARTMENT OF  
**ENERGY**

Fossil Energy and  
Carbon Management

Office of Environment,  
Security, Safety and Health



# Maintaining Environment, Security, Safety and Health (ESS&H) Excellence

Annual Report for  
Fiscal Years 2020 & 2021

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# A Letter from the Assistant Secretary



The primary mission of the U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) is to minimize the climate and environmental impacts of fossil energy and advance carbon management to make significant contributions to achieving the nation's net-zero goals by mid-century. FECM's programs use research, development, demonstration, and deployment approaches to advance technologies in order to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors.

During fiscal years (FYs) 2020–2021, our two sites—the Strategic Petroleum Reserve (SPR) and the National Energy Technology Laboratory (NETL)—have maintained their strong records in the areas of environment, security, safety and health (ESS&H) while keeping the organizational mission at the forefront of their priorities.

FECM is unique in that we operate in many high-risk operational environments across our two sites, making the safety of our employees the primary concern. To reinforce our commitment to safety, FECM continued implementation of the *Heroes for Zero* program with the goal of driving FECM's accidents, injuries, environmental releases, and regulatory violations towards zero through 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.

The COVID-19 pandemic presented a unique challenge, as it arose in FY 2020 and continued through FY 2021. In response, FECM took protective measures, modified its operations, and implemented actions to safeguard employees' health, while ensuring that essential functions continued uninterrupted. During this time, while most of our workforce operated remotely and in full-telework mode, we have ensured operational continuity and maintained mission focus and implementation. As with the rest of the Department, we have learned from the experience and incorporated best practices into current and future operations. The Department developed the COVID-19 Workplace Safety and Reentry Framework, which outlines the requirements to protect the health and safety of the workforce for a safe reentry to DOE federal facilities as well as the reentry schedule for the safe accomplishment of the DOE mission in a COVID-19 environment. We are committed to addressing essential work requirements and reentering employees safely to the workplace consistent with best public health practices.

Moving forward, our employees will continue to uphold the principles of ESS&H. They will remain committed to achieving the highest levels of compliance, maintaining a safe and secure work environment for all personnel, and ensuring that our operations preserve the health, safety, and security of the surrounding communities. I look forward to ensuring that strong ESS&H procedures and values are incorporated into every task we undertake.

## **Brad Crabtree**

Assistant Secretary

Office of Fossil Energy and Carbon Management

# ACRONYMS

AHAs	Activity Hazard Analyses	HQ	Headquarters
ALB	Albany	IH	Industrial hygiene
Btu	British thermal units	IOSC	Incidents of Security Concern
CAIRS	Computerized Accident/Incident Reporting System	ISM	Integrated Safety Management
COOP	Continuity of Operations	ISO	International Organization for Standardization
CSO	Cognizant Security Office	LE2	Life Extension 2
CY	Calendar year	LOTO	Lockout/Tagout
DART	Days Away, Restricted, or On-Job Transfer	M&O	Management and Operating
DOE	U.S. Department of Energy	MGN	Morgantown
EMS	Environmental Management System	NETL	National Energy Technology Laboratory
EO	Executive Order	NNSA	National Nuclear Security Administration
EOC	Emergency Operations Center	NORM	Naturally Occurring Radioactive Material
EPA	U.S. Environmental Protection Agency	ORPS	Occurrence Reporting and Processing System
EPEAT	Electronic Product Environmental Assessment Tool	OSHA	Occupational Safety and Health Administration
ERO	Emergency Response Organization	PGH	Pittsburgh
ERT	Emergency Response Team	PMO	Project Management Office
ES&H	Environment, Safety, and Health	QA	Quality Assurance
ESS&H	Environment, Security, Safety and Health	R&D	Research and Development
FECM	Office of Fossil Energy and Carbon Management	RDD&D	Research, Development, Demonstration, and Deployment
FEMP	Federal Energy Management Program	S&S	Safeguards and Security
FFPO	Fluor Federal Petroleum Operations	SARS	Safety Analysis and Review System
FY	Fiscal year	SAV	Site Assistance Visit
GGE	Gallons of gasoline equivalent	SPR	Strategic Petroleum Reserve
GHG	Greenhouse gas	TRC	Total Recordable Case
GSF	Gross square foot	VPP	Voluntary Protection Program

# EXECUTIVE SUMMARY

The Annual Report for Fiscal Years 2020–2021, *Maintaining 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 and Carbon Management (FECM). This report focuses on FECM’s ESS&H efforts at the Strategic Petroleum Reserve (SPR), the National Energy Technology Laboratory (NETL), and FECM Headquarters. It highlights the continual progress being made at the SPR and NETL sites to ensure that facility operations adhere to the highest standards of ESS&H excellence.

The report covers fiscal years (FYs) 2020–2021 and provides an objective and comprehensive view of FECM’s ESS&H program. While the trend analysis and highlighted efforts focus on ESS&H operations at the SPR and NETL over the last couple years, some performance metrics provide data going back to FY 2008, or earlier depending on relevant baselines, to enrich the analysis. The insights from this report will help shape the future priorities of FECM.

## 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 introduces the report and provides a brief overview and history of FECM and its SPR and NETL sites.

Section II provides highlights of ESS&H accomplishments and captures the SPR and NETL’s efforts, programs, and achievements as they relate to major ESS&H topical areas.

Section III includes a summary of ESS&H performance, displaying and analyzing FECM’s performance for the metrics discussed. Section IV outlines each site’s challenges, goals, and planned initiatives to achieve those goals for FYs 2022–2023. Throughout the sections, the report discusses impacts from the COVID-19 pandemic and how FECM sites are continuing to fulfill their missions under unprecedented circumstances.

## Summary of ESS&H Performance

FECM’s performance is outlined in Sections II, III, and IV. Table 1 provides a summary of the SPR and NETL’s accomplishments (Section II) in the areas of environment, security, safety and health, and operations.

The performance metrics section (Section III) displays FECM data as the aggregate of both NETL’s and the SPR’s results for each metric. Table 2 provides a high-level summary of FECM’s performance during FYs 2020–2021 and includes FY 2019 as a baseline. Acronyms used in the table are: DART – Days Away, Restricted, or On-Job Transfer; TRC – Total Recordable Case; Btu – British thermal units; GSF – gross square foot; and GGE – gallons of gasoline equivalent.

**TABLE 1** | Summary of FECM Accomplishments for FYs 2020–2021

Topic Area	NETL	SPR
<b>Environment</b>	Promoted the use of electric vehicles, implemented a new chemical inventory database, updated its Hazardous Waste Procedure, updated its Radiation Protection Procedure, and made progress on closing groundwater remediation sites.	Continued to reduce the number of unplanned environmental releases despite record oil sales, revised its Environmental Instruction Manual, and proceeded with the <i>Life Extension 2 (LE2)</i> program while meeting all deadlines for permits pertaining to dredging and filling in of wetlands.
<b>Security</b>	Completed three virtual full-scale emergency exercises, six virtual table-top exercises, eight quarterly accountability drills, and 102 weekly accountability drills. Conducted annual and initial Emergency Response Organization (ERO) position-specific trainings, and general employee Emergency Response Trainings.	Conducted four hybrid exercises for the Preparedness Response Exercise Program, and staff performed Planning Section functions for Emergency Response during 10 major tropical storms and hurricanes that endangered SPR sites. Based on lessons learned from COVID-19 and the FY 2020 hurricane season, site formalized significant changes to Continuity of Operations (COOP) Plan and Emergency Response Procedures.
	Completed an organization-wide Video Surveillance System Upgrade to replace camera systems at all three main sites, renovated Pittsburgh (PGH) Security Command Center, and continued construction of a Secure Area at Morgantown (MGN).	Replaced aging equipment issued to Protection Force Officers, engaged new vendor to ensure tactical vehicle reliability, and implemented COVID-19 protocols at the SPR Range to ensure staff's health and safety, while maintaining compliance with DOE requirements to qualify semiannually on SPR weapon systems.
<b>Safety &amp; Health</b>	Environment, Safety, and Health (ES&H) Program developed and maintained several COVID-19 mitigation protocols, implemented an ES&H Management Plan that promotes project-specific safety training, and maintained all external ES&H certifications.	Developed a site-specific COVID-19 Workplace Safety Plan, developed and communicated enhanced contract language for industrial hygiene (IH) activities to ensure adequate controls are in place during performance of contract work, and further improved the Lockout/Tagout (LOTO) Program with updated software.
	Conducted a total of 518 internal inspections at all three sites, began to reinvigorate the ES&H Management System's Management Review Board, and developed an Incident Management Alert Guide, which describes the process of how to notify management of various types of incidents.	Completed annual Integrated Safety Management (ISM) validation, documented site performance in the ISM Annual Review and Report, and continued to implement the Management In Action program, requiring weekly walk-throughs of the site by directors, managers, and supervisors.
<b>Operations</b>	Remained certified to the latest applicable environmental and occupational health and safety standards. Continued to improve operations by building a strong ESS&H culture, pursuing quality assurance (QA) compliance, and promoting continuous learning.	Maintained Voluntary Protection Program (VPP) Star status at all operating sites, and the SPR transitioned its Environmental Management System to the latest standard. Continued to improve operations by building a strong ESS&H culture, pursuing quality assurance compliance, and promoting continuous learning.

FECM environmental operations have continued to see improvements in three sustainability metrics: potable water intensity, energy use intensity, and vehicle fleet petroleum consumption. FECM has also maintained progress in the mitigation of environmental releases, with only two occurring in the last two years.

The SPR and NETL enhanced their security programs with upgrades to facilities and equipment. At their sites, both continue to conduct a variety of emergency management exercises and increase their interoperability with mutual partners in local communities.

During FYs 2020–2021, FECM continued its overall downward trends in the TRC rate, DART Case rate, and DART rate. The noticeable dip in FY 2020 values coincided with the onset of the COVID-19 pandemic, when on-site activities dropped sharply. FY 2021 values largely resemble those of FY 2019. NETL and the SPR continue

to promote the *Heroes for Zero* safety campaign, and follow a variety of ISM measures. Additionally, the SPR instituted its Management and Operating (M&O) contractor's Management in Action safety program.

Although they continue to make improvements across ESS&H, both the SPR and NETL identified challenges that will require their attention to maintain a high level of performance. For example, staff turnover, particularly with respect to emergency response and security personnel, remains a challenge, and makes it difficult to maintain or replace institutional knowledge. Additionally, upcoming construction projects at the SPR and NETL sites will place greater demands on ESS&H personnel's time. Of particular note: the SPR's currently constant operational status with respect to emergency and congressionally mandated oil sales creates a strain on its oversight program. The SPR's maintenance and operational program is designed for a standby posture in a mission ready state.

**TABLE 2 |** Summary of FECM Performance Metrics, FYs 2020–2021

Metric	2019	2020	2021	FYs 2019–2021 % Change
DART Case Rate <sup>1</sup> (Number of cases per 100 workers)	0.40	0.20	0.40	0%
DART Rate <sup>1</sup> (Number of days per 100 workers)	23.40	5.03	25.03	7%
TRC Rate <sup>1</sup> (Number of cases per 100 workers)	0.70	0.32	0.64	-9%
Operational Occurrences <sup>2</sup>	12	10	13	8%
Environmental Releases <sup>2</sup>	2	2	0	-100%
Potable Water Intensity (Gallons per GSF) <sup>3</sup>	13.5	13.4	13.6	0.74%
Energy Use Intensity (Btu per GSF) <sup>3</sup>	188,976	201,062	176,437	-7%
Fleet Petroleum Consumption (GGE) <sup>3</sup>	56,424	51,259	56,709	0.51%
Regulatory Violations <sup>4</sup>	1	0	0	-100%

<sup>1</sup>DART: Days Away, Restricted, or On-Job Transfer. TRC: Total Recordable Case.

Data collected from Computerized Accident/Incident Reporting System Database, as of May 6, 2022.

<sup>2</sup>Data collected from Occurrence Reporting and Processing System (ORPS) Database, as of May 9, 2022.

<sup>3</sup>Data collected from DOE Sustainability Dashboard.

<sup>4</sup>Data are from 2021 ESS&H Data Calls.

To maintain progress in ESS&H in the face of these challenges, both NETL and the SPR have set goals and priorities for FYs 2022–2023. For example, NETL will maintain its strong record on safety and health with various measures, including by establishing leading indicators for safety metrics, and by reducing laboratory personnel training deficiencies. The SPR will maintain the high priorities of both

providing safety and health support to the LE2 program, and completing improvements to the Industrial Hygiene Program. The SPR management will collaborate with DOE and contractor personnel to use new causal analysis processes to create a meaningful safety trending program, which leads to positive changes that are measurable, effective, and sustainable.



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# INTRODUCTION

The Office of Fossil Energy and Carbon Management (FECM) mission is central to our nation's efforts to minimize the environmental impacts of fossil fuels while working towards net-zero emissions and meeting America's climate goals. FECM uses research, development, demonstration, and deployment (RDD&D) approaches to advance technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors. Priority areas of technology work include point-source carbon capture, hydrogen production, methane emissions reduction, critical mineral production, and carbon dioxide removal to address accumulated emissions in the atmosphere.

FECM 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 FECM's integration of ESS&H into all aspects of the work planning and implementation processes.

This report summarizes FECM's ESS&H performance for fiscal years (FYs) 2020–2021 and includes data from the National Energy Technology Laboratory (NETL), the Strategic Petroleum Reserve (SPR), and FECM Headquarters (FECM-HQ). The historical FECM data also includes the 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 FECM's operations and sites. Section II provides a comprehensive overview of FECM's key accomplishments in ESS&H during FYs 2020–2021. Section III summarizes the FECM-wide key ESS&H performance metrics. Section IV describes key challenges, goals, and planned initiatives outlined for FY 2022 and beyond.

## Office of Fossil Energy and Carbon Management Operations

The FECM RDD&D program conducts research that focuses on early-stage technologies that help to ensure clean and affordable energy for all Americans, facilitate the transition towards a carbon-pollution-free economy, and rebuild a U.S. critical minerals supply chain. To meet these challenges, FECM refocuses investments from traditional fossil combustion-centric activities (e.g., Advanced Energy Systems and Cross-cutting Research) to climate-centric activities (e.g., carbon capture, utilization, and storage). These reallocations will enable near-term work to develop and deploy carbon solutions for the power and industrial sectors. Immediate action will be taken to locate and mitigate methane leaks, one

of the most potent greenhouse gases (GHGs)—coupled with longer term research and development (R&D) to expedite the clean hydrogen energy economy.

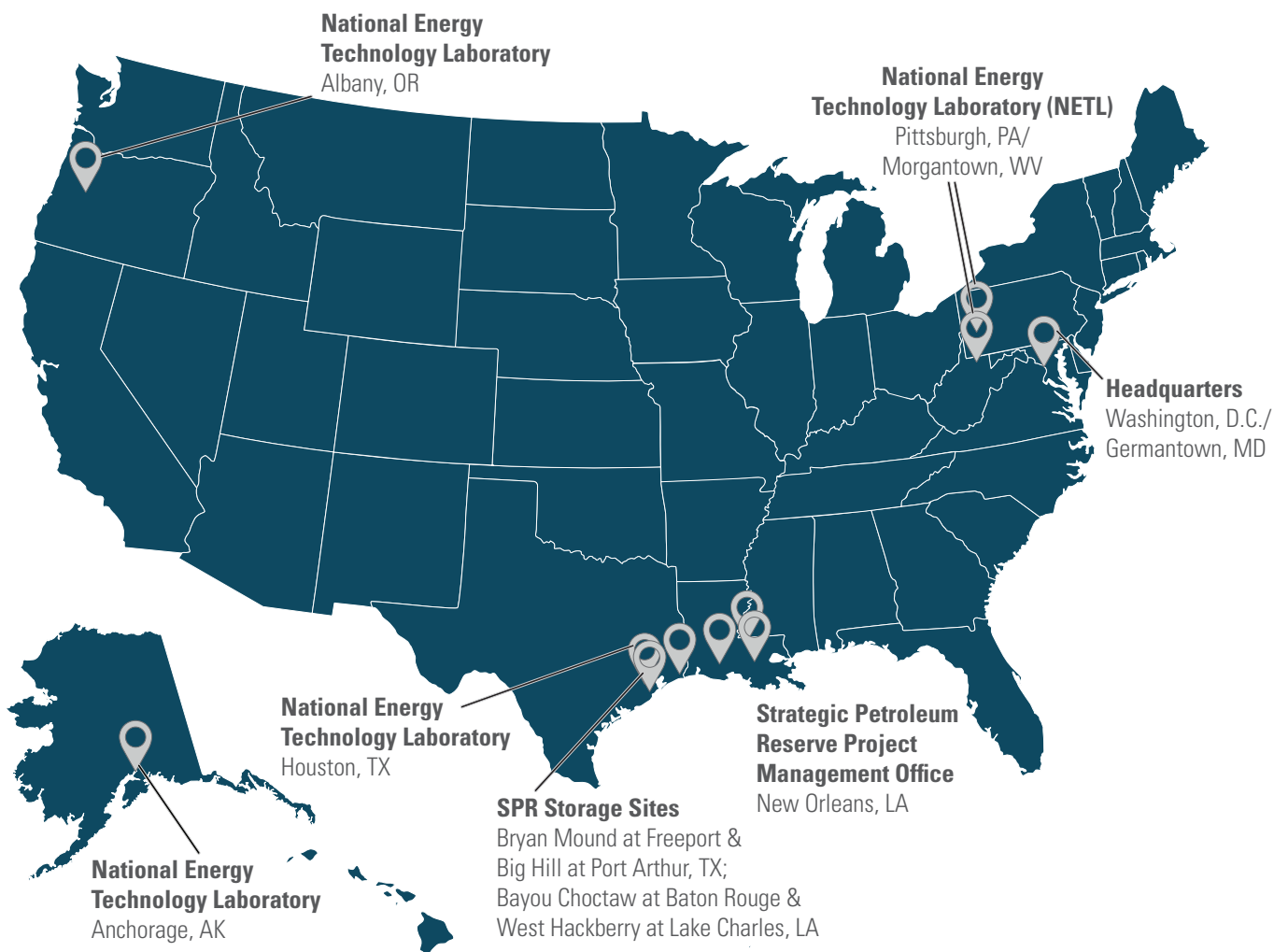
These investments will be critical to meet 100 percent clean electricity goal by 2035. Carbon dioxide removal will be an important tool to achieve the goal of economy-wide net-zero emissions and industrial decarbonization by 2050. FECM is investing in direct air capture, carbon capture and storage coupled to the conversion of biomass waste to energy, and accelerated weathering through mineral carbonation to assist in meeting our climate goals.

In addition, FECM reviews applications for exports of natural gas and manages the nation’s SPR (which is a key emergency

response tool available to protect the nation from energy supply disruptions) and other strategic reserves (the Northeast Home Heating Oil Reserve and the Northeast Gasoline Supply Reserve).

FECM has its HQ in Washington, D.C. and Germantown, Maryland; it also has the NETL field sites in Morgantown, West Virginia; Pittsburgh, Pennsylvania; Albany, Oregon; Anchorage, Alaska; Houston, Texas; and New Orleans, Louisiana. The FECM organization comprises nearly 3,100 federal and contractor employees—scientists, engineers, technicians, and other professionals—located at FECM-HQ, NETL, the SPR Project Management Office (PMO), four SPR field sites in the Gulf Coast region, and a marine terminal (see Figure 1).

**FIGURE 1 |** FECM National Laboratories and Facilities



*Note: NETL is collocated with the Office of Indian Affairs in Anchorage, Alaska and collaborates on local fossil energy and carbon management-related research and outreach.*

FECM's innovative RDD&D programs focus on the efficient and clean use of the nation's most abundant energy resources.

RDD&D priorities include:

- **Reduce Methane Emissions:** Develop technologies and deploy regional initiatives to monitor and reduce methane emissions across the legacy fossil fuel infrastructure, including coal, oil, and gas.
- **Accelerate Carbon-Neutral Hydrogen:** Develop technologies that leverage the natural gas infrastructure for hydrogen production, transport, storage, and use, coupled to carbon management.
- **Develop Low-Carbon Supply Chains for Industries:** Develop novel approaches to recycle carbon oxide emissions, principally carbon dioxide, into value-added products such as cement, concrete, steel, chemicals, and fuels using systems-based carbon management approaches.
- **Demonstrate and Deploy Point-Source Carbon Capture:** RDD&D for carbon capture and storage in the power and industrial sectors to enable wider, strategic commercial deployment to meet net-zero emissions goals by 2050.
- **Advance Critical Minerals, Rare Earth Elements, Coal Waste to Products, and Mine Remediation:** Improving rare earth elements separation/recovery technologies to manufacture products from coal waste and to address current market and process economics; advancing R&D to address abandoned mines.
- **Increase Efficient Use of Big Data and Artificial Intelligence:** Use artificial intelligence, machine learning, and data analysis to create learning algorithms within large datasets to help discover new materials, optimize processes, and run autonomous systems.

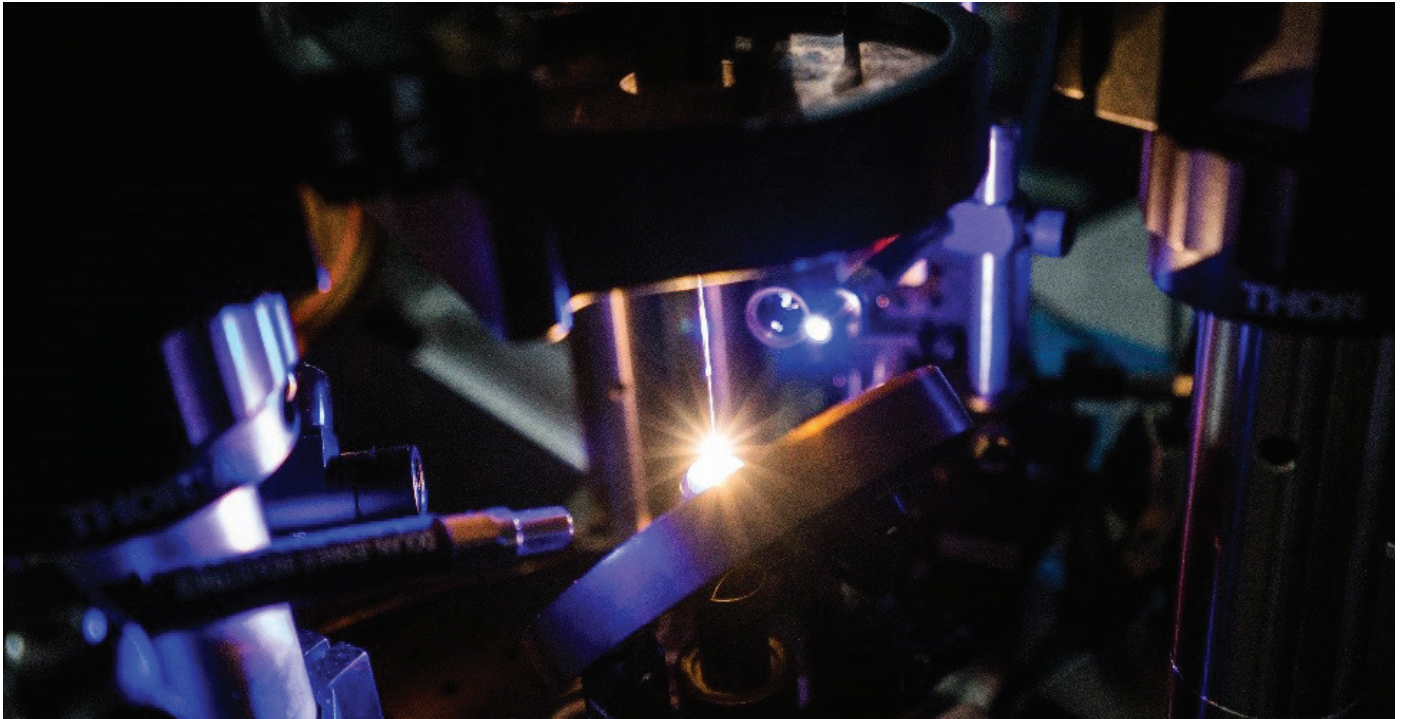
- **Address the Energy-Water Nexus:** Improve our efficient use of scarce water resources and advance water remediation technologies associated with produced or displaced water from oil, gas, and coal industries, in addition to that associated with dedicated carbon dioxide storage.
- **Invest in Thoughtful Transition Strategies:** Invest in technologies and approaches and deploy regional initiatives to help in the transition to a net-zero carbon economy in coal and fossil-based power plant communities.

## *National Energy Technology Laboratory Overview*

NETL is the only government-owned, government-operated laboratory in the U.S. Department of Energy (DOE) complex and at the center of technology development that will enable low- and zero-carbon energy and industry. For more than a century, NETL and its predecessor organizations have been driving innovation and delivering solutions for an environmentally sustainable and prosperous energy future. NETL works toward ensuring affordable, abundant, and reliable energy that powers a robust economy and enhances national security, while developing technologies to manage carbon across the full life cycle and enabling environmental sustainability.

NETL has been the nation's premier energy technology laboratory, delivering integrated solutions to enable transformation to a sustainable energy future. Advanced technologies enable clean, reliable, and carbon-neutral energy needed to diminish and eliminate carbon dioxide emissions, decarbonize the nation's energy infrastructure and industries, improve electrical grid reliability and resilience, expand critical materials production, educate America's future scientists and engineers, revitalize the workforce, and support U.S. energy and national security goals.

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



With more than 1,800 federal and contractor employees across five sites located in Morgantown, West Virginia; Pittsburgh, Pennsylvania; Albany, Oregon; Houston, Texas; and Anchorage, Alaska, NETL functions as both an on-site science and technology research center and as the administrator of nearly 1,800 contracts with external organizations. Additionally, NETL funds nearly 500 university research projects that support the training of the next generation of energy scientists.

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

**FIGURE 3 |** NETL site locations: Albany, OR; Pittsburgh, PA; Morgantown, WV



Oregon



Pennsylvania



West Virginia

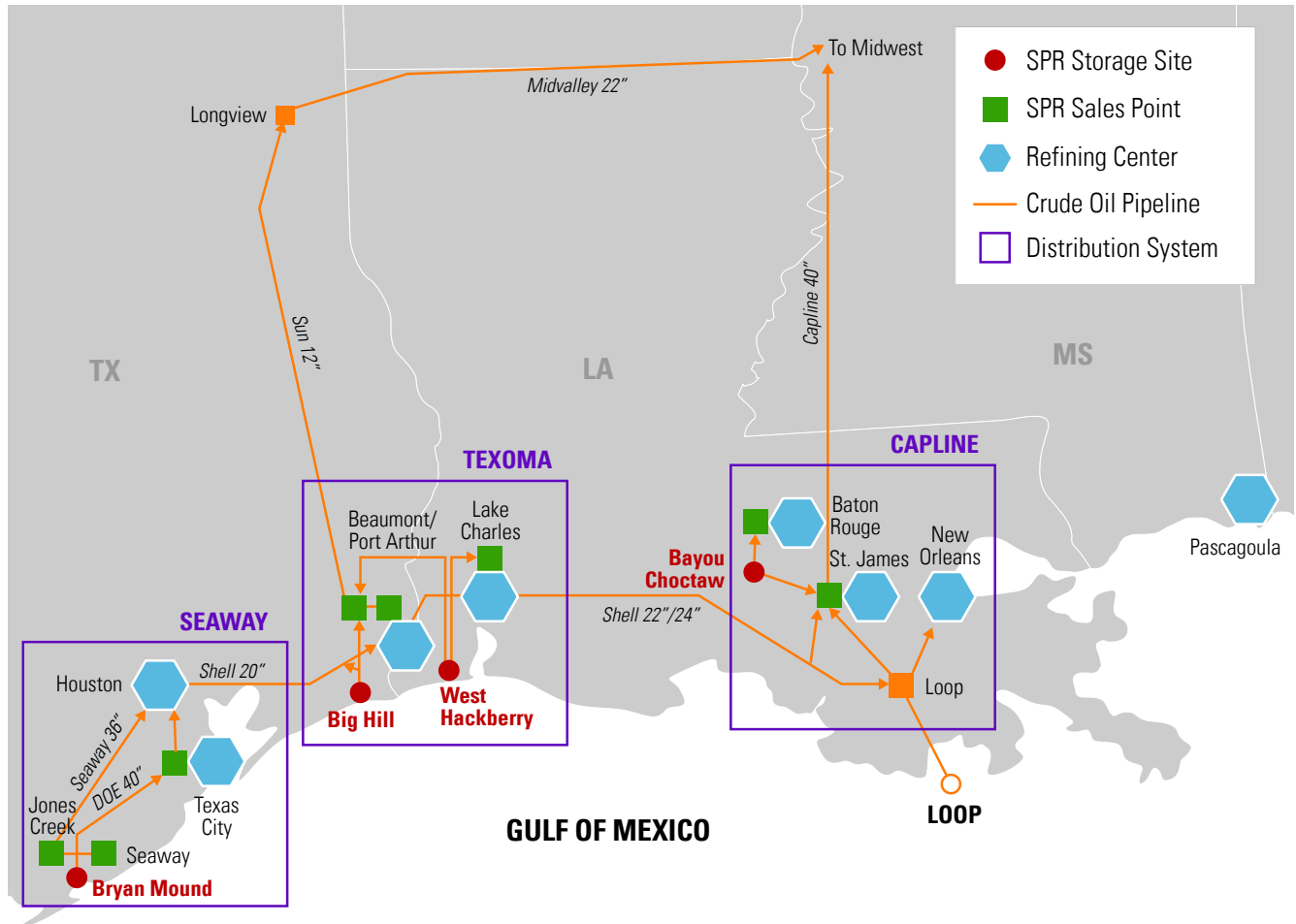
**FIGURE 4** | The Secretary of Energy and NETL Director visit a NETL field site



**FIGURE 5** | NETL scientist inspects core samples



**FIGURE 6 |** The SPR has four storage sites along the Gulf Coast



### Strategic Petroleum Reserve Overview

The SPR is a DOE-owned, contractor-operated complex of four sites that currently stores oil in 60 subterranean salt dome caverns along the Gulf of Mexico, as shown in Figure 6.

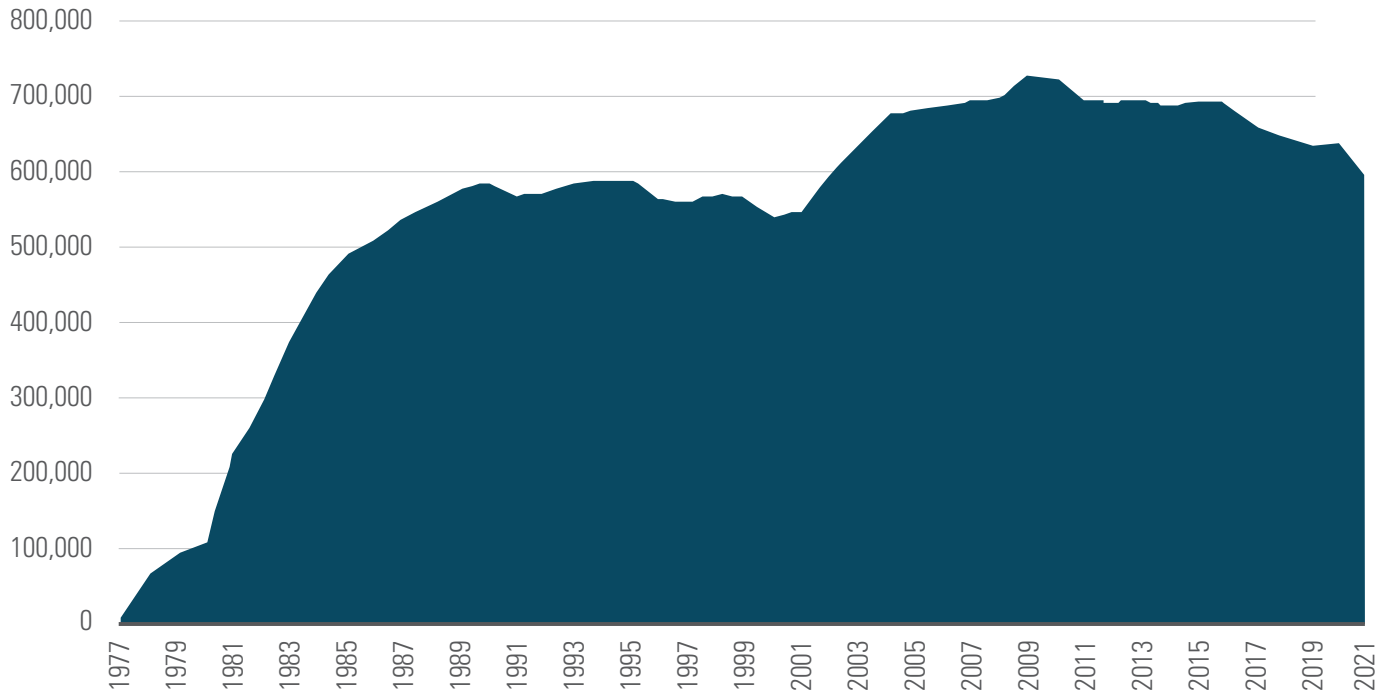
The SPR’s PMO is headquartered in New Orleans, Louisiana, and its four operating sites are Bayou Choctaw and West Hackberry in Louisiana and Bryan Mound and Big Hill in Texas. The PMO oversees daily operations of the major crude oil storage sites and logistical facilities for the nation’s oil stockpile. The SPR has a storage capacity of 714 million barrels of oil and is the largest stockpile of government-owned emergency crude

oil in the world. As of July 2022, the SPR’s inventory was 480 million barrels of crude oil due to ongoing sales.

As of 2022, the SPR comprises 115 federal employees and more than 1,000 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 7 |** Crude oil stocks in the Strategic Petroleum Reserve since 1977 (thousand barrels)

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



Source: U.S. Energy Information Administration

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—in 1991, 2005, and 2011. Although the SPR was established to cushion oil markets during energy disruptions,<sup>1</sup> the Secretary of Energy can authorize non-emergency sales of oil to respond to lesser supply disruptions or to raise revenues. Four non-emergency sales occurred from FYs 2018–2019. In November 2021, the President of the United States authorized the release of 50 million barrels of oil from the SPR, to address rising prices in the wake of the COVID-19 pandemic and its effects on global supply.

The SPR also manages the one-million-barrel emergency Northeast Home Heating Oil Reserve, which houses fuel oil at three sites throughout the northeastern United States, and the Northeast Gasoline Supply Reserve, which holds one million barrels of gasoline.

**FIGURE 8 |** A view of the SPR’s Bryan Mound Site



<sup>1</sup> 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

Information in this section draws upon responses received from the SPR and NETL to a data request from FECM-HQ on their accomplishments in the major ESS&H topical areas listed below:

## 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 Safety Campaign*)
- Integrating safety into all activities as a fundamental practice

## ESS&H Operations

- Achieving self-assessment and external certification of ESS&H programs
- Building a strong ESS&H culture
- Increasing onsite quality assurance (QA)
- Fostering a continuous learning environment

## Environmental

FECM strives to be a leader among DOE programs in promoting environmental stewardship. FECM 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 FECM sites have made are below.

### *Maintaining Strong Environmental Stewardship and Eliminating Environmental Legacies*

FECM is committed to maintaining robust pollution prevention programs and promoting environmental stewardship in all its operations. FECM sites implement programs that aggressively pursue pollution prevention, as well as prevent and remediate environmental legacy liabilities.

Executive Order (EO) 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, was signed in December 2021, and established new goals for federal sustainability in management of buildings, procuring vehicles, and overall operations. Each FECM site approaches achieving efficiency and sustainability goals by researching and implementing options for reducing energy use, water intensity, and fleet petroleum consumption.

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 FECM-HQ staff members to conduct Site Assistance Visits (SAVs) for additional oversight and guidance. The SPR

also publishes a Site Environmental Report to communicate its compliance efforts and highlight successful programs and achievements for each calendar year (CY).<sup>2</sup>

## NETL Environmental Efforts

NETL has several accomplishments in the areas of adopting best practices, preventing pollution, and eliminating environmental legacies.<sup>3</sup> In FY 2021, NETL implemented a new chemical inventory database for tracking chemicals and gas cylinders, which helps with generating reports to meet compliance obligations and research needs. This kind of data-driven best practice enables NETL to track export-controlled chemicals, to prepare input to a Chemical Weapons Convention report, and to prepare the U.S. Environmental Protection Agency (EPA) Tier II and Oregon State Fire Marshall Hazardous Substance Inventory reports. This tool enhances NETL's ability to manage chemical hazards in the workplace. Additional best practices have included: identifying terminology consistent with Occupational Safety and Health Administration (OSHA) hazard communication requirements, reducing risks to employees who handle chemicals and waste; providing over 150 cleaning and disinfecting stations throughout the three sites during the COVID-19 pandemic, limiting personnel exposure to the virus while maintaining essential on-site NETL work functions; and ensuring physical distancing, barriers, and cleaning practices in customer-facing security functions. Finally, NETL continues to promote the use of electric vehicles for travel between sites and maintains the necessary charging infrastructure.

NETL has continued to update its Hazardous Waste Procedure, ensuring that EPA Generator Improvement rules have been adequately integrated into NETL's waste management program. The Pollution Prevention Waste Minimization Procedure and associated employee training materials were updated to reflect current recycling and non-hazardous waste management and minimization practices. Updating the procedure and training materials ensures efficient use and environmentally preferred management of

**FIGURE 9 |** Acid and base dispensing sheds for wastewater discharge pH treatment at NETL



**FIGURE 10 |** Electric vehicle parking spaces and charging station at NETL



<sup>2</sup> See: [2020 NETL Annual Site Environmental Report](#); [2020 SPR Site Environmental Report](#)

<sup>3</sup> Ongoing environmental changes due to previous human activities.

non-hazardous waste. NETL has maintained its commitment to eliminating environmental legacies by updating NETL's Radiation Protection Procedure, combining the procedure used at Morgantown (MGN) and Pittsburgh (PGH) with the procedure used at the Albany (ALB) site; the updated procedure will address the use of Naturally Occurring Radioactive Material (NORM). The updated procedure will help to ensure consistent application of DOE radiation protection program requirements at NETL sites. Finally, NETL's Wyoming Groundwater Remediation Sites 4, 6, and 7 have been found to be below the Maximum Contaminant Limit for the contaminant of concern and have been placed in a two-year stability monitoring phase. These sites are former R&D locations, at which benzene was later identified as a contaminant of concern within groundwater. If the wells do not exceed the limit throughout the upcoming two-year phase, application for permission to close the sites will be made to the Wyoming Department of Environmental Quality. Closure of these sites will reduce ongoing remedial activity costs and allow personnel to focus on remedial activities at the remaining sites.

### The SPR Environmental Efforts

The SPR has pursued several initiatives to reduce environmental incidents, adopt best practices, and prevent pollution. The SPR's proactive work planning and environmental oversight at the operational level continues to reduce the number of unplanned releases. In both FY 2020 and FY 2021, the SPR only had one release of oil or brine that was reportable to outside regulators. This is a significant achievement given the unprecedented volume of oil currently being moved. Additionally, the site has completed a comprehensive revision of the Environmental Instruction Manual. This update provides clear instructions to field staff, helps eliminate Environmental Management System (EMS)-related findings, and reduces paperwork. Finally, with respect to the *Life Extension 2* (LE2) program, the SPR environmental program was able to meet all deadlines for the Section 404 permits pertaining to dredging and filling in of wetlands. This is another important achievement, accomplished in a short period of time and under tight schedules. Delay would have resulted in significant additional costs.

## Security

One of FECM's major responsibilities is to comply with all applicable DOE safeguards and security (S&S) standards. This section contains two priorities that capture both NETL 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*

FECM strives to maintain secure and resilient operations, which require a robust emergency management program to help protect against, mitigate, and quickly respond to and recover from all hazards. Both of FECM's sites have 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

NETL has continued to take a variety of actions to enhance its emergency management program. From FYs 2020–2021, NETL conducted six table-top exercises via WebEx in accordance with COVID-19 physical distancing requirements. Three were conducted in FY 2020 and three were conducted in FY 2021. Corrective actions were developed to address the deficiencies identified. NETL conducted three virtual full-scale exercises via WebEx in FY 2021. Corrective actions were again developed and addressed. Additionally, NETL conducted annual and initial Emergency Response Organization (ERO) position-specific training via WebEx, as well as 102 weekly accountability drills in FY 2020 and FY 2021. General Employee Emergency Response Training took place via computer-based applications. This training is mandatory for all site employees.

**FIGURE 11 |** NETL Albany Site Bomb Search Training conducted by local law enforcement



### The SPR Emergency Management Efforts

The SPR continued to strengthen its emergency management program by administering training, drills, and exercises for federal and contractor employees. Emergency Management staff have conducted four hybrid exercises for the Preparedness Response Exercise Program, maintaining safety within a COVID-19 environment. Each exercise consisted of utilizing the Microsoft Teams online tool to facilitate an Incident Command initial briefing, followed by employing on-site and Oil Spill Response Organization resources to safely deploy the oil response boom (a temporary floating barrier to contain oil). Additionally, the SPR successfully exercised quarterly notification drills to account for all federal and contractor staff, achieving 100 percent accountability. The site also conducted numerous “real world” staff accountability evolutions in response to hurricanes and changing pandemic conditions. The SPR has purchased and distributed new satellite phones and cases. Each storage site has satellite phones designated for senior personnel.

Most notably, during FYs 2020–2021, while working under COVID-19 telework status, Fluor Federal Petroleum Operations (FFPO) Emergency Preparedness staff performed Planning Section functions during 10 major tropical storms and hurricanes that endangered SPR sites. During these events, the staff provided Hurricane Alert Level recommendations, subject-matter expert interpretations of requirements described in site Emergency Response Procedures and Management and Operating (M&O) Continuity of Operations (COOP) documents, to the DOE Project Manager and staff. In addition, Emergency Preparedness personnel staffed virtual Emergency Operations Centers (EOCs), and established Documentation Units to perform recordkeeping. Two of these storms, Hurricane Laura and Hurricane Delta, caused major damage to SPR sites, including loss of commercial power, flooding of roads, the need to remove debris and wildlife, and major fence and rooftop damage. Based on lessons learned from COVID-19 and the record-breaking hurricane season in FY 2020, the SPR formalized significant changes to its COOP Plan and its Emergency Response Procedures.

**FIGURE 12 |** SPR Emergency Response Team (ERT) members conducting oil spill response training



## *Developing Programs and Making Efforts to Enhance Site Security*

FECM increased its protection measures for personnel and site infrastructure to better identify and confront ongoing and emerging threats. During FYs 2020–2021, FECM strengthened employee and site security by enhancing the security of FECM facilities and infrastructure, as well as ensuring compliance with DOE regulations and policies.

### NETL Site Security

NETL took several measures to enhance security across its sites. NETL completed an organization-wide Video Surveillance System Upgrade to replace camera systems at NETL’s ALB, MGN, and PGH sites. The upgrade enables NETL to remain compliant with DOE Orders and improves the sites’ physical security posture. With multiple new cameras and monitors, officers at all three sites have enhanced capabilities to view perimeters, front gates, and traffic. The new systems also allow for cross-site connectivity, as needed. Further, the PGH site relocated security functions into a newly renovated Security Command Center, a fully modernized, updated, and energy-efficient facility. Officers are now separated from visitors/customers and are located within a hardened structure. Finally, construction of a Secure Area at MGN is ongoing. The Secure Area will provide DOE with an alternative location, outside of the National Capital Region, to access classified material when necessary.

**FIGURE 13** | A NETL security officer conducts a vehicle inspection



**FIGURE 14** | West Hackberry DOE Security Survey, November 2019; returning from Remote Physical Security System Testing in an area accessible only by boat



### The SPR Site Security

The SPR has made several improvements in equipment and protocols. The site’s tactical vehicles have been sent to a new vendor to ensure and improve vehicle reliability. This is an ongoing effort as vehicles are sent to Michigan for post-warranty work, which is vital to maintaining site security posture. Security staff have also replaced aging weapons and equipment issued to Protection Force Officers. Replacement of firearms and security equipment further improves both site security and officers’ safety. Finally, COVID-19 protocols at the SPR Range were implemented to ensure Protection Force Officers’ and range staff’s health and safety, while maintaining compliance with DOE requirements to qualify semiannually on SPR weapon systems.

## Safety & Health

FECM is committed to providing a safe and healthy work environment for its employees, contractor staff, and visiting public. Principles of awareness, staff’s fitness for duty, sites’ hazard mitigation efforts, and communication are critical to ensuring that DOE provides a safe work environment at all sites—whether in an office, industrial location, laboratory, or heavy construction setting. This section details two priorities that help shape both NETL and the SPR’s efforts in safety and health: striving for zero accidents and integrating safety into all activities.

## Striving for Zero Injuries and Illnesses

The *Heroes for Zero* safety campaign’s goal is to work to 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 FECM 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 implementing a variety of measures. First, the Environment, Safety and Health (ES&H) Program developed and maintained several COVID-19 mitigation protocols, ensuring NETL employees were following official guidance to protect against transmission of the virus. NETL continues to implement its Safety Committee to facilitate discussions about issues that impact the organization. The committee includes representatives from the three labor unions, as well as from various organizations at NETL, and provides a forum for representatives and management to raise safety concerns and discuss solutions. NETL also implemented an ES&H Management Plan that promotes project-specific safety training and tracks the number of project-specific training courses completed.

NETL’s ES&H Training Process Procedure also received an update to better reflect current policies, more clearly define processes, and improve safety training results. In addition, the NETL Hot Work Procedure and Hot Work Permit Form

**FIGURE 15 |** Clarifier used for settling solids from industrial wastewater before discharge at NETL



have been updated to incorporate the latest National Fire Protection Association 51B standard, and to address audit findings regarding combustible materials near hot work. The procedure and hot work permit provide more emphasis and guidance on area inspections and on removing combustible materials prior to performing hot work. More generally, NETL has maintained its ES&H certifications. All three NETL sites continue to be certified to the International Organization for Standardization (ISO) 14001:2015 and ISO 45001:2018 standards, with the latest recertification occurring in August 2019. The ISO 14001 and ISO 45001 standards ensure independent certification of NETL’s ES&H Program, support continued improvement in site ES&H performance, and enhance compliance with all ES&H regulations.

## The SPR Safety and Health Efforts

The SPR continues to improve safety and health programs with updates to procedures and guidance. Concerning the pandemic, the SPR developed a site-specific COVID-19 Workplace Safety Plan, the implementation of which successfully managed more than 1,200+ potential COVID-19 cases since March 2020 without a single work-related

exposure. Additionally, the SPR developed its Interim Guidance for Welding, worked with subcontractors to ensure proper implementation, and completed an industrial hygiene (IH) “mock-up” of welding activities to test engineering control effectiveness in reducing exposure to toxic fumes. All new welding tasks are coordinated through the Industrial Hygiene Program and the SPR has not experienced a single overexposure since the new controls were implemented. More broadly, SPR management also developed and communicated enhanced contract language for IH activities to ensure adequate controls are in place during performance of contract work. The new IH contract language has reduced overexposures to chemical and welding fumes during contracted work performed on-site.

The SPR has also further improved the Lockout/Tagout (LOTO) Program with the implementation of Brady Link 360 software, associated training, and other initiatives to drive site-to-site consistency, all while ensuring safe execution of hazardous energy control across the SPR complex. The use of the software has reduced paperwork and improved accuracy of procedures, which has resulted in zero LOTO incidents. Finally, the SPR has updated its digital ergonomic request

**FIGURE 16** | Subject Matter Experts participate in LOTO process improvement at West Hackberry



## *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. The ISM approach incorporates guiding principles and core functions into all operations, helping to maintain a standardized ESS&H process across FECM.

Both NETL and the SPR incorporate ISM into their activities by championing the *Heroes for Zero* program, sharing safety best practices and lessons learned, and implementing new processes to ensure the safety of all federal and contractor employees. In addition, NETL and the SPR conducted site-specific activities to demonstrate their commitment to the principles of ISM.

### NETL Safety Integration

NETL staff made a significant effort to integrate safety into management at all three of its sites, and completed a total of 518 internal inspections/audits. This total included eight ES&H Management System Audits; 218 R&D Safety Analysis and Review System (SARS) Inspections (annual and initial); 228 Facility SARS Inspections; 55 Environmental/Regulatory Assessments; eight Focused Inspections; and one management-requested inspection. Additional data-driven efforts included radiological surveys continuously performed on materials and samples associated with R&D SARS packages that use, or are suspected to contain, NORM.

Additionally, NETL began efforts to reinvigorate the ES&H Management System’s Management Review Board by requesting additional representation from other laboratory organizations, including management from the Research and Innovation Center and Information Technology. NETL has also developed an Incident Management Alert Guide, which describes the process of how to notify management of various types of incidents. Annual training modules were updated to continue to meet current regulatory requirements and ensure compliance with site permits, further helping to integrate safety into all activities at NETL.

**FIGURE 17** | Chemical spill drill at NETL MGN

### The SPR Safety Integration

The SPR has continued to improve its safety integration efforts through several oversight initiatives. First, the SPR completed its annual ISM validation and documented its performance in the ISM Annual Review and Report. The report summarizes the results of all audits and assessments conducted during the fiscal year, is used to judge annual ISM performance, and provides senior leadership with qualitative and quantitative data verifying that ISM is performing effectively. The annual report is briefed to DOE and M&O contractor staffs each year. Additionally, the SPR's M&O contractor continued to implement a Management In Action program, requiring weekly walk-throughs of the site by directors, managers, and supervisors. Key features of the program include documenting observations and conducting safety dialogues with employees. Finally, the SPR's Change Control Board continued its reviews of unfunded projects for their safety and health impacts when considering providing funding.

## ESS&H Operations

The FECM 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 FECM 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 FECM in identifying best practices, recognizing strong performance, and targeting areas in need of improvement. Assessment and recognition of ESS&H programs demonstrate FECM's commitment to ESS&H soundness.

### NETL Assessments and Certifications

NETL remained certified to applicable Environmental and Occupational Health and Safety standards, specifically ISO 14001:2015 and ISO 45001:2018. NETL successfully completed open solicitation for its ISO 14001/45001 external auditor during FY 2020. The contract was awarded to Government & Military Certification Systems, Inc. of Washington, DC. The base contract, with two option years, is supporting NETL through its three-year certification cycle. The contract included transfer of certificates followed by surveillance audits in years one and two of the contract, and recertification audits in year three of the contract. This contract will support NETL through CY 2022, with its recertifications due by October 2022.

The auditor completed a surveillance audit at all three NETL sites using a virtual format from October 26–29, 2020, and a second virtual surveillance audit at all three sites from April 5–8, 2021. Additional surveillance audits occurred onsite at the MGN and PGH sites from October 25–26, 2021, and at all three sites using a virtual format on December 20, 2021. The latter served as an external corrective action review, resulting in closure of outstanding minor non-conformities



from the October 2020 and April 2021 audits, with no additional actions required.

With respect to internal assessments, the more than 500 internal audits and inspections mentioned previously in this Section resulted in approximately 50 safety related corrective actions resolved in FY 2020 and approximately 68 safety related corrective actions resolved in FY 2021. Additionally, three Internal Auditor Training sessions were held for over 30 internal auditors, in order to instruct them on conducting process-based audits to ISO 14001 and ISO 45001. This training took place in August 2021 and enhanced capabilities for conducting internal audits of the ES&H Management System. The internal audit team conducted four internal audits of the system, two per year in FY 2020 and FY 2021. Finally, NETL's Enterprise Performance Assessment System provided quarterly assessments pertaining to all three sites on designated security topics. This assessment is reviewed by NETL Senior Management and feedback is often provided by management on ways to improve the process.

The FECM Office of Environment, Security, Safety and Health (FE-17) conducted virtual SAVs in September 2020 and September 2021. NETL responded to the 2021 SAV Report in February 2022. All comments and questions within the report have been addressed, including those pertaining to the following topics: hazardous waste handling; assignment of an Officially Designated Federal Security Authority; impacts to ES&H programs due to COVID-19; Hot Work Permits; On-site Inspections; Activity Hazard Analyses (AHAs); impacts from recent EOs on federal climate action; and emergency management and continuity programs. The report and response also addressed the opportunities for improvement identified in the 2020 SAV Report.

A NETL team member received an important recognition in FY 2021: MGN officer James Shurm was awarded the Officer of the Month for April 2021 by the security contractor DPC for his excellent service to NETL and contributions to the contract.

**FIGURE 18 |** NETL MGN Officer James Shurm (center) receiving the Officer of the Month recognition and award for April 2021 by the DPC Program Manager Michael Stoehr (left) and DPC Vice President of Operations Henry Wolfe (right)



### The SPR Assessments and Certifications

The SPR continues to undertake numerous activities to achieve third-party certifications and external recognition. The SPR achieved recertification from the American National Standards Institute National Accreditation Board of ISO 14001:2015 for its EMS. The most recent full registration audit was conducted by Orion Registrar, Inc. The Certificate of Registration 1021815 was issued on March 17, 2021 and is valid until December 11, 2023.

**FIGURE 19 |** Bryan Mound VPP Committee Team members proudly display the OSHA VPP Star Worksite flag



During FYs 2020–2021, the SPR conducted internal assessments as well, for safety and emergency preparedness. The M&O contractor’s Safety team conducted two status update reports on LOTO program improvements, following an effectiveness review in FY 2019 in which 100 percent of all findings were validated to be completed and effective. The team also undertook an assessment to determine the effectiveness of selected safety training programs. The safety and health programs evaluated included LOTO, Respiratory Protection, Confined Space Entry, Electrical Safety, Hazard Communication, and Fall Protection. The training programs were evaluated to determine compliance with OSHA regulations and industry standards. Of the six areas reviewed, there were zero problematic findings generated. Some opportunities for improvement, however, were identified to enhance the training programs as they go through their normal update cycles. During this period, the M&O Emergency Preparedness team provided assessors in support of nine Organizational Assessments. The assessors evaluated topical areas including Emergency Management, Fire Protection, and Emergency Response. This review generated four findings and two opportunities for improvement. Once again, 100 percent of all findings were validated to be completely addressed and effective.

Finally, the OSHA and DOE VPPs have continued to recognize the SPR. DOE VPP Star Awards in FY 2020 went to Bryan Mound, Bayou Choctaw, and Big Hill; and West Hackberry received the Star of Excellence Award. The OSHA Region 6 VPP Super Star Awards in FY 2020 similarly went to Bryan Mound, Bayou Choctaw, and Big Hill; and West Hackberry again received the Star of Excellence Award. In FY 2021, Bryan Mound received the OSHA VPP Star Award, and Bayou Choctaw and West Hackberry received the Star of Excellence Awards. DOE’s VPP did not evaluate and issue awards in FY 2021 due to COVID-19. The SPR received an additional recognition in FYs 2020 and 2021, winning the Electronic Product Environmental Assessment Tool (EPEAT) Purchaser Award.

## *Building a Strong ESS&H Culture*

FECM 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

NETL has initiated and continued many safety and health efforts during FYs 2020–2021. First, a new ES&H Management Plan has developed leading indicators of safety, which will update results of the FECM Leading Indicator Workgroup and develop more meaningful ES&H metrics. Additionally, the newly implemented Enterprise Performance Assessment System will generate four lessons learned per quarter. NETL has also increased access to and clarity of R&D Project Safety Documentation. The goal was to improve consistency and accessibility of R&D SARS files by ensuring eSARS documents are filed in a consistent manner at each site and to develop a future Business System Upgrade Plan.

**FIGURE 20 |** NETL pandemic response activities included dispensing face masks, such as those at MGN, B-26 Lobby



Personnel and training initiatives have also contributed to a strong ESS&H culture. NETL has restructured and increased the resources for the Employee Concern Program, which now is better communicated to employees. The result has been an increase in submitted ES&H concerns, which are resolved in an appropriate timeframe, as determined by the nature and severity of the concern. NETL continues to monitor laboratory personnel training deficiencies, with a goal of no more than 100 instances of deficient project-specific training at the end of any week during the CY. Finally, an updated annual Security Refresher Briefing is required for all NETL personnel, covering additions to on-site access policies pertaining to COVID-19 restrictions, and location information for the new Security Command Center.

### The SPR Culture Building

The SPR has continued several initiatives to promote a strong ESS&H culture. During FYs 2020–2021, the site held an annual ES&H Summit. This event includes briefings by the safety, health, and environmental departments of the M&O contractor and the security subcontractor. Current issues are briefed and discussed in an open forum. The SPR also presented virtual Health, Safety and Environment Week events with a focus on holistic safety and health, specifically returning to on-site work while being mindful of mental wellbeing and prevention of soft tissue injury, such as sprains and other common accidents.

Additionally, in FY 2020, the M&O contractor used the Safety Barometer survey from the National Safety Council to provide a measure of safety culture and identify areas where it should be improved. The data is compiled and organized by the Council, which provides a summary report that the SPR shared with all employees. Each SPR site took measures to address its areas for greatest improvement. The survey also gave employees the opportunity to provide anonymous opinions and assessments of the safety culture and system. Finally, the SPR initiated a Subcontractors' Safety Council, for existing and prospective subcontractors, to provide their feedback on the

subcontracting process, ask questions, discuss problems, and make presentations on best practices. Action items to be taken are documented in meeting minutes.

**FIGURE 21** | SPR ERT members receiving briefing prior to conducting live fire response training, Texas A&M TEEX Training Facility



### *Increasing Onsite Quality Assurance*

Every FECM task is subject to a rigorous, systematic QA process that validates its alignment with the organization's mission and reflects the highest standards of excellence. The QA process instills confidence in employees and customers for each ESS&H product and service offered by FECM. This section details efforts of NETL and the SPR to comply with the QA requirements of DOE Order 414.1D, Chg. 1.<sup>4</sup>

### NETL Quality Assurance

NETL carries out key QA initiatives, such as employing and continuously improving the Incident Management Alert process, which notifies key NETL management personnel of serious incidents and ensures that essential information is communicated appropriately to personnel. NETL also continues to implement the site-wide Safety Committee, comprised of NETL management, representatives from the entire organization, labor representatives, and safety personnel to address safety issues relevant to all employees. to ensuring compliance with QA requirements.

<sup>4</sup> See: [DOE Order 414.1D, Quality Assurance](#)

**FIGURE 22** | NETL ES&H Specialist performs drinking water sampling using multimeter to evaluate free chlorine in water sample



### The SPR Quality Assurance

During FYs 2020–2021, the QA team attended remote training and participated in benchmarking events to understand, adjust, and apply forward-thinking methods in the SPR oversight programs despite pandemic restrictions. The QA team assisted all SPR offices in making similar adjustments to their oversight programs by sharing lessons learned and codifying the process of conducting remote oversight. The QA personnel also finalized the integration of risk analysis with causal analysis within the issues management program and formalized the process by which DOE will conduct and document effectiveness reviews for implemented corrective actions.

### *Fostering a Continuous Learning Environment*

For continuous performance improvement, FECM fosters a learning environment that emphasizes the importance of training, development, and the incorporation of best practices into operations. The FECM sites conduct trainings focused on the following areas: safety, health, and wellness on the job;

environmental management, remediation, and sustainability; waste minimization; strong security procedures; adequate emergency preparedness; and root cause analysis.

### NETL Trainings

NETL promotes a continuous learning environment by ensuring training stays as current and relevant as possible. The ES&H Training Process Procedure was updated to better reflect NETL’s current organization and policies. Similarly, the updated mandatory Security Refresher Briefing reflected revisions to security personnel, on-site access policies, and on-site security infrastructure.

NETL holds personnel to high training standards. The effort to monitor the lab personnel’s project-specific training deficiencies on a weekly basis is significant. Additionally, emergency management personnel have continued to undergo position-specific training, even remotely due to pandemic restrictions, as have all employees with respect to the General Employee Emergency Response Training.

**FIGURE 23 & 24** | NETL Albany Emergency Response personnel participate in emergency management exercise



## The SPR Trainings

The SPR demonstrated its commitment to continuous learning and training even during the height of the COVID-19 pandemic. The SPR safely conducted mandatory fire brigade response refresher training at the Texas A&M Training Center, in College Station, Texas. This training covered firefighting, hazardous materials response, oil spill response, emergency medical response, leadership training, and technical rescue. During these sessions, 227 ERT members (115 in FY 2020; 112 in FY 2021), and 70 Technical Rescue Team members (31 in FY 2020; 39 in FY 2021) received training.

**FIGURE 25 |** SPR ERT members conducting oil spill response training, Texas A&M TEEEX Training Facility





# SUMMARY of ESS&H PERFORMANCE METRICS

FECM is committed to reducing, and ultimately eliminating, work-related injuries, illnesses, and environmental releases. This section highlights progress made during FYs 2020–2021 to improve FECM-wide ESS&H performance measures. Data related to FECM’s and DOE’s health and safety performance represent all workers, including federal employees, contractors, and subcontractors. FECM 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 FECM sites. Appendix A describes the outcomes of the FY 2020 site-specific initiatives contained in the 2019 Annual Report. Appendices B, C, and D summarize the FECM-wide and site-specific ESS&H quantitative performance information. All data included in this report are as of May 2022.

From FY 2020–2021, FECM continued positive trends across sustainability and environmental metrics and maintained low rates in key accident/injury metrics, such as the Total Recordable Case (TRC) rate and the Days Away, Restricted, or On-Job Transfer (DART) rate. Safety metrics show lower

rates in FY 2020 than in FY 2021, which coincides with lower on-site activity due to COVID-19. To support continuous improvement in preventing accidents and injuries, FECM sites are pursuing a variety of initiatives for FY 2022 and FY 2023, as detailed in Section IV.

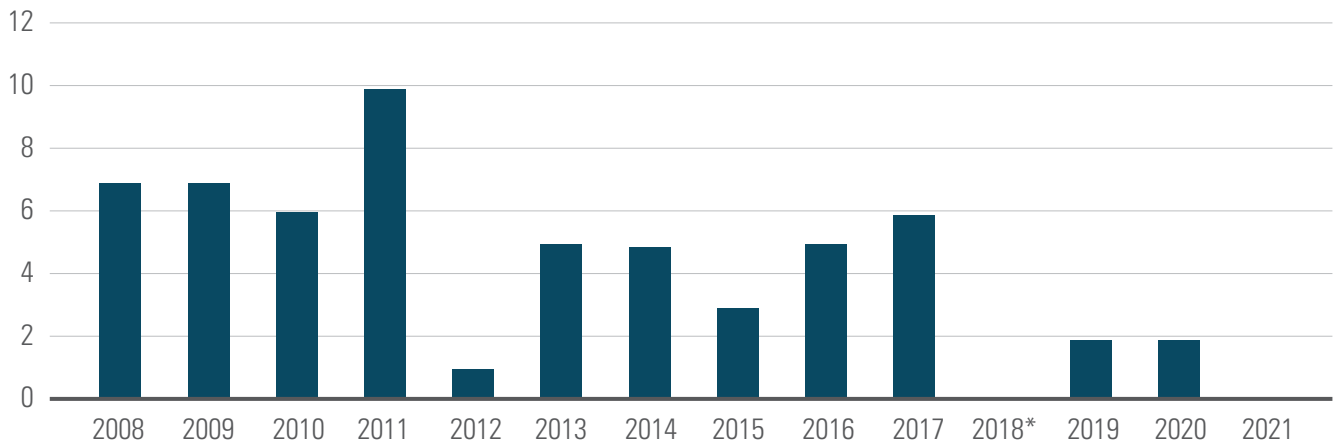
## Environmental

### *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 to the ORPS database. Oil and brine spills have typically accounted for most of the environmental releases within FECM data. From FYs 2020–2021, FECM sites reported only two environmental releases, both occurring in FY 2020 at the SPR (see Figure 26). This maintains the low trend during recent years.

The two releases occurred at the West Hackberry and Big Hill sites. In the first instance, five barrels (just over 200 gallons) of crude oil overflowed onto a well pad, due to two temporary wellhead valves being left open. The oil remained within the designated levee containment. Less than two gallons of oil were blown by winds from the top of the tank, over the levee and into the on-site ditch. At Big Hill, operators discovered a tear in the site’s oil recovery pond liner, resulting from brine discharge flow during SPR fill operations. This caused the liner to separate at a seam and allow water to get under the liner, causing it to float upward.

**FIGURE 26** | The number of environmental releases at FECM sites by fiscal year



Source: Occurrence Reporting and Processing System, as of May 9, 2022

### Energy Use Intensity

Energy intensity is defined as energy consumption per square foot of building space in British thermal units (Btu). In CY 2021, EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, and EO 14008, *Tackling the Climate Crisis at Home and Abroad*, revoked the 2019 EO 13834, *Efficient Federal Operations*. While DOE Implementing Instructions for the new EOs are being finalized, goals for the sustainability metrics below largely remain governed by relevant federal law. Until DOE receives the Implementing Instructions, DOE is maintaining the existing FY 2021 energy intensity target of a 15 percent reduction relative to a FY 2015 baseline.

There are various means of achieving this goal, some of which include the following:

- Using remote auditing technology for assessing buildings' energy performance
- Participating in demand management programs
- Ensuring that monthly performance data is entered into the EPA's ENERGY STAR® Portfolio Manager
- Incorporating, where feasible, the standard Green Button data access system
- Implementing space utilization and optimization practices and policies

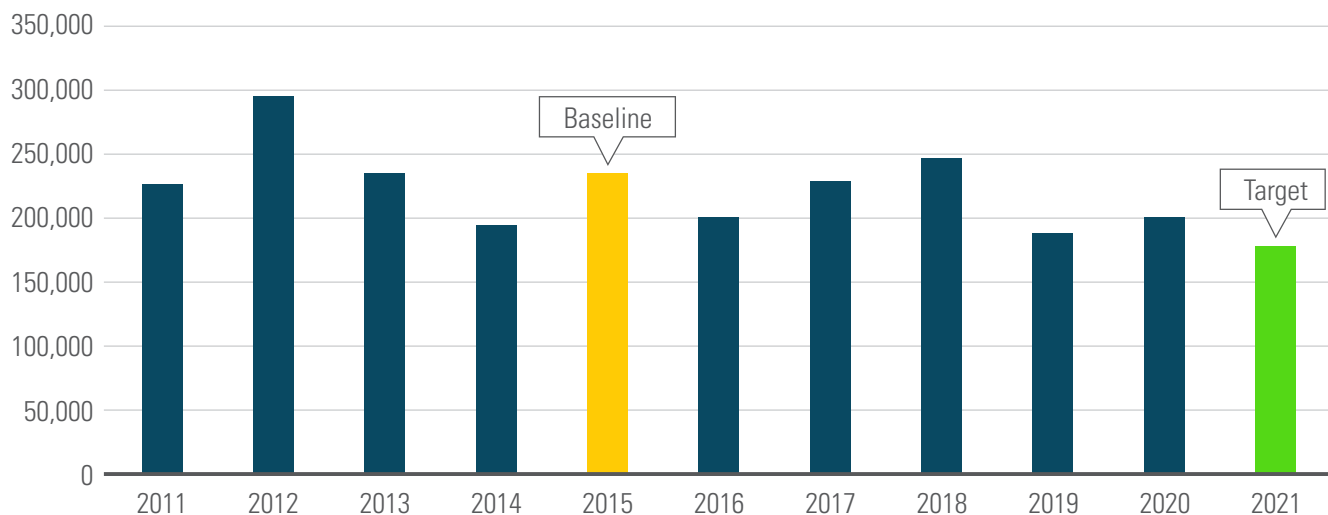
- Identifying opportunities for transition to energy-efficient technologies
- Conforming to municipal energy performance benchmarking and reporting requirements.

By FY 2021, FECM had reduced energy use intensity by 25 percent from the FY 2015 baseline, a reduction that is ahead of the goal of 15 percent. FECM sites have contributed to this trend by implementing energy efficiency initiatives. For example, NETL has completed smart meter installations in data centers at MGN and is making considerable progress in doing the same at ALB and PGH sites. Through its Site Sustainability Plan, NETL is ensuring that building design packages meet High-Performance Sustainable Building requirements. Additionally, in FY 2021, 100 percent of all electronic products purchased achieved the EPEAT standards, and 100 percent of specific products were Energy Star-designated and Federal Energy Management Program (FEMP)-designated.

### Potable Water Intensity

Until receipt of the new Implementing Instructions, DOE is maintaining the existing FY 2021 target of reducing potable water intensity by 28 percent relative to a FY 2007 baseline. By FY 2021, FECM had lowered its potable water intensity by 37.4 percent from the baseline. The percentage for FECM has remained steady for the past several years.

**FIGURE 27 |** Energy use intensity in FECM buildings by fiscal year (Btu per gross square foot [GSF])



Source: DOE Sustainability Dashboard, as of May 2, 2022

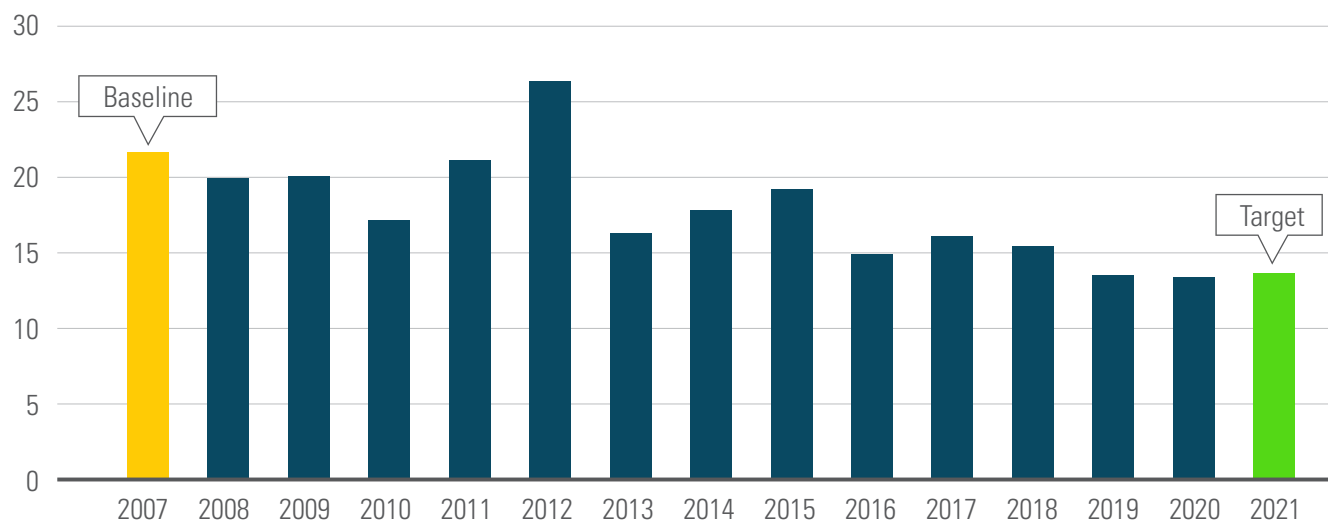
### Vehicle Fleet Petroleum Consumption

Based on EO 13834 and the 2019 Sustainability Report and Implementation Plan, DOE targets a reduction in fleet petroleum consumption of 37.3 percent by FY 2018, relative to the FY 2005 baseline, with annual 2 percent reductions thereafter. FECM’s fleet petroleum consumption in FY 2018 was 92,252 gallons of gasoline equivalent (GGE). This represents a 52 percent reduction from the baseline year,

which is well ahead of the aforementioned target.

The higher value in FY 2018, compared to surrounding years, is due to increased site activities and Life Extension 2 (LE2) work at the SPR.<sup>5</sup> The overall downward trend matches FECM’s continued efforts in increasing the fuel efficiency of its vehicle fleet. For example, over the last couple years, NETL has expanded electric vehicle charging stations at the Morgantown and Pittsburgh sites, and has provided four electric vehicles for travel between the two sites.

**FIGURE 28 |** FECM potable water intensity by fiscal year in gallons per gross square foot (GSF)

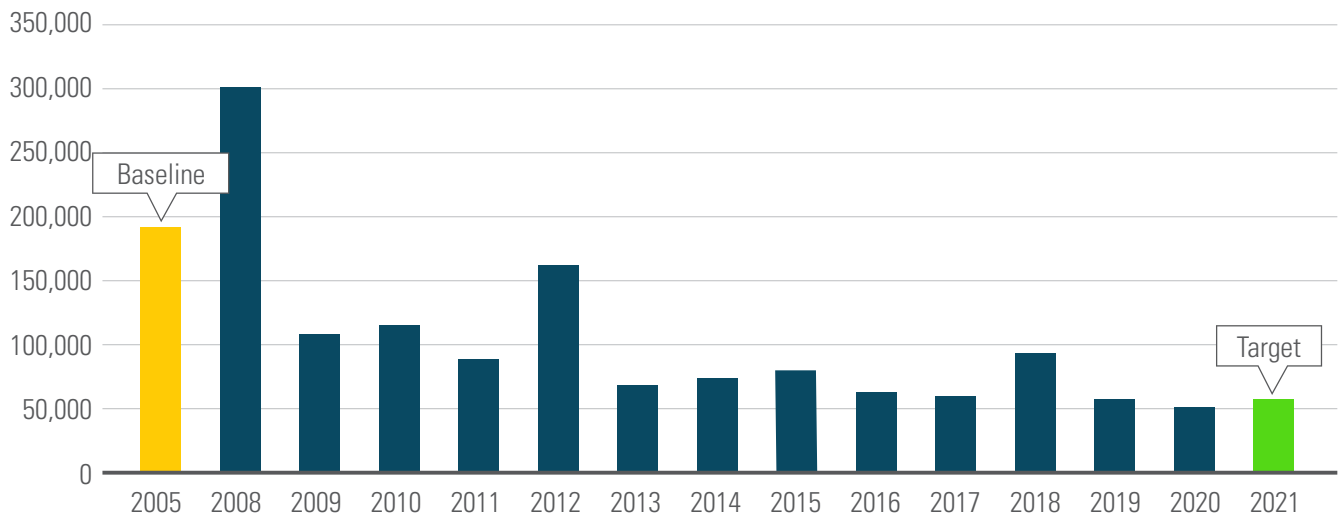


Source: DOE Sustainability Dashboard, as of May 2, 2022

<sup>5</sup> See: [The Strategic Petroleum Reserve’s Modernization Program Audit Report, June 2020](#)



**FIGURE 29 |** FECM vehicle fleet petroleum consumption by fiscal year (GGE)



Source: DOE Sustainability Dashboard, as of May 2, 2022

## Security

### *Incidents of Security Concern (IOSC)*

DOE Order 470.B Chg. 2, Attachment 5, outlines the details of IOSC.<sup>6</sup> 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 the following:

- Ensuring that security incidents are communicated to DOE/National Nuclear Security Administration (NNSA) line management, Congress, and other 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 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:

1. Pose threats to national security interests and/or DOE assets
2. Create potentially serious or dangerous security situations
3. Have a significant effect on the S&S program’s capability to protect DOE S&S interests
4. Indicate the failure to adhere to security procedures
5. Illustrate that the system is not functioning as designed by identifying and/or mitigating potential threats (e.g., detecting suspicious activity, hostile acts).

<sup>6</sup> See: [DOE Order 470.4B – Safeguards and Security Program](#)

Managers often have discretion in categorizing an incident as a Category A or B. Examples of IOSC reported by the field sites during FYs 2020–2021 are as follows:

- Denied entry due to prohibited articles (Category B)
- Foreign nationals denied access for lack of proper identification (Category B)
- Miscellaneous incidents (Category B)

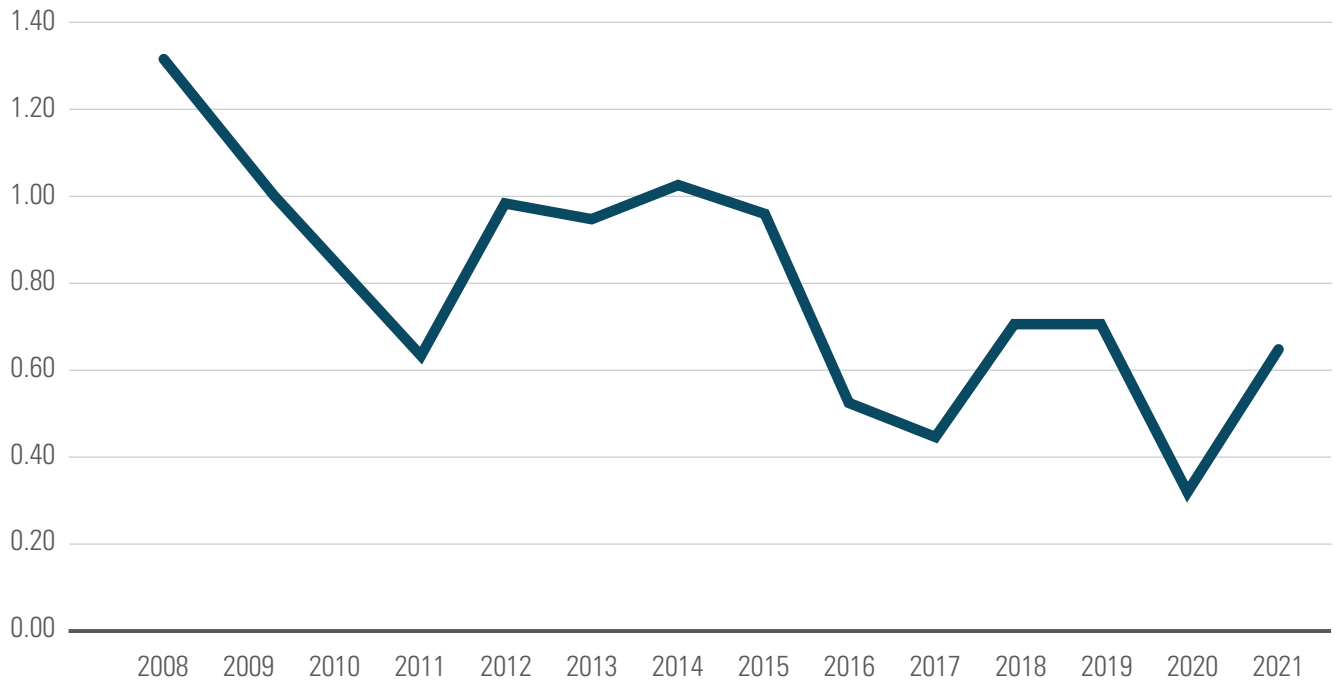
These incidents were documented and closed out in the S&S Information Management System.

## 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 FECM sites. The basis for this normalization is 200,000 hours worked, which is equivalent to the number of hours worked by 100 workers in one year.

**FIGURE 30 |** FECM TRC rate by fiscal year (number of injury and illness cases per 100 workers)



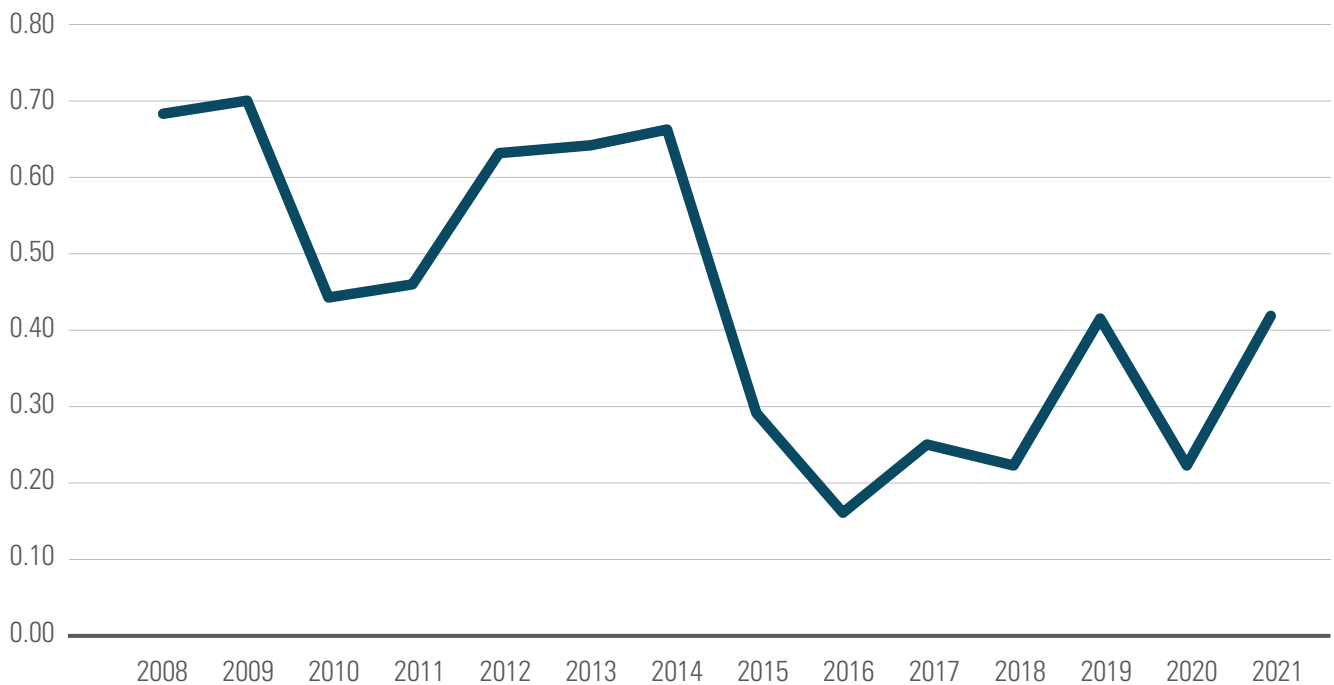
Source: Computerized Accident/Incident Reporting System, as of May 6, 2022

In FY 2020, FECM's TRC rate reached its lowest point since 2008, with a value of 0.32 (see Figure 30). This significant decline from preceding years can at least partially be explained by the reduction in on-site activity during the first phase of the COVID-19 pandemic. The following year, FECM's TRC rate increased to 0.64, still slightly below the recent pre-pandemic year values. Details of some of the cases provide context. The number of TRCs for FECM sites fell from 14 in FY 2019 to 8 in FY 2020, before returning to 16 in FY 2021. Accidents in FY 2020 included: chemical injury to an arm from a concentrated floor cleaning agent; physical injury during a protective force fitness assessment; and slips, trips, and falls, sometimes resulting in significant numbers of days away from work. In FY 2021, significant accidents included: a hand injury from operation of research equipment; upper body injuries from pushing or pulling against gates or access hatches; a knee injury while climbing onto a vehicle; a hand injury during protective force training; lost consciousness due to heat stress; and slips, trips, and falls, again sometimes resulting in many days away from work.

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

FECM'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. In FY 2018 and 2019, FECM's DART Case Rate first decreased slightly to 0.2, followed by an increase to 0.4 (see Figure 31). With respect to each site, the SPR's DART Case Rate was 0.2 in FY 2018 and 0.4 in FY 2019, while NETL's rate was in the middle, at 0.3, both years. A more specific measure—days away from work—adds context to the upward trend. While days on transfer or restriction remained relatively similar from FYs 2018–2019, FECM's days away from work increased from 29 in FY 2018, to 269 the following year. This is chiefly due to the aforementioned ladder accident, which occurred at NETL in June 2019 and resulted in 180 days away from work for recovery from a shoulder injury.

**FIGURE 31** | FECM DART Case Rate by fiscal year (number of cases per 100 workers)



Source: Computerized Accident/Incident Reporting System, as of May 6, 2022

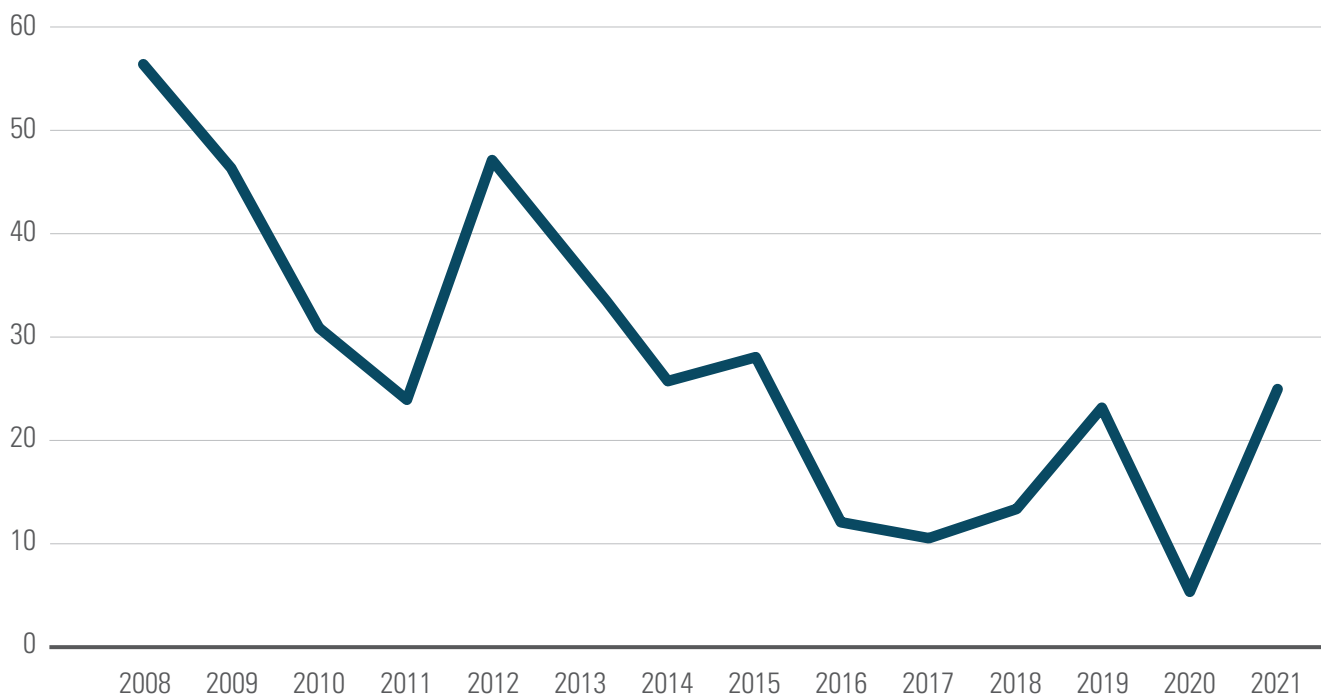
### Days Away, Restricted, or On-Job Transfer (DART) Rate

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 workers in one year). This rate is commonly used as an indicator of accident severity.

FECM had DART rates of 5.03 in FY 2020 and 25.03 in FY 2021 (see Figure 32). The FY 2020 rate is the lowest since FY 2008, and the FY 2021 rate is similar to the year before the

pandemic. In FY 2020, FECM sites reported 99 days away from work, and 26 on restricted duty or transfer. The following year, the figures were 500 lost workdays and 258 on restricted duty or transfer. Accidents that contribute to the DART rate typically consist of work-related slips, trips, and falls. The previous discussion of TRCs details the types of incidents that occurred over the last couple of years. The cases that contributed most significantly to days away from work, on restricted duty, or on transfer were the accidents involving the injuries from pushing or pulling against gates or access hatches, and the outdoor falls.

**FIGURE 32 |** FECM DART rate by fiscal year (number of days per 100 workers)



Source: Computerized Accident/Incident Reporting System, as of May 6, 2022

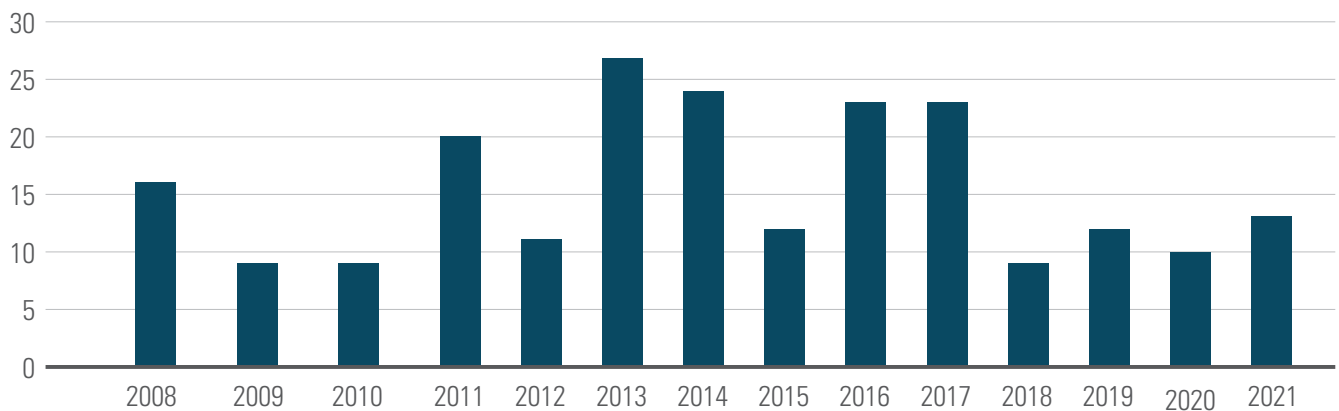
## Operational Occurrences

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 2020–2021, there were 23 total operational occurrences at FECM sites, similar to the number that occurred during the prior two years (Figure 33).

NETL accounted for five of the ten total occurrences in FY 2020, and five of the thirteen total in FY 2021. The types of incidents included a fire suppression water line break, electrical interruptions due to off-site service provider failure, loss of IT data center air conditioning due to an on-site mechanical issue, and a fire contained to a research facility attic.

The SPR experienced five occurrences in FY 2020 and eight in FY 2021. The SPR's operational occurrences mainly comprised maintenance challenges with an oil spill response boat; a lock-out of an incorrect breaker during maintenance; exposure to manganese in excess of OSHA limits while welders were not wearing respirators; a stop-work authorization due to a sub-contractor's failure to follow instructions; a worker's personal hydrogen sulfide monitor alarm being triggered while completing a diagnostic workover on a well; an electrical arc when an excavator vehicle's boom moved too close to a power line; and the environmental releases mentioned earlier in this Section.

**FIGURE 33** | FECM number of operational occurrences by fiscal year



Source: Source: Occurrence Reporting and Processing System, as of May 6, 2022

## 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 2020–2021, FECM incurred no regulatory violations. Figure 34 summarizes the record since FY 2008.

**FIGURE 34** | FECM regulatory violations or notices of violation by fiscal year

Fiscal Year	Number of Violations or Notices
2008	0
2009	1
2010	1
2011	1
2012	2
2013	0
2014	1
2015	2
2016	1
2017	0
2018	0
2019	1
2020	0
2021	0



# ESS&H CHALLENGES, GOALS, AND INITIATIVES FOR FY 2022 AND FY 2023

From FY 2020 to FY 2021, FECM continued to make progress in its ESS&H performance, especially when compared to historical levels. In FY 2022 and FY 2023, FECM will maintain its focus on minimizing accidents and injuries, improving IH programs, educating employees, enhancing emergency responses through exercises, eliminating IOSC, and minimizing environmental releases. This section provides an overview of FECM's ESS&H challenges, priorities, and site-specific initiatives.

## Key Challenges to Performance

Both the SPR and NETL face challenges to their ESS&H efforts in FY 2022 and beyond, and while they share some of those challenges, others are site-specific.

### *NETL Challenges*

Personnel matters pertaining to ES&H and emergency management, exacerbated by COVID-19 restrictions, are a significant challenge. While telework has enabled many employees to fulfill at least some of their duties, some of these employees provide voluntary support to the ERO. Depending on the telework status, a full ERO is not always available, especially with respect to the Fire Warden Cadre. As a large percentage of ERO employees will be operating on a variable telework/on-site/remote work schedule moving forward, this could hinder the ability to address emergencies quickly and efficiently. This could create an additional burden for on-site ERO staff and might make it more important to leverage automation when possible. Similarly, the need for support and staffing in the Security team continues. With a senior Security team member soon retiring, the Security team will

lose substantial historical knowledge and expertise in the security, foreign nationals, counterintelligence, and emergency response areas. This loss will place a greater burden on existing staff to fill these gaps. A significant portion of personnel security actions that were normally managed by DOE-HQ Personnel Security were brought back down to the individual sites to fulfill. This has caused, and continues to cause, challenge and requires clear and concise communication from all levels regarding current workflow and what actions NETL is responsible for and when. Additionally, NETL continues to adapt to ISO 14001/45001 process-based auditing requirements. Enhanced auditing skills will be required to fulfill this internal auditing function, mandating additional training and support. NETL relies on its ES&H federal and contractor staff as internal auditors, which can present difficulties in terms of personnel workload. On a general note, NETL continues to experience higher than normal employee turnover from retirements, personnel changes, and a competitive job market. Recruiting well-qualified candidates for both the federal and contractor workforce continues to be a challenge.

NETL is receiving additional funding in FY 2022 and through the Bipartisan Infrastructure Law in support of DOE's initiatives, resulting in increases in staffing, project management, and onsite construction projects. These increases will impact already limited ES&H and Facility Operations resources. In the past, some ES&H functions were difficult to support based on a site-managed structure due to a limited workforce. NETL's Facility Operations has recently been restructured based on functional expertise, into R&D Operations & Engineering, Facility Planning & Engineering,

Maintenance, Operations & Sustainability, and ES&H & Emergency Management. This will potentially ease some of the workload between the sites.

Finally, the Secure Area construction project continues to place a strain on current Security resources since the Security team leads the design and construction efforts. In the future, the operation of a Secure Area at NETL will also require substantial modifications to be made to NETL policies and procedures, including the Facility Security Plan. It will also require additional support and resources for its operation and maintenance in the outyears.

### *The SPR Challenges*

The SPR has identified staffing constraints as a challenge as well. Many SPR M&O Contractor staff members will be eligible for retirement within the next few years. Also, the petrochemical industry facilities near most of the SPR storage sites are growing and, as a result, recruiting SPR-trained employees. Knowledge transfer and retaining staff will both be challenging.

The uncertainty of the federal budget makes both short- and long-term planning difficult for DOE and the M&O Contractor. A reduction in budget, if it occurred, would lead to less ES&H oversight by the M&O Contractor due to staff and program constraints (e.g., less travel to sites to perform organizational assessments of ES&H programs).

Of particular note, the currently constant operational status with respect to emergency and congressionally mandated oil sales and exchanges creates a strain on the oversight program. The SPR's maintenance and operational program is designed for a standby posture in a mission ready state.

## **Priorities and Goals for FYs 2022–2023**

In the wake of challenges that both NETL and the SPR face in FYs 2022–2023, each site has determined priorities and goals for improving its ESS&H program.

### *NETL Goals*

NETL has identified a range of priorities to continue improving its performance in ESS&H, emergency management, and QA. With respect to environmental management, NETL is performing stability monitoring on Wyoming Groundwater Remediation Sites 4, 6, and 7, and aims to keep the wells stable throughout the end of the two-year stability monitoring period (ending in September 2023 for all three sites). If the groundwater contaminant monitoring results remain below regulatory levels throughout the two-year period, NETL will apply for closure of the sites with the Wyoming Department of Environmental Quality. Remedial activities continue at Sites 9 and 12. Additionally, in accordance with the new DOE Climate Adaptation and Resilience Plan, NETL is preparing a Vulnerability Assessment and Resilience Plan for submission to DOE-HQ before the end of FY 2022. This plan will improve facility management by determining and quantifying vulnerabilities and allowing for robust planning to enhance resilience to climate-driven threats.

NETL's security goals include considering establishment of a virtual EOC using an IT platform. As a large percentage of ERO employees will be operating on a variable schedule combining on-site and remote work, the implementation of a virtual EOC platform appears to be the most efficient method of ERO management moving forward. For similar reasons, NETL is investigating the use of an electronic accountability system, potentially utilizing identity key card acknowledgement, for on-site building evacuations and emergency incidents.

NETL will maintain its strong record on safety and health with various measures, including by establishing leading indicators for safety metrics. Possible leading indicators will be identified and a long-term data gathering process will be established to provide a baseline for each management-approved metric. NETL goals for existing metrics include: the OSHA TRC Rate to be less than or equal to 1.5, and the DART Rate to be less than or equal to 0.7. Finally, NETL will maintain its ISO 14001 and ISO 45001 certifications to demonstrate best-in-class ES&H programs, including re-competing the contract for NETL external auditing support.



## *The SPR Goals*

The SPR's upcoming priorities cover a variety of activities across safety and environmental standards, emergency management, and employing best practices. Providing safety and health support to the LE2 program, and completing improvements to the Industrial Hygiene Program, are ongoing high priorities. The SPR will continue to provide on-site support to high-risk activities, such as workover and construction. While striving for zero accidents and injuries, for performance measurement purposes the SPR aims to achieve a TRC rate of less than 1.40, and to achieve a DART Case Rate of less than 0.90. The SPR will maintain external certification by OSHA and DOE VPPs by continuing to achieve Star status at each storage site.

The SPR will develop and execute IH monitoring assessment plans for upcoming fiscal years, with quarterly goals, encompassing all high-risk SPR activities including, but not limited to, cavern integrity operations, degas operations, and fluid movements. The site plans to reduce IH exposure risk using the hierarchy of controls (elimination/substitution, engineering, administrative, and personal protective equipment). Additional goals include reducing vehicle accidents to the maximum extent possible, maintaining a strong and vibrant safety culture across the SPR, and periodically evaluating the effectiveness of safety programs. The SPR will continue to work with M&O Contractor Operations and Maintenance personnel to identify vulnerabilities related to inspection, testing, and maintenance of fire protection systems, and will develop new procedures designed to increase efficiency, mitigate future problems, and ensure compliance with relevant directives and requirements.

Finally, the SPR will establish readily accessible, compliant, and safe storage areas for site ERT bunker gear and will make use of lessons learned during the pandemic to promote or adjust existing processes, or develop new methods, for keeping personnel safe and healthy. The SPR management will collaborate with DOE and contractor personnel to use new causal analysis processes to create a meaningful safety trending program, which leads to positive changes that are measurable, effective, and sustainable.

## **2022–2023 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. For a review of site-specific initiatives previously identified for FY 2020, and their outcomes, please see Appendix A.

### *NETL Actions*

#### **ESS&H Programs**

- Establish leading indicators for safety and health metrics. All data regarding leading indicators will be posted to the intranet.
- Address access and clarity of R&D Project Safety Documentation. Improve consistency and accessibility of R&D SARS files by ensuring eSARS documents are filed in a consistent manner. Develop a future Business System Upgrade Plan.
- Virtualize and complete software upgrades to all three sites' card access control systems.
- Construct a new Security Command Center in MGN.
- Institute a "Smart Labs" program in conjunction with NETL's Net-Zero activities to improve cost effectiveness of ESS&H programs.
- The PGH site has two Aqueous Film Forming Foam systems that are part of its fire protection program. With recent attention on EPA's Health Advisory Level for PFAS (per- and polyfluoroalkyl substances) at 70 parts per trillion, NETL has initiated a project to evaluate whether these two foam systems continue to be necessary and what options are available. Outcomes may include removing the systems and replacing them with traditional wet systems or with a Green Film Forming Foam.
- In response to EPA's Hydrofluorocarbon Phasedown, NETL has enhanced its work processes through a revised refrigerant inventory tracking form and a new equipment/refrigerant purchasing form. These enhancements will ensure that all refrigerants on-site (stored and within equipment) and new purchases are tracked and managed, and those refrigerants

removed from equipment are recovered and managed appropriately. NETL will ensure implementation of these processes and will also consider use of alternative refrigerant compounds.

### **Quality Assurance and Emergency Management**

- Conduct table-top and full-scale exercises, and functional exercises in accordance with the most current COVID-19 work restrictions.
- Schedule evacuation drills of all occupied buildings in accordance with the most current COVID-19 work restrictions.
- Schedule ERO position-specific refresher trainings in accordance with the most current COVID-19 work restrictions.

## *The SPR Actions*

### **ESS&H Programs**

- Conduct a re-baseline of IH hazards across the SPR complex.
- Develop and implement an IH course for leaders to drive line control's understanding of IH hazards to reduce exposures during routine work activities.
- Continue training the Site Safety Specialists to the level of IH technicians.
- Reduce motor vehicle incidents and injuries from slips, trips, and falls.
- Develop and implement an incident investigation course for senior leaders to assist first-line leaders in gathering evidence and conducting root cause analysis to prevent recurrence of incidents and injuries.

- Establish a Process Improvement Team to evaluate safe driving behavior and culture.
- Improve Job Hazard Analysis as part of Improved Work Planning and Control.
- Conduct a safety barometer survey to evaluate safety culture across the SPR after two years of COVID-19 pandemic.
- Conduct daily field safety oversight reports for all LE2 field activities.
- Procure new ES&H software to drive efficiencies and reduce paperwork, thus allowing subject matter experts to provide additional field oversight. New ES&H software would drastically increase efficiency, free up resources to perform other vital field duties, and allow for more in-depth analysis of exposure scenarios at the SPR. The value to the SPR line management would be prompt analysis of work planning scenarios, more relevant estimations of health risks, and better decision-making tools for investment in engineered controls.

### **Quality Assurance and Emergency Management**

- Promote standardization of ERT equipment support trailers, including organization, maintenance, and replacement of damaged equipment.
- Continue to ensure that the ERT receives adequate training and equipment to perform its assigned mission.
- When possible, maintain more of a DOE QA presence during the M&O Contractor's qualification and surveillance of suppliers.

# APPENDIX A: RESULTS OF FY 2020 SITE-SPECIFIC INITIATIVES

## NETL Site-Specific Initiatives for FY 2020 and Outcomes

FY 2020 NETL Site-Specific Initiative	Actions Taken and Status
<b>ESS&amp;H Programs</b>	
Maintain ES&H Management System certifications.	All three NETL sites continue to be certified to the ISO 14001:2015 and ISO 45001:2018 standards (last recertified in August 2019).
TRC and DART rates consistently meet targets that are set well below industry standards. NETL Federal TRC=0.3 & DART=0.3. Site Support Contractor Personnel TRC=0.5 & DART=0.5.	NETL consistently meets target objectives which are below industry standards.
Improve research project specific training completion rates.	NETL was running between 64 and 228 training deficiencies in 2019 (average over the year was 125). NETL goal was to keep these numbers below 100. In January of 2020, NETL started improvements. With the changes (new notifications to supervisors) NETL then ran between 29 and 41 deficiencies in CY 2020, with an average of 37. In FY 2021, NETL ran between 29 and 49 deficiencies, with an average of 40. NETL will continue monitoring its results for FY 2022, during return-to-work conditions, to see if the numbers continue to stay low.
Identify incidents through the Incident Management process to undergo a causal analysis, generate corrective actions to prevent recurrence of incidents, and promote continuous improvement.	NETL continues to implement the process, scaling the effort of the causal analysis as warranted. Approved corrective actions are tracked to completion.
Emphasize employee ridesharing, shuttle availability, and electric vehicle usage in support of GHG emission reduction initiatives.	NETL released an updated procedure on the use of government vehicles. When traveling between the MGN and PGH sites, the procedure mandates NETL personnel shall only use all-electric government-owned vehicles, or personnel can drive their privately-owned vehicle.
Maintain on-site refueling infrastructure and maintain/expand electric vehicle charging stations as necessary to support zero-emission or plug-in hybrid vehicles.	NETL maintained on-site refueling infrastructure and maintained/expanded electric vehicle charging stations at the MGN and PGH facilities, including training sessions for personnel. NETL maintained four electric vehicles for use for traveling between the MGN and PGH sites—two at each site.
Divert non-hazardous solid waste from disposal to the maximum extent economically feasible, as part of NETL's pollution prevention and recycling initiatives.	In FY 2020, NETL diverted 333,840 lbs. of nonhazardous waste out of 365,600 lbs. discarded, amounting to 91 percent recycled. This was accomplished by ensuring that any materials that could be recycled were diverted from landfill disposal.

FY 2020 NETL Site-Specific Initiative	Actions Taken and Status
<p>Complete installation of dedicated smart meters in data centers at all sites to measure monthly power usage effectiveness. Identify plans to optimize the power usage effectiveness for the data centers in compliance with the Data Center Optimization Initiative, as well as to achieve virtualization through the NETL data center or a virtual (cloud) server.</p>	<p>Smart meters are part of the design package for three data centers in ALB, MGN, and PGH. MGN is complete; ALB and PGH are under construction. This was 33 percent complete as of the end of FY 2021.</p>
<p>Continue annual development of the Site Sustainability Plan (which includes the High-Performance Sustainable Building Plan) to ensure design packages contain High-Performance Sustainable Building requirements to get more buildings certified to 2016 Guiding Principles standards.</p>	<p>NETL's Site Sustainability Plan was submitted to DOE-HQ on December 17, 2019, and December 5, 2020, for FYs 2020 and 2021, respectively.</p>
<p>Ensure that at least 95 percent of all electronic products purchased achieve EPEAT standards and are registered. In addition, ensure 95 percent of specific electronic products are Energy Star-designated and FEMP-designated.</p>	<p>In FY 2020, 99.75 percent of electronic products were EPEAT-registered, and 100 percent of electronic products were Energy Star-designated and FEMP-designated.</p> <p>In FY 2021, 100 percent of products were EPEAT-registered, and 100 percent of electronic products were Energy Star-designated and FEMP-designated.</p>
<p>Ensure that 90 percent of managed workstations and printers have power management settings in place to meet NETL electronic operation and maintenance initiatives.</p>	<p>In FY 2020, 100 percent of printers and 97.33 percent of workstations had power management settings in place.</p> <p>In FY 2021, 100 percent of printers and 98.16 percent of workstations had power management settings in place.</p>
Quality Assurance and Emergency Management	
<p>Ensure implementation of safety management measures by performing R&amp;D Initial and Annual SARS assessments, conducting facility inspections, and developing AHAs, lessons learned, and tracking near misses.</p>	<p>Annual assessments were conducted on all R&amp;D projects. Facility inspections are performed on a quarterly-to-annual basis determined by building classification and usage. AHAs continue to be performed to address safety concerns for construction projects and site maintenance work. NETL is focused on improving its Lessons Learned Program to reduce risk and establish best practices.</p>
<p>Continue development and deployment of site-wide monthly safety training sessions on relevant topics via NETL's Safety Committee.</p>	<p>Monthly safety topics are published to the "Safety Corner" on the NETL intranet home page.</p>
<p>Conduct table-top and full-scale exercises to provide training and enhance NETL's response capabilities for Active Shooter, Severe Weather, and Chemical Release events.</p>	<p>Active Shooter table-top exercises were completed at the MGN and PGH sites in FY 2020; a Severe Weather/Mass Casualty table-top exercise was completed at the ALB site in FY 2020; and an Active Shooter table-top exercise was completed at the ALB site in FY 2021.</p>
<p>Acquire additional radios with interoperable radio frequencies to interface with off-site responders.</p>	<p>Additional radios with interoperable channel frequencies were acquired in FY 2020 to enhance the interface of NETL's ERO with off-site responders.</p>

## The SPR Site-Specific Initiatives for FY 2020 and Outcomes

FY 2020 SPR Site-Specific Initiative	Actions Taken and Status
<b>ESS&amp;H Programs</b>	
Develop a basic ordering agreement to enhance the Industrial Hygiene Program.	A contract was awarded to a qualified IH support services contractor and has proven to be useful, when necessary.
Update IH standard forms to ensure all relevant data from the monitoring sessions is captured.	This has been completed and fully implemented. The new forms have ensured that IH sampling data is standardized, which has provided a higher quality result.
Incorporate statistical analysis to ensure IH exposure assessment results account for the variability of potential exposure, thus ensuring robust and reliable IH decisions are made.	M&O Industrial Hygiene has implemented the American Industrial Hygiene Association's "IHSTAT" as its statistical analysis tool. The IHSTAT is an Excel-based worksheet that calculates a variety of exposure statistics that will more accurately characterize risk across the SPR. The M&O contractor demonstrated the use of this statistical method for monitoring welding exposures.
Continue making improvements to the LOTO Program, specifically to include the full implementation of the machine-specific energy control procedures.	Improvements have been made to the LOTO program by utilizing the Brady 360 software, while driving an effective auditing process leading to process improvements and efficiencies. The use of the software has reduced paperwork while ensuring accuracy of the procedures, which has resulted in zero incidents.
Improve the consistency in preparing job hazard analyses and develop effective guidelines.	This action is expected to be finalized by the end of FY 2022.
Revise the SPR environmental requirements and develop training to better communicate compliance element criteria.	This action is expected to be finalized by the end of FY 2022.
Enhance the SPR Release Estimation, Notification, and Reporting procedures.	This task has been completed.
Complete a "Process Improvement" activity that includes the SPR site participation to enhance functionality and compliance with the SPR Chemical Management Program.	A Process Improvement meeting will take place in May 2022 at the New Orleans office.
Continue training the Site Safety Specialists to the level of Industrial Hygiene Program technicians.	Site Safety Specialists continue to be trained to the level of Industrial Hygiene Program technicians. This is an ongoing effort due to attrition and the addition of eight new safety positions to support the LE2 project.

FY 2020 SPR Site-Specific Initiative	Actions Taken and Status
<b>Quality Assurance and Emergency Management</b>	
Ensure Emergency Management fully supports QA-led onsite Management Appraisals.	Emergency Management topics often require on-site presence, which was not an option due to pandemic travel restrictions. Therefore, there was no progress in this area during FY 2020; further efforts are ongoing.
Develop, plan, and deliver additional training on conducting causal analysis to ensure corrective actions are identified and issues will not recur.	This was not implemented during FYs 2020–2021.
Plan and conduct a QA workshop for all department employees to identify improvement actions from the previous year’s trending information. Identify new and upcoming process changes and procedural updates.	QA sessions were conducted with DOE personnel to instruct them on the enhancements made to the SPR’s Issues Management System. System changes were extensive, and refinements are made when the evidence suggests the system would benefit.
Enhance the response capability of the ERT.	Ongoing activity.
Research new equipment and training for the Technical Rescue Teams at all four operational sites.	Ongoing activity.
Procure two more Cascade Systems and ensure all equipment is installed.	Ongoing activity.

# APPENDIX B: FECM ES&H DATA

Safety and Health Data Table, FYs 2012–2021

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
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
2018	0.20	13.40	0.70	9
2019	0.40	23.40	0.70	12
2020	0.20	5.03	0.32	10
2021	0.40	25.03	0.64	13
<b>FYs 2019–2021 % Change</b>	<b>0%</b>	<b>7%</b>	<b>-9%</b>	<b>8%</b>
<b>10-Year % Change</b>	<b>-37%</b>	<b>-47%</b>	<b>-35%</b>	<b>18%</b>

Acronyms: DART – Days Away/Restricted or On-Job Transfer; TRC – Total Recordable Case  
 Red numbers indicate percentage increase, and green numbers indicate percentage decrease.

## Environmental Data Table, FYs 2012–2021

<b>Fiscal Year</b>	<b>Environmental Releases</b>	<b>Potable Water Intensity</b> (gallons per GSF)	<b>Energy Use Intensity</b> (Btu per GSF)	<b>Fleet Petroleum Consumption</b> (GGE)
<b>2012</b>	1	26.38	293,504	162,258
<b>2013</b>	5	16.39	235,425	67,744
<b>2014</b>	5	17.91	193,851	74,265
<b>2015</b>	3	19.24	235,097	79,222
<b>2016</b>	5	14.91	201,106	62,492
<b>2017</b>	6	16.07	227,838	58,702
<b>2018</b>	0	15.5	246,658	92,252
<b>2019</b>	2	13.5	188,976	56,424
<b>2020</b>	2	13.4	201,062	51,259
<b>2021</b>	0	13.6	176,437	56,709
<b>FYs 2019–2021 % Change</b>	<b>-100%</b>	<b>0.74%</b>	<b>-7%</b>	<b>0.51%</b>
<b>10-Year % Change</b>	<b>-100%</b>	<b>-49%</b>	<b>-40%</b>	<b>-65%</b>

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



# APPENDIX C: NETL ES&H DATA

NETL Safety & Health Data Table, FYs 2012–2021

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
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
2018	0.30	8.70	0.60	5
2019	0.29	19.48	0.36	9
2020	0.30	9.10	0.38	5
2021	0.23	26.11	0.53	5
<b>FYs 2019–2021 % Change</b>	<b>-21%</b>	<b>34%</b>	<b>47%</b>	<b>-44%</b>
<b>10-Year % Change</b>	<b>-60%</b>	<b>234%</b>	<b>-48%</b>	<b>-29%</b>

Acronyms: DART – Days Away/Restricted or On-Job Transfer; TRC – Total Recordable Case  
 Red numbers indicate percentage increase, and green numbers indicate percentage decrease.

## NETL Environmental Data Table, FYs 2012–2021

<b>Fiscal Year</b>	<b>Environmental Releases</b>	<b>Potable Water Intensity</b> (gallons per GSF)	<b>Energy Use Intensity</b> (Btu per GSF)	<b>Fleet Petroleum Consumption</b> (GGE)
<b>2012</b>	1	12.54	116,906	20,267
<b>2013</b>	3	11.66	127,883	12,192
<b>2014</b>	1	16.63	166,856	9,942
<b>2015</b>	0	14.08	153,588	8,783
<b>2016</b>	0	12.74	138,653	7,860
<b>2017</b>	0	10.21	135,927	6,082
<b>2018</b>	0	7.7	143,915	5,356
<b>2019</b>	1	10.9	148,866	7,450
<b>2020</b>	0	9.8	141,061	4,237
<b>2021</b>	0	8.7	143,429	3,932
<b>FYs 2019–2021 % Change</b>	<b>-100%</b>	<b>-20%</b>	<b>-3.7%</b>	<b>-47%</b>
<b>10-Year % Change</b>	<b>-100%</b>	<b>-31%</b>	<b>23%</b>	<b>-81%</b>

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

# APPENDIX D: SPR ES&H DATA

SPR Safety and Health Data Table, FYs 2012–2021

Fiscal Year	DART Case Rate	DART Rate	TRC Rate	Operational Occurrences
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
2018	0.20	21.5	0.80	4
2019	0.43	23.49	1.06	3
2020	0.09	0.35	0.26	5
2021	0.60	35.44	0.77	8
<b>FYs 2019–2021 % Change</b>	<b>40%</b>	<b>51%</b>	<b>-27%</b>	<b>167%</b>
<b>10-Year % Change</b>	<b>-27%</b>	<b>-69%</b>	<b>-25%</b>	<b>100%</b>

Acronyms: DART – Days Away/Restricted or On-Job Transfer; TRC – Total Recordable Case  
Red numbers indicate percentage increase, and green numbers indicate percentage decrease.

## SPR Environmental Data Table, FYs 2012–2021

<b>Fiscal Year</b>	<b>Environmental Releases</b>	<b>Potable Water Intensity</b> (gallons per GSF)	<b>Energy Use Intensity</b> (Btu per GSF)	<b>Fleet Petroleum Consumption</b> (GGE)
<b>2012</b>	1	64.50	801,429	48,468
<b>2013</b>	0	29.92	497,702	37,102
<b>2014</b>	1	21.63	272,815	52,770
<b>2015</b>	2	38.35	713,310	66,918
<b>2016</b>	5	22.97	567,121	54,632
<b>2017</b>	6	37.33	755,370	52,620
<b>2018</b>	0	39.0	835,760	86,896
<b>2019</b>	1	21.5	423,221	48,974
<b>2020</b>	2	21.7	414,916	47,022
<b>2021</b>	0	26.0	319,326	52,778
<b>FYs 2019–2021 % Change</b>	<b>-100%</b>	<b>21%</b>	<b>-25%</b>	<b>7.8%</b>
<b>10-Year % Change</b>	<b>-100%</b>	<b>-60%</b>	<b>-60%</b>	<b>8.9%</b>

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

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